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Prepared for

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APPLICATION FOR A PERMIT TO CONSTRUCT AND OPERATE A CLASS I LANDFILL

OAK HAMMOCK DISPOSAL FACILITY

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Project Number FW0400

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SECTION 1. INTRODUCTION

1.1 Terms of Reference

GeoSyntec Consultants (GeoSyntec) has prepared this permit application to construct and operate a Class I landfill known as Oak Hammock Disposal (OHD). The permit application is submitted to the Florida Department of Environmental Protection, Central Division (FDEP) on behalf of Omni Waste of Osceola County, LLC (Omni). The permit application has been prepared to comply with the requirements of Chapter 62-701 of the Florida Administrative Code (FAC). FDEP Form 62-701.900(1), Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility has been used to verify the completeness of this permit application and is included as Appendix A to this permit application.

In June 2001, Omni's request for approval of a Conditional Use/Site Development Plan to construct and operate the OHD facility was approved by the Osceola Board of County Commissioners. On 25 March 2002, Osceola County signed a 10-year contract with Omni, which requires Omni to transport the County solid waste from the County's transfer station to the OHD facility for disposal. Thus, the development of the OHD facility will serve the municipal solid waste (MSW) needs of Osceola County and will be available for use by surrounding counties.

An application for an Environmental Resources Permit (ERP) has also been prepared by GeoSyntec as a separate document and is submitted to FDEP concurrently with this Class I landfill permit application. The ERP application provides information related to environmental issues and surface water management design. The narrative portion of the ERP application is included as Appendix B to this permit application for reference.

It should be noted that this Class I landfill permit application and the ERP application are intended to support both a five-year construct and operate permit and a conceptual plan of development for build-out of the facility. FDEP approval is sought for the permit and the conceptual plan. The five-year construct and operate permit is referenced as Phase 1 and includes the layout and design of four landfill cells covering approximately 53 acres. Other principal features of Phase 1 include a leachate management system, an interim storm water management system, operations area, waste haul road, and access road. The concept plan includes layout and design of 21 landfill cells covering approximately 264 acres and includes the same principal features mentioned above, as they are planned for the final configuration of the site.

Permit drawings entitled "Oak Hammock Disposal, a Solid Waste Facility, Permit Application" are an integral part of this permit application. The permit drawings show plans, sections, and details of the proposed Class I landfill and ancillary features and are comprised of 50 sheets. These permit drawings are intended to provide sufficient detail for permit approval. Additional detail will be provided in construction drawings prepared for individual cells and other features. The construction drawings will be issued later for the purpose of bidding and will be used for construction.

The permit application was prepared under the responsible charge of Mr. Kenneth W. Cargill, P.E., of GeoSyntec. The hydrogeological investigation was performed by Kubal-Furr & Associates (KFA) under a separate contract to Omni and is presented in the report entitled "*Hydrogeologic Investigation Report and Water Quality Monitoring Plan,*" which is attached as Appendix E to this permit application. The ERP reports related to environmental considerations entitled *"Wetland Resource Impact and Mitigation Plan"* and *"Conceptual Wildlife and Habitat Management Plan"*, were prepared by Biological Research Associates (BRA) under a separate contract with Omni. These reports are attached to the ERP application as Appendices E3 and E4.

1.2 Location

The OHD site is located in eastern Osceola County, Florida, west of highway U.S. 441, approximately 6.5 miles south of Holopaw. The OHD site is located in Sections 11, 13, and 14 of Township 28 South, Range 32 East, and Sections 17 and 18 of Township 28 South, Range 33 East, Osceola County, Florida. The site location is shown in Figure 1. The main entrance of the facility is located at latitude 28° 02' 57", longitude 81° 03' 10", on highway U.S. 441. Coordinates of the main entrance are a Northing of 1350637 and an Easting of 639127 in the Florida State Plane Coordinate System. The center of the landfill footprint is located at latitude 28º 03' 32" and longitude 81º 05' 46" or a Northing of 1354222 and an Easting of 625229.

1.3 Site Description

The OHD site is currently utilized for cattle grazing and hunting. The area proposed for the development of the landfill and a part of the borrow area is an inactive sod farm. The property is generally bounded by the Gannarelli Property to the north, Bronson's, Inc. Property to the west, Clay Whaley Property to the south, and highway U.S. 441 to the east. The surrounding areas are also primarily utilized for cattle grazing and hunting.

The OHD site comprises a total of 2178.8 acres. The landfill footprint is 263.8 acres. The supporting facilities such as storm water features, leachate storage facility, buildings, and access road encompass 108.2 acres. Approximately 166 acres will be used for borrow areas. Significant portions of the remaining property will be preserved for agricultural use through a conservation easement. The proposed landfill facility will be connected to highway U.S. 441 through a 2.86-mile access road.

1.4 Purpose and Scope

This permit application has been prepared for the purpose of obtaining FDEP approval to construct and operate a Class I landfill over a five-year period and to obtain FDEP conceptual approval for a Class I landfill having a projected 30-year life. The proposed footprint of the Class I landfill is shown in Figure 2, which indicates the sequence of phases throughout the projected build-out period. The Phase 1 area will be constructed and operated under the first five-year permit, the objective of this application.

As presented in this permit application, the proposed 264-acre Class I landfill will provide available waste capacity for a period of approximately 30 years, based on an estimated average incoming waste rate of approximately 1,700 tons per day. Phase 1 will provide available waste capacity for a period greater than five years based on the incoming waste rate of 1,700 tons per day.

This permit application discusses the methodology and approach for the design, construction, operation, closure, and post-closure care of the facility. It is the intent of this permit application to address all applicable parts of the FDEP Form 62-701.900(1). Specifically, and in addition to all general requirements, this permit application provides:

- engineering report;
- hydrogeological investigation and site reports;
- geotechnical site investigation report;
- water quality and leachate monitoring plan;
- Operation Plan;
- Contingency Plan (as a part of the Operation Plan);
- technical specifications;
- Construction Quality Assurance (CQA) Plan
- landfill closure information.

Although a final cover system design is included in the permit drawings, this permit application is for construction and operation and not for closure. A separate permit application for closure will be submitted to FDEP in accordance with applicable sections of Chapter 62-701, FAC, prior to final closure construction activities being performed. A closure plan and closure report required by Section 62-701.600(3) and (4), FAC, are not submitted at this time. Details of the final cover system design to include erosion control and storm water management features are submitted with this permit application for the purpose of obtaining a permit for the conceptual design for facility build-out. It should be noted that Omni intends to construct final cover in sections of the landfill as areas are brought to final waste elevations.

1.5 Organization of the Permit Application

To address the requirements of Chapter 62-701 of the FAC, this permit application is organized as follows:

- *Section 1: Introduction*: This section provides terms of reference and site description and discusses the scope and organization of the permit application.

- *Section 2: General Information*: This section addresses applicable parts of FDEP Form 62-701.900(1) not otherwise addressed in the narrative portion of this document or in the attached appendixes.

- *Section 3: Geotechnical Design*: This section discusses site physiography and lithostratigraphy, addresses fault/seismic/unstable areas, and reports the results of analyses for bearing capacity, slope stability, and foundation settlement.

- *Section 4: Leachate Management System*: This section describes the landfill double-composite liner, leachate collection, leachate transmission, and leachate storage systems.

- *Section 5: Landfill Gas Management*: This section describes the gas collection, gas conveyance, and gas control and disposal systems.

- *Section 6: Landfill Closure*: This section discusses the closure design, closure procedures, closure schedule, closure operations, long-term care, and financial responsibilities.

The following appendices are attached to this permit application.

- *Appendix A: FDEP Form 62.701.900(1)*
- *Appendix B: Application for an Environmental Resources Permit* (narrative only)
- *Appendix C: Site Ownership*
- *Appendix D: Public Notification*
- *Appendix E: Hydrogeologic Investigation Report and Water Quality Monitoring Plan*
- *Appendix F: Geotechnical Investigation Report*
- *Appendix G: Bearing Capacity Analysis*
- *Appendix H: Slope Stability Analysis*
- *Appendix I: Settlement Analysis*
- *Appendix J: Stability of Final Cover System*
- *Appendix K: Leachate Management System*
- *Appendix L*: *Gas Management System*
- *Appendix M: Final Cover System Performance Evaluation*
- *Appendix N: Water Quality and Leachate Monitoring Plan*
- *Appendix O: Operation Plan*
- *Appendix P: Technical Specifications*
- *Appendix Q: Construction Quality Assurance (CQA) Plan*
- *Appendix R: FDEP Form 62-701.900(28)*

SECTION 2. GENERAL INFORMATION

2.1 Purpose

The purpose of this section is to present and address landfill permit general requirements of Chapter 62-701, FAC, not specifically addressed in other sections or appendices of this permit application. This section is specifically organized to provide information keyed to applicable parts of FDEP Form 62-701.900(1) for the Oak Hammock Disposal (OHD) facility

2.2 Prohibitions

Information required by Section 62-701.300, FAC is presented below. This information responds to Parts D-1 through D-11 of Form 62-701.900(1).

The OHD facility satisfies siting criteria requirements. No solid waste will be placed:

- in an area where geological formations or other subsurface features will not provide adequate support (stability of the landfill is discussed in detail in Section 3 of this permit application);
- within 1,000 feet of any existing or approved potable water well;
- in dewatered pits;
- in a natural or artificial body of water;
- in an area subject to frequent and periodic flooding except where flood protection measures are in place;
- within 200 feet of a wetland (or body of water) except where the facility is designed with permanent leachate control methods, which will result in compliance with water quality standards and criteria (the leachate management system is described in detail in Section 4 of this permit application); or
- on the right of way of any public highway, road, or alley.

The exemptions stated in Sections 62-701.300(12) through (16), FAC, are not applicable to the OHD facility because:

- yard trash storage areas will meet all siting criteria;

- no indoor or vehicle storage of waste will be allowed; and
- there are no existing facilities at the site.

Other Class 1 landfill prohibitions will be enforced at the OHD facility. Specifically:

- no open burning of solid waste will be allowed;
- no hazardous waste will be accepted for disposal;
- no liquids or non-liquids containing polychlorinated biphenyls (PCBs) will be accepted for disposal;
- no biomedical waste will be accepted for disposal unless the biomedical waste has been properly incinerated;
- no lead-acid batteries, used oil, yard trash, white goods, or whole tires will be accepted for disposal in the landfill (however, yard trash, white goods, and whole tires will be accepted for processing, reuse, or recycling);
- no prohibited liquid waste will be accepted for disposal; and
- no prohibited commingled used oil will be accepted for disposal.

The OHD facility is not located within 3,000 feet of Class I surface waters. The nearest surface water to the landfill is the intermittent stream, Bull Creek, which is rated as a Class III surface water by FDEP.

2.3 Ownership

Documents related to ownership of the proposed landfill site are included in Appendix C of this permit application. As indicated by these documents, the property is owned by Gannarelli and Bronsons, but Omni has a legal agreement with the property owners to purchase and use the site for the purpose of permitting, constructing, and operating the OHD facility. These documents respond to Part E-10 of Form 62-701.900(1).

2.4 Public Notification

A public notice of this permit application has been published in the Osceola Sentinel. This is a newspaper of general circulation in Osceola County. A copy of this notice is included in Appendix D of this permit application. The publication of this notice responds to part E-13 of Form 62-701.900(1) and Section 62-701.320(8)(a), FAC. Notice also was sent to the Chair of the Osceola County Commission, and the state Senator and Representative serving the area where the project is located. Copies of these letters are also included in Appendix D. These notices satisfy the requirements of Rule 62-701,320(8)(b), FAC and Section 403.707(14), Florida Statutes.

2.5 Airport Safety

Information as required by Section 62-701.320(13), FAC is presented below. This information responds to Parts E-14 and F-2 of Form 62-701.900(1).

The OHD facility satisfies the siting requirements for airport safety and notification. The closest licensed and operating airport runway is Kissimmee Airport, which is approximately 26 miles from the landfill, which exceeds the minimum 10,000-foot separation requirement. It is not necessary to notify any airport, the Federal Aviation Administration, or the Florida Department of Transportation because the proposed landfill facility is not located within a six-mile radius of any licensed and operating airport runway. A vicinity map showing the location of all airports in Osceola County and the proposed landfill facility is included as Figure 1 in this permit application.

2.6 Siting

2.6.1 Overview

General criteria restrictions as described in Section 62-701.340, FAC are discussed below. This information responds to Part G of Form 62-701.900(1).

2.6.2 Floodplain

As shown in the permit drawings, the landfill is partially located within the 100-year flood plain, which has been identified on Osceola County maps received from the Osceola County GIS Department. However, as documented in the ERP application submitted concurrently with this permit application, the proposed landfill footprint and stormwater management system (including swales, dry retention basins, and wet retention basins) are a net contributor to the 100-year flood waters rather than a receptor of flood waters. Since the landfill stormwater management system has been designed to retain all runoff from the 100-year storm event, more water is taken out of the 100-year floodplain than the infringed floodplain is able to store. Therefore, compensating water storage capacity is provided and the storage capacity of the floodplain outside of the OHD facility is increased. Calculations verifying the capability of the landfill storm water management system to contain the 100-year storm event are submitted as part of the ERP application. In summary, the OHD facility will not restrict the flow of the 100-year storm event and will provide excess compensating storage.

The landfill is designed to prevent washout of solid waste in an extreme storm event. In their final configuration, the storm water management system berms defining the retention basins at the perimeter of the landfill will be constructed to an elevation more than four feet higher than the 100-year flood elevation indicated by the Osceola County maps. Additionally, the landfill cells will be constructed within a perimeter berm that is approximately 16 feet above existing site grades. The landfill liner system perimeter anchor trench will be approximately 15 feet higher than the 100-year flood elevation.

2.6.3 Horizontal Separation

The permit drawings submitted with this permit application include dimensions between the landfill liner system perimeter anchor trench, which corresponds to the toe of the proposed final cover system slope, and the property boundary. As shown on these drawings, the minimum horizontal separation between waste placed in the proposed landfill and the landfill property boundary is 130 feet, which exceeds the 100-foot setback requirement of Section 62-701.340(4)(c), FAC.

2.6.4 Screening of Landfill from Public View

Additional measures will not be needed to screen the landfill from public view. The proposed landfill facility is located approximately 1.7 miles west of highway U.S. 441, which is the closest public area. The area between the facility and highway U.S. 441 consists of the natural vegetation of central Florida, including extensive stands of trees, which screen the site activities from public view.

2.7 Landfill Information

Landfill information as required by Section 62-701.330(3)(e), FAC, is presented below. This information responds to Part F-5 of Form 62-701.900(1).

2.7.1 Estimated Population for the Service Area

The area serviced by the facility is primarily Osceola County. According to population figures available from the Osceola County Planning Department, this service area had a population of 172,493 in 2001 and the projected population for this service area in the year 2010 is about 231,500.

The OHD facility also will be available to serve surrounding counties. According to population figures available from Florida Association of Counties, the population of surrounding counties (Brevard, Indian River, Okeechobee, Orange, and Polk) was 2,062,673 in 2001.

2.7.2 Type, Source of Solid Waste , and Annual Quantity

Household trash, commercial waste, construction and demolition debris, and other waste classified as Class I waste may be disposed in the OHD landfill. The waste will be from residential communities and commercial sources.

The landfill will generally be open from Monday through Saturday (half-day on Saturday), and closed on Sundays. As such, the landfill will operate approximately 286 equivalent full days per year. The estimated average waste disposal rate for the OHD landfill is expected to be 1,700 tons/day. Therefore, the annual quantity of solid waste to be disposed in the OHD landfill is expected to be approximately 486,200 tons.

2.7.3 Anticipated Life

Based on the permit drawings presented with this permit application, the estimated volume of waste and initial cover soils that can be disposed in the OHD landfill is approximately 23.7 million cubic yards. The life of the OHD landfill is approximately 30 years, based on an average annual waste disposal rate of 474,000 tons/year, an average in-place unit weight of 1,500 pounds/cubic yard, and 20 percent of the available volume dedicated to initial cover.

2.7.4 Cover Material

On-site borrow soils will be used for initial, intermediate, and final cover applications. Available on-site borrow soils consist of materials considered suitable for all cover applications. Soils stripped from the inactive sod farm may be stockpiled for use as the final cover vegetative layer. If adequate quantities of stripped soils are not available for the final cover vegetative layer, appropriate soil will be imported from off site, or soil may be mixed with composted organic matter to meet specification requirements.

2.8 Land Use Information

2.8.1 Conformance with Local Zoning

The facility is in compliance with Osceola County's comprehensive plan and local zoning ordinances. In June 2001, Omni's request for approval of a Conditional Use / Site

Development Plan to construct and operate the OHD facility was approved by the Osceola Board of County Commissioners.

2.8.2 Neighboring Land Use

The site is bounded by the Gannarelli property to the north, Bronson Inc.'s property to the west, Clay Whaley's property to the south, and highway U.S. 441 to the east as shown in the permit drawings, Sheet 3 of 50. According to Osceola County zoning maps, areas adjacent to the proposed OHD landfill are zoned as Agricultural Development and Conservation District, AC District. Review of the Osceola County Future Land Use Maps indicates that the future land use for areas with a one-mile radius of the proposed landfill are also zoned as AC. Thus, the neighboring land uses are compatible with Omni's proposed project. Further, Omni has worked closely with these property owners to ensure that the project's impacts are minimized. Consequently, these property owners do not object to Omni's project.

SECTION 3. GEOTECHNICAL DESIGN

3.1 Overview

Information and analyses presented in this section are based on findings from both the hydrogeological and geotechnical investigations required by Section 62-701.410, FAC. As previously stated, the hydrogeological investigation was performed by KFA under a separate contract with Omni and is included as Appendix E to this permit application. The geotechnical investigation was performed by GeoSyntec and is reported in Appendix F to this permit application. The geotechnical investigation was conducted to characterize the underlying soils and to define the engineering properties of the soils, and to conduct the foundation analyses for the landfill. Information provided by both the hydrogeological investigation and the geotechnical investigation was used in performing the geotechnical design for the Oak Hammock Disposal (OHD) landfill.

The remainder of this section presents:

- the general physiography and lithostratigraphy at the site;
- a site evaluation of fault areas, seismic impact zones, and unstable areas;
- a discussion of the bearing capacity and slope stability analyses; and
- a discussion of the settlement analysis of the subgrade.

3.2 Physiography and Lithostratigraphy

The OHD site is located in relatively flat terrain, which is gently sloping to the east and south at approximately one to two feet per mile. The OHD site is within the Osceola Low, which is east of the Ocala Platform, west of the Brevard Platform, and north of the Okeechobee Basin. The Osceola Low is part of the Osceola Plain, which is a physiographic feature in the central to mid-peninsular physiographic zone of Florida. Within the area of the landfill footprint, existing ground elevations range between approximately 80 feet and 82 feet above the National Geodetic Vertical Datum of 1929 (NGVD29).

A generalized lithostratigraphy of the site from the ground surface to basement rock consists of:

- Undifferentiated Pleistocene to Recent deposits consisting of :
    - silty sand/sand sublayers (approximately 55 to 65 feet thick);
    - clayey sand/sandy clay/sandy, shelly clay sublayers (approximately 10 to 20 feet thick);
    - shell hash/shelly sand (approximately 5 to 20 feet thick); and
    - interbedded silty sand/clayey sand/shelly, silty sand sublayers (approximately 50 to 75-ft thick);
- Miocene deposits of the Hawthorn Group (approximately 145 feet thick) consisting of:
    - Peace River formation; and
    - Arcadia formation; and
- Ocala Group (basement rock).

A surface-water feature near the landfill footprint is Bull Creek, which passes north and east of the proposed landfill and crosses the OHD property southeast of the landfill. A minimum setback of 490 feet between the edge of waste and the centerline of Bull Creek has been maintained in the landfill design. Existing surface drainage on and in the vicinity of the landfill footprint is generally sheetflow or through shallow man-made ditches. Sheetflow is controlled by the surficial silty sand layer. Based on an evaluation of information presented by the hydrogeological investigation, the average wet season groundwater table has been assumed at elevation 79 feet NGVD or about 1 foot below the existing ground surface, whichever is higher for the purposes of storm-water management system design. The low seasonal groundwater is estimated to be up to approximately 36 inches below ground surface.

3.3 Site Evaluation

The site has been evaluated with respect to fault areas, seismic impact zones, and unstable areas as described in 40 Code of Federal Regulations (CFR) §258.13, §258.14, and §258.15, respectively, in accordance with Section 62-701.410(2)(c), FAC. Based on the hydrogeological investigation performed by KFA (Appendix E), there are no Holocene faults within 200 feet of the proposed OHD landfill, and the proposed OHD landfill is not within a seismic impact zone.

Unstable areas, as defined by 40 CFR §258.15, include areas with poor foundation conditions, areas susceptible to mass movements, and karst terrains. The proposed facility is not located in an unstable area. As documented by the geotechnical investigation, the foundation conditions at the facility are good, primarily consisting of medium density sands underlain by soils of the Hawthorn Group. This conclusion is supported by the bearing capacity analysis presented later in this section, which indicates a factor of safety greater than 9.5 with respect to the bearing capacity failure. Areas susceptible to mass movement are areas of landslides, avalanches, debris slides and flows, block sliding, and rock fall. The site of the proposed OHD landfill is relatively flat, providing virtually no opportunity for mass movement. The results of the slope stability analyses presented later in this section indicate that construction of the proposed landfill would not cause instability at the site. Therefore, the facility is not in an area susceptible to mass movements. Based on borings from the hydrogeological and geotechnical investigations (Appendices E and F), the facility is not located in an area of karst terrain. Therefore, the site is located in an area that is not susceptible to sinkholes.

The area of the proposed landfill footprint is generally located on an inactive sod farm. The top layer of soil at the site contains some organic matter, which will be removed prior to construction of the landfill. There are limited wetland areas present in the footprint of the proposed landfill. In these areas, the excavation of soft organic soils will be performed to deeper competent ground, as required. No other indications of the presence of muck, previously filled areas, or soft ground were noted during the geotechnical investigation.

3.4 Stability Parameters

3.4.1 Landfill Description

The maximum height of the proposed landfill is approximately 98 feet above the existing ground elevation. The side slopes and top slopes will be 4H:1V and 5 percent, respectively. The components of the proposed landfill include, from top to bottom, final cover system, compacted waste, double-composite liner system, select subgrade, and subgrade. The proposed landfill is encompassed by a 16-foot high perimeter berm constructed of general fill.

The components of the liner system include, from top to bottom, 2 feet of the liner protective layer, primary drainage geocomposite, primary 60-mil high-density polyethylene (HDPE) geomembrane, primary geosynthetic clay liner (GCL), secondary drainage geocomposite, secondary 60-mil HDPE geomembrane, and secondary GCL.

3.4.2 Geotechnical Material Properties

A discussion of the geotechnical material properties used in the geotechnical evaluation of the proposed landfill is presented in Appendix F, (*Geotechnical*

Investigation Report). A summary of the principal geotechnical material properties is presented in the paragraphs below.

The soil components of the final cover system have a unit weight of approximately 120 lb/ft^3. The shear strength properties of the final cover system is characterized with an effective friction angle of 35º and an effective adhesion influence of zero. The properties of individual components of the final cover system do not influence the bearing capacity, global slope stability, and settlement analyses discussed in this section of the permit application. The geotechnical evaluation of the final cover system is presented in Section 6.

Disposed waste will be compacted municipal solid waste (MSW). The unit weight of MSW varies linearly with depth from 41 lb/ft^3 (at the surface) to 67 lb/ft^3 (at 115 ft deep). The unit weight of MSW varies asymptotically with depth from 67 lb/ft^3 (at 115 ft deep) to 83 lb/ft^3 (at great depth). The average unit weight of MSW is 55 lb/ft^3. The shear strength properties of MSW are characterized by a bi-linear Mohr-Coulomb envelope. The shear strength has a constant value of 500 lb/ft^2 in the normal stress range between 0 and 625 lb/ft^2. An effective friction angle of 33º characterizes the shear strength for normal stresses greater than 625 lb/ft^2.

The unit weight of the soil components of the double-composite liner system is between 110 lb/ft^3 and 120 lb/ft^3. The shear strength property of the double-composite liner system is best characterized by the weakest effective interface shear strength between the layers of the liner system. The double-composite liner system has the following interfaces:

- liner protective layer and geocomposite drainage layer;
- geocomposite drainage layer and 60-mil textured HDPE geomembrane;
- 60-mil textured HDPE geomembrane and GCL;
- GCL and geocomposite drainage layer; and
- GCL and select subgrade.

As required by the *Technical Specifications* presented as Appendix P, the average effective interface shear strength envelope of the interfaces between differing materials will exceed that characterized by an effective friction angle of 10º and an effective adhesion of zero when tested according to ASTM D 5321 or D 6243 at confining stresses of 50, 125, and 200 pounds per square inch.

The unit weight of subgrade and subsurface soils is approximately 115 lb/ft^3. Based on geotechnical evaluation of subgrade and subsurface soils, the shear strength is characterized by an effective friction angle, which varies between 25º and 35º.

The magnitude of landfill foundation settlement depends on the deformational characteristics of the subgrade and subsurface soils. The deformational property of coarse-grained soils is characterized by the elastic modulus. Elastic modulus of coarse-grained soils was estimated using empirical relationship available in the literature and results of the geotechnical investigation. A detailed description of the elastic modulus relationship used in this permit application is presented in Appendix F. The deformational property of fine-grained soils is characterized by their compression index. A modified compression index equal to 0.1 is used in this permit application.

3.5 Bearing Capacity and Slope Stability Analyses

3.5.1 General

The landfill slopes and overall waste mass of the proposed OHD landfill are stable both during the active life of the landfill and following closure of the landfill as required by Section 62-701.410(2)(3), FAC. The landfill perimeter berm will be constructed with side slopes inclined at 3 horizontal to 1 vertical (3H:1V) on the exterior of the perimeter berm and 4H:1V on the interior of the perimeter berm. Interior berms between cells will be constructed at maximum 3H:1V slopes. During active waste filling operations, a maximum waste slope of 3H:1V will be maintained on all interior waste slopes. All exterior (i.e., at the landfill perimeter) waste slopes and the final cover side slopes of the landfill cells will be inclined at 4H:1V. The results of bearing capacity and slope stability analyses for both the active life of the landfill and the post-closure condition are presented in this section.

3.5.2 Bearing Capacity

The capacity of the landfill foundation is related to the magnitude of load and the size of the loaded area. Generally, bearing capacity is not an issue for structures such as landfills where the size of the loaded area relative to magnitude of loads is large. A detailed bearing capacity analysis is presented in the calculation package entitled "*Bearing Capacity Analysis*" attached as Appendix G to this permit application. As shown in the calculation package, the foundation will not fail in a bearing capacity failure mode and has a bearing capacity factor of safety greater than 8.0. For bearing capacity, a factor of safety of 2.0 to 2.5 normally is considered adequate. This factor of safety was calculated using very conservative assumptions as discussed in Appendix G.

3.5.3 Slope Stability

The following potential mechanisms of instability were analyzed for the proposed OHD landfill. These cases are considered to encompass all potential deep-seated failure surfaces involving the landfill waste mass or the perimeter berm. Surficial failure surfaces in the waste mass or perimeter berm are not considered likely. The veneer stability of the final cover system is discussed in Section 6 of this permit application.

- *Case 1:* Final Configuration, Circular Shear Surfaces: In this case, circular shear surfaces that pass through the final cover system, the disposed MSW, the double-composite liner system, and the foundation soils of the proposed landfill were analyzed. A minimum acceptable factor of safety of 1.50 was established for this case.

- *Case 2*: Final Configuration, Non-Circular Shear Surfaces: In this case, non-circular shear surfaces that pass through the final cover system, the disposed MSW, and along the double-composite liner system of the proposed landfill were analyzed. A minimum acceptable factor of safety of 1.50 was established for this case.

- *Case 3*: Perimeter Berm Stability: In this case, circular shear surfaces that pass through the slope of the perimeter berm were analyzed. A minimum acceptable factor of safety of 1.50 was established for this case.

- *Case 4:* Interim Configuration: In this case, circular and non-circular shear surfaces that pass through the disposed MSW, the double-composite liner system, and the foundation soils were analyzed. This case differs from Cases 1 and 2 in that interim waste slopes of 3H:1V were considered in lieu of the final configuration. A minimum acceptable factor of safety of 1.30 was established for this case.

The detailed slope stability analyses are presented in the calculation package entitled "*Slope Stability Analyses*" attached as Appendix H to this permit application. The calculation package discusses the assumed material properties, problem geometry, and the computer-generated results for each analysis. As shown in this calculation package, the calculated factors of safety for the potential failure mechanisms described above exceed the minimum factor of safety established for each case. Specifically, a factor of safety of 1.5 was exceeded for the final configuration of the landfill and a factor of safety of 1.3 was exceeded for the interim waste slopes.

3.6 Subgrade Settlement Analysis

Both total and differential subgrade settlements have been evaluated as part of the foundation analysis in accordance with Section 62-701.410(2)(3), FAC. The results of the settlement analysis are used to evaluate the impact of anticipated settlements on the performance of the leachate collection system and the proposed liner system. The settlements are calculated using the conventional elastic deformation and consolidation theories. Detailed settlement calculations are presented in the calculation package entitled "*Settlement Analysis*" attached as Appendix I to this permit application

The calculated total settlements of the landfill liner system range from 0.2 to 2.1 feet for areas near the landfill perimeter and areas near the landfill center, respectively. Based on the calculated total settlements, final grades for components of the leachate collection system were calculated. The final grade of the:

- geonet drainage layer in the leachate collection system is between 1.5 percent and 2.0 percent (grade prior to settlement is 2.0 percent); and

- leachate collection system piping is between 0.4 percent and 1.4 percent (grade prior to settlement is between 0.5 percent and 1.5 percent).

The design calculations for the leachate management components presented in Section 4 of this permit application were performed considering the initial grades and the final grades of the landfill liner system after settlement. These design calculations confirm that the calculated settlement of the landfill liner system will have no significant effect on the performance of the leachate collection system.

In addition, the maximum tensile strain in the geomembrane component of the liner system is calculated using the estimated settlements. As discussed in the calculation package entitled "*Settlement Analysis*", the maximum tensile strain in the geomembrane is less than 2 percent. HDPE geomembranes have a maximum allowable tensile strain of about 5 percent [Berg and Bonaparte, 1992], which is significantly greater than the calculated maximum tensile strain due to settlement. Therefore, the calculated settlements should have no significant impact on the integrity of the geomembrane liner.

Based on the results of the subgrade settlement analysis, it is concluded that settlement of the subgrade should have no significant effect on the performance of the leachate collection system or on the integrity of the liner system.

SECTION 4. LEACHATE MANAGEMENT SYSTEM

4.1 Overview

4.1.1 Purpose and Scope

This section describes the leachate management system for the Oak Hammock Disposal (OHD) facility including the landfill liner and leachate control systems. The section also describes the procedures for collecting and storing the leachate from the landfill as well as maintenance and operation of the leachate management facilities as required by Chapters 62-701.400 and 62-701.500(8), FAC.

4.1.2 Organization

The remainder of this section is organized to:

- provide a description of the liner and leachate control system;
- summarize the leachate production rate analysis;
- discuss the design of the liner system;
- discuss the design of the leachate collection system;
- summarize the evaluation of liner system leakage;
- discuss the design of the leachate removal, transfer and storage systems; and
- present the leachate sampling and analysis program.

4.2 Description of the Liner and Leachate Control Systems

4.2.1 General Description

The OHD landfill is comprised of 21 cells and the footprint occupies approximately 264 acres in total plan area. The landfill will be lined with a double-composite liner system, and then capped with a geomembrane as a part of the final closure system. As shown by the descriptions and calculations provided in this section, the liner system proposed for the facility exceeds the minimum design standards in Section 62-701.400, FAC for Class I landfills.

In each cell, the liner system is sloped toward a low point located in one corner of the cell along the perimeter of the landfill. The elevation of the liner subgrade is above the seasonal high ground water level except in the sump areas. Sump construction will place the bottom of the sumps 2 to 3 feet below the upper reach of the seasonal high water level. The primary difficulty with regard to this situation is related to construction. The landfill operator will attempt to schedule construction in the sump area during periods of low groundwater. Otherwise, the sump area will be dewatered during construction. After construction, the liner system will be held in place by the weight of the liner system (2 feet of low-permeability soil), sump gravel (2-feet thick minimum), and general fill and liner protective layer above the liner system, which varies in thickness from 2 feet to 16 feet. This configuration provides a factor of safety greater than 3.5 against uplift assuming 6 feet of 100-pounds per cubic foot soil/gravel resisting a buoyant force of 3 feet of water.

Pre-settlement grading will provide a minimum 2 percent grade sloping toward the leachate collection system piping. Based on the results of the settlement analyses presented in Section 3, the post settlement grade is expected to be greater than 1.5 percent. All design calculations for the design of the primary and secondary drainage layers were based on an initial two percent gradient and a final minimum gradient of one percent in order to be conservative.

Due to the grading configuration, the majority of the cells are roughly rectangular shaped areas sloping toward one corner. This configuration results in two sides of the cell that are lower than the other sides. The liner system will be placed over the prepared subgrade to intercept leachate percolating downward through the landfill. The primary drainage layer of the liner system will collect and remove leachate that is intercepted. Leachate from the primary drainage layer enters a perforated high density polyethylene (HDPE) pipe located along the two lower sides of the cells. The purpose of these pipes is to collect leachate from the drainage layer and convey it to the leachate collection sumps. Each leachate collection pipe will be embedded in two feet of drainage gravel and will have a minimum post-settlement slope of 0.4 percent toward the sump area in each cell. It is expected that the drainage gravel will actually convey the majority of leachate collected and that the pipe will be available for any excess in the most critical situations. The primary drainage layer has been designed to satisfy the maximum 1-foot head criteria set forth in Section 62-701.400(3)(c)1, FAC.

A secondary drainage layer is installed between the primary and secondary liners. The intent of the secondary drainage layer is to collect any leachate that may possibly leak past the primary liner through manufacturing or installation defects. The secondary drainage layer is designed to limit the head on the secondary liner to less than the thickness of the drainage layer, which is a geocomposite for the OHD facility.

The sump area is divided into two hydraulically isolated areas, primary and secondary, separated by the primary composite liner. The primary sump area receives the leachate that is collected in the primary leachate collection system. The secondary sump area collects any leachate that may leak through the primary liner and is collected by the secondary drainage layer. Each sump area is initially equipped with two primary sump manholes and one secondary sump manhole. As operation experience is gained, one of the primary manholes may be removed in cells constructed later in Phase 1. No manholes will be eliminated without the concurrence of FDEP. Each sump manhole has a dedicated level-controlled sump pump to remove collected leachate from the sump.

Collected leachate is pumped from the sump into the leachate transmission line where it is conveyed to the on-site leachate storage containers. Storage containers will be either a steel tank or a flexible container system. From the on-site storage containers, leachate will be transported by truck to a wastewater treatment plant.

4.2.2 Liner System

The liner system consists of a double-composite liner. The liner system, from top to bottom, consists of:

- 2-foot thick liner protective layer;
- primary geocomposite drainage layer;
- 60-mil thick primary HDPE textured geomembrane;
- primary geosynthetic clay liner (GCL);
- secondary geocomposite drainage layer;
- 60-mil thick HDPE secondary textured geomembrane; and
- secondary GCL.

In the sump areas, the liner system is further supplemented with a 2-foot thick layer of low-permeability soil having a hydraulic conductivity less than or equal to 10^{-7} centimeters per second underlying the secondary GCL. The limits of the extent of the low-permeability soil layer are indicated on the permit drawings.

4.2.3 Leachate Collection

Leachate collected in the sumps will be pumped out using submersible leachate pumps. The pumps will be connected to a 6-inch diameter HDPE header pipe located at the top of the sump manholes. Each cell will have a dedicated header pipe. The header pipe will convey leachate pumped from both the primary and secondary sumps to the main leachate transmission pipeline. The leachate transmission pipeline will then convey leachate pumped from all of the sumps around the landfill to the leachate storage containers. The leachate transmission line will be an 8-in diameter HDPE pipe.

Each leachate sump pump will be hung from the top of the sump riser on a pump guide bar and be attached to a 3-inch HDPE or flex hose riser pipe. The riser pipes will be equipped at the top with a quick release mechanism to provide easy access to the pumps for maintenance purposes. At the top of the sump manhole, the pipe leading from each sump pump will be fitted with an isolation valve for maintenance and a check valve to prevent the backflow of leachate from other pumps. The primary and secondary sides of the header will be equipped with separate flow totalizers to record the quantity of leachate being pumped from the cell. A mechanical flow diagram detailing the piping configuration is included in the permit drawings.

An air release valve will be installed on the header pipe near the first primary sump riser on each cell. The air release valve is intended to release any air or gas that may enter into the pipeline thereby reducing the flow capacity of the pipeline.

Each cell will be equipped with three sump pumps. Two sump pumps will be dedicated to handling the primary leachate sump and the third pump will handle secondary leachate sump. Each cell will have a motor control station to control the operation of the sump pumps. These motor control stations will communicate with the main control panel. Sump pumps will be controlled by level switches located in the sump risers.

The primary sumps will be equipped with three level switches set at different elevations within the sump manhole. Under normal operation, only the lower level switch will be activated. This will send a signal to the motor control station to start one of the primary sump pumps. The motor control station will operate the primary sump pumps so that both are used in an alternating fashion. The sumps will be equipped with low-level switches that will stop the pump when the sump has been evacuated.

During periods of high leachate generation, one pump may not be sufficient to keep up with the inflow of leachate. At this point, the higher level switch will be activated. This will notify the motor control station to start the second primary leachate pump. The primary leachate pumps have been sized to handle the maximum leachate flow rate of 350 gallons per minute expected in the early operation of Cell No. 1. Cell No. 1 was chosen for pump sizing because it is the largest cell in the landfill and all pumps are to be identically sized for interchangeability. Pump sizes may be modified during the operational life of the landfill to account for operational experience.

A third level switch will also be installed in the sumps. This switch will be connected to an alarm to notify the operator in the event leachate levels in the sump reach this level. The intent of this alarm is to notify the operator of potential problems with pumps or piping.

The secondary sump will also be equipped with level switches. The first switch will start the secondary pump motor in the event leachate is detected in the secondary sump. The second switch is an alarm switch similar to the alarm switch in the primary sump. As previously discussed with FDEP, the secondary sump will be connected to the primary sump by a 3 inch HDPE pipe between the primary and secondary manholes installed at a height of 4 feet above the bottom of the sump. This pipe is intended to provide an emergency overflow from the primary sump to the secondary sump in the event of unusually high leachate flows or primary sump pump failure. If the primary sump pumps are unable to keep up with the flow of leachate into the primary sump, the overflow will allow the primary sump to overflow into the secondary sump so that the secondary sump pump can help remove leachate from the system. The operating restrictions and required records for this method of operation are discussed in the "*Operations Plan*" attached as Appendix O to this permit application.

The main control panel will monitor the number of sump pumps operating at any one time. The maximum number of pumps operating will be limited to four pumps in order to maximize pump efficiency.

Flow totalizers will be installed on the leachate collection headers at each cell. These totalizers will provide measurements of leachate volumes pumped from the leachate sumps. Separate totalizers will be installed for the primary and secondary sides of the system to monitor the quantity of leachate pumped. The volumes of leachate pumped from each cell will be recorded. At the end of each month, the monthly leachate production rate will be compared to the monthly precipitation measures in the rain gauges installed at the landfill in accordance with Section 62-701.400(8)(g), FAC. In addition, the monthly leachate production rate will also be recorded as a percentage of the monthly precipitation.

Design calculations for the piping system are included in the calculation package entitled "*Leachate Management System*" attached as Appendix K. Results of these design calculations are discussed later in this section of the permit application.

4.2.4 Leachate Storage and Transfer

Leachate from the landfill will be stored temporarily on-site in the leachate storage area. The on-site storage area was sized to contain leachate generated during an average seven-day period occurring during the maximum rainfall year as discussed in the calculation package entitled "*Leachate Management System*". Four storage containers with individual capacities of approximately 250,000 gallons will be used yielding a total on-site storage capacity of 1,000,000 gallons. Four containers were used to allow for inspection maintenance or repair of individual containers without any interruption of service. As shown in the permit drawings, these containers may be constructed of 60-mil HDPE geomembrane sheets welded together at the edges to create a large, flexible storage container. These flexible containers will provide covered storage for the collected leachate and will effectively control vector, which may be attracted to the leachate. Alternatively, a conventional steel tank, or equivalent may be used. During the initial phases of landfill construction, all leachate will be stored in flexible leachate storage containers in the interim leachate storage facility as indicated in the permit drawings. If a steel tank is used, the bottom of the steel tank will be cathodically protected using sacrificial anodes, the exterior surfaces of the tanks will be protected by a surface coating designed to prevent corrosion and deterioration, and the interior of the tank will be coated with epoxy or similar material resistant to the leachate in accordance with Section 62-701.400(6)(c)(4), FAC.

All of the leachate storage containers will be placed within a bermed area to provide secondary containment of more than 110 percent of the container's volume. The maximum fill elevation of the storage containers will be two feet below the top of the primary liner. The maximum elevation of leachate within the storage containers will be electronically monitored and alarmed to prevent overfilling. The bottom and sides of each bermed area will be lined. In the case of a steel tank, a single 60-mil HDPE geomembrane will be installed in the bermed area. In the case of the flexible storage containers, the bermed areas will be lined with two 60-mil HDPE geomembranes separated by a leak detection zone. In both cases the bottom HDPE geomembrane will be installed over a GCL. Each bermed area will be graded to drain to a sump area where rainwater can be collected and discharged or spilled leachate can be pumped back into the storage containers. Each sump will be equipped with a riser into which a submersible pump can be lowered. The leak detection zone below the flexible containers will also have a sump connected to a riser pipe for monitoring and removing leachate, as required.

Within each bermed area the liner system is sloped toward a low point located at the innermost corner of all the storage containers. The elevation of the finished grade within the bermed area is above the seasonal high ground water level, however the liner system will be at or below the seasonal high water level. The landfill operator will attempt to schedule construction of the leachate storage area during periods of low groundwater. Otherwise, the sump area will be dewatered during construction. After construction, the liner system will be held in place b the weight of the liner system, 2 to 3 feet of liner protective drainage layer. This configuration provides a factor of safety greater than 2.4 against uplift assuming 3 feet of 100 pounds per cubic foot soil/gravel resisting a buoyant force of 2 feet of water.

All of the pipelines into and out of the storage containers will be equipped with manually and automatically actuated valves. Each container will be equipped with level sensors to monitor the level of leachate contained within that container to prevent overfilling. As a container fills, when the high level switch is activated, the inlet valve will automatically close to prevent additional leachate from being pumped into that container. If the valve fails to close and leachate continues to fill the container, a high level switch will be activated that will set off an alarm and shut down all leachate sump pumps to prevent overfilling of the containers. Manual valves are provided for maintenance and emergency shut off.

Leachate container inspection requirements are discussed in the *Operations Plan* presented in Appendix O of this permit application. The exposed exterior of the containers will be inspected weekly for leaks, corrosion, maintenance deficiencies, and in the case of a steel tank adequacy of the cathodic protection system. Inspections of steel tank interiors will be performed whenever a tank is drained or at least once every three years. The overfill protection equipment will be inspected weekly to ensure it is in good working order.

If inspections reveal a leak, or any other deficiency that could result in a release of leachate, remedial measures will be taken to eliminate the leak or deficiency. Inspection records will be maintained and made available to FDEP upon request for the lifetime of the facility.

During transport truck loading, the operator will select which container(s) to empty from a main control panel at the truck-load station. All tanks will be emptied using centrifugal pumps located near the truck-load station. Two pumps are provided at this location so that a backup pump is available in the event one pump is down for maintenance or one pump fails.

Low-level switches will monitor the level of leachate in the containers and will close the pump out valve associated with that container in the event the container is drawn down below a preset level. If all pump out valves are closed, the truck loading pumps will also be shutdown.

4.2.5 <u>Leachate Collection System Maintenance</u>

The leachate collection system (LCS) includes 6-inch diameter perforated leachate collection pipes and cleanouts. The collection pipes will be cleaned and maintained, as necessary, through the side slope cleanout pipes. The leachate collection pipe cleanouts can be accessed at the top of the perimeter berms as shown in the permit drawings. Leachate collection pipes can be cleaned by flushing with high-pressure water from a hose or by snaking in the case of severe blockages.

4.3 Leachate Production Rates

4.3.1 <u>General</u>

Leachate production rates for the proposed landfill were estimated using an analytical model. Modeling of leachate production was carried out using the Hydrologic Evaluation of Landfill Performance (HELP) model, Version 3.07, developed for the U.S. Environmental Protection Agency (Schroeder et. al., EPA/600/R-94/168a and EPA/600/R-94/168b, 1994). The HELP model is a water balance calculator commonly used to estimate leachate production rates for landfills. A detailed description of the analyses and subsequent validations is included in the calculation package entitled "*Leachate Management System*", attached as Appendix K to this permit application.

4.3.2 <u>Estimated Production Rates</u>

The HELP model was used to calculate leachate production rates for three basic cases, each representative of a different stage in the development of a cell. A brief description of the results for the three basic cases is as follows:

- Case 1: This case simulates the initial stages of waste deposition. The cell is covered with 10 feet of waste and 6-inches of initial cover.

- Case 2: This case was designed to simulate the intermediate stages of deposition. The cell is covered with 30, 60 and 95 feet of waste and 6 inches of initial cover. Because of the varying depths of waste, this case was broken into three sub-cases representative of the waste thickness, 2a, 2b and 2c for 30, 60 and 95 feet, respectively.

- Case 3: This case simulated a closed cell with the full thickness of 95 feet of waste and installation of the final cover over the waste.

Each case was also analyzed for different surface slopes, 5 percent and 25 percent, corresponding to the slope of the final cover. A summary of the results of the HELP model for these cases is included in Appendix K to this permit application.

Various combinations of Cases 1 through 3 were used to simulate the landfill filling sequence. For example, during waste deposition, some cells may be closed, others waiting to be closed but with 95 feet of waste, and portions of others at intermediate points with varying depths of waste. Based on the proposed landfill filling sequence developed, the HELP model was run to estimate the most critical combination of waste depths and open area for the selected precipitation record. Selection of the precipitation record used for design is discussed in Appendix K. The combination of waste deposition identified by the HELP model predictions as the worst-case scenario for leachate generation is presented in Appendix K.

The results of the HELP model prediction were used to design the various components of the leachate collection system. The primary drainage layer is capable of handling a peak day leachate production rate of 29,000 gallons per acre. This value represents the worst-case scenario for leachate production. The design of the primary drainage layer accounted for several factors that could reduce the flow transmission capacity of the geocomposite. These factors included: weight of the surcharge above the drainage layer, a reduction in the base slope as a result of settlement of the landfill subgrade, biological fouling of the geotextile, creep deformation and chemical clogging of the geonet. A detailed description of these factors is included in Appendix K.

The leachate collection pipes, leachate sump pumps and the leachate transmission line were designed to carry the maximum average daily leachate generation for the worst-case scenario. Detailed descriptions of the calculations are presented in

Appendix K and results are discussed later in this section. The leachate storage containers were sized to store all the leachate generated in one week under a worst-case scenario presented in Appendix K without any off-site transfer of the leachate.

4.4 Liner System

4.4.1 Properties of Materials

The components of the liner system include, from top to bottom, the liner protective layer; primary drainage geocomposite, primary geomembrane, primary GCL, secondary drainage geocomposite, secondary geomembrane, and secondary GCL. A summary of the liner system material properties follows.

4.4.2 Liner Protective Layer

The liner protective layer is a 2-foot thick layer of soil having the physical and performance properties as specified in Section 02240 of the Technical Specifications attached as Appendix P to this permit application. In accordance with Section 62-701.400(3)(d)(3), FAC, the upper one-foot of the liner protective layer may consist of shredded tires in lieu of soil. The OHD facility intends to use tire chips, as available, having a size of approximately 1 inch to 2 inches.

4.4.3 Geotextile Filter Fabric

Separate geotextile filter fabrics are used primarily in the leachate collection sump areas to provide a separation between the protective cover and sump gravel and between the gravel installed around the leachate collection pipe and the liner protective layer. The specified geotextile filter fabric is a needle punched non-woven material having physical and performance properties as specified in Section 02720 of the Technical Specifications attached as Appendix P to this permit application.

4.4.4 Geocomposite Drainage Layers

4.4.4.1 Primary Drainage Layer

The material specified for the primary drainage layer consists of a geocomposite material consisting of a two or more strand polyethylene geonet core with needle punched non-woven geotextile heat laminated to each side. The geonet core is to be manufactured of HDPE and is, therefore, chemically resistant to Class I landfill leachate in accordance with Section 62-701.400(4)(a)(1), FAC. The primary geocomposite was designed to meet specific requirements for hydraulic transmissivity under a specific hydraulic gradient and compressive strength. A geocomposite will be used having physical and performance properties as specified in Section 02720 of the Technical Specifications attached as Appendix P to this permit application. The parameters specified are designed to limit the accumulated head on the liner to less than 1 foot.

Design calculations to support the selection of the specified geocomposite properties are presented in Appendix K. The specifications require appropriate laboratory testing to confirm that the selected geocomposite has the specified properties. This testing includes hydraulic transmissivity tests conducted at the design compressive stress and gradient and using the appropriate boundary conditions. (i.e. the geocomposite is tested with the adjacent materials corresponding to those used in the field). Testing the geocomposite at the design compressive stress not only provides appropriate hydraulic properties, it also confirms that the geonet has sufficient compressive strength to prevent collapse (Section 62-701.400 (4)(a)(2), FAC).

4.4.4.2 Secondary Drainage Layer

The basic physical requirements for the secondary drainage layer are the same as those for the primary drainage layer with the exception of the required transmissivity. Because the quantity of leachate expected to be carried by the secondary drainage layer is significantly less than that carried by the primary drainage layer, a lower transmissivity value is allowed for the secondary drainage layer. Design calculations to support the selection of the specified transmissivity are presented in Appendix K. A secondary drainage layer having the physical and performance properties as specified in Section 02720 of the Technical Specifications attached as Appendix Q to this permit application will be used. Testing requirements for the secondary geocomposite are the same as for the primary geocomposite

4.4.5 Primary and Secondary Liner Geomembranes

The specified geomembrane liner is a 60-mil thick HDPE geomembrane as required by Section 62-701.400(3)(b)(1), FAC. An HDPE geomembrane has the appropriate physical, chemical, and mechanical properties to be resistant to leachate in accordance with Section 62-701.400(3)(a)(1), FAC, as indicated in the following discussion.

Geomembranes used in containment facilities such as landfills are subjected to tensile stresses resulting from a variety of causes including: gravity stresses, settlement, thermal contraction, etc. Geomembranes must therefore have adequate tensile behavior. Several aspects of tensile behavior should be considered, including tensile strength and elongation. A more detailed discussion of these parameters is included in the calculation package entitled "*Settlement Analysis*" discussion attached as Appendix I to this permit application.

The design calculations presented in Appendix I of this permit application indicate that the maximum strain induced in the geomembrane due to settlement is less than 2 percent. This value is less than the typical 12 percent yield strain of HDPE geomembranes. Therefore, from the standpoint of tensile behavior, HDPE geomembranes are appropriate for use in this landfill liner system.

Since the late 1970s, extensive laboratory testing has been conducted to evaluate the chemical compatibility of several types of geomembranes with a variety of chemicals typically encountered in waste. Most of this work was sponsored by the U.S. Environmental Protection Agency (USEPA). A summary of these studies can be found in reports by Haxo et al. [1982] and Schwope et al. [1985].

This extensive chemical compatibility testing program has shown that, among all materials tested, HDPE geomembranes have the highest known degree of compatibility with almost all chemicals encountered in waste. As a result, in the past few years, there has been a tendency to automatically select HDPE geomembranes (or any of the other closely related polyethylene geomembranes) for all liner systems used with municipal solid waste. The use of HDPE geomembranes at this landfill is in agreement with the state-of-practice.

An important consideration regarding geomembrane installation is the susceptibility to low temperatures. HDPE geomembranes are not very susceptible to low temperatures. They become brittle only at temperatures below -40°F. Therefore, the use of HDPE geomembranes at this site is considered appropriate.

In selecting the thickness of an HDPE geomembrane, two installation aspects are generally considered: flexibility and seaming. These can be summarized as follows:

- Flexibility: This is a major consideration to facilitate installation and alleviate concentrated stresses. From this viewpoint, a thickness of 80 mil or less is typically recommended.

- Seaming: Because they are easily overheated, thin HDPE geomembranes can be difficult to weld. A thickness of 40 mil is the minimum typically recommended.

The 60-mil thick HDPE geomembrane provides a good balance between flexibility and seamability and is therefore appropriate for the viewpoint of installation considerations. The requirements for the geomembrane specified for this design are included as Section 02770 of the Technical Specifications, attached as Appendix P to this permit application.

4.4.6 Primary and Secondary Geosynthetic Clay Liners (GCL)

The GCL acts as the low-permeability soil component of the composite liner. The GCL is approximately 0.2 in. thick and its hydraulic conductivity is normally less than 1 x 10^{-9} cm/s, based on laboratory permeability tests. The GCL is used to provide a plugging action in the event of a liner penetration. The low permeability clay contained in the GCL is dry when installed. If a penetration occurs, the clay will absorb some of the leachate passing through the HDPE liner and will swell to seal off the penetration. The requirements for the GCL specified in this design are included as Section 02780 of the Technical Specifications attached as Appendix P to this permit application.

4.5 Leachate Collection System

4.5.1 General

This section presents a brief discussion of the results of calculations for the design of the leachate collection system. The components of the leachate collection system include the geocomposite drainage layers and the collection pipes. Each of these components must be properly designed and constructed to perform its intended function. A detailed discussion of the design calculations are provided in Appendix K.

4.5.2 Drainage Layer Design

The head of leachate directly above and in contact with the composite liner affects the rate of leakage through the composite liner. In order to minimize leakage through the composite liner, the leachate drainage layer must minimize the leachate head. Section 62-701.400 (3)(c)(1), FAC, requires that the head generated by leachate accumulation on the primary liner must be less than 1 foot. Section 62-701.400 (3)(c)(2) requires that the head on the secondary liner not exceed 1-inch or the thickness of the drainage layer. Appendix K provides the calculations prepared for design of the primary and secondary drainage layers. As shown in these calculations, the maximum head on the primary liner during the peak daily leachate production is 2.87 inches, which is less than the 12-inch regulatory maximum. The maximum head on the secondary liner under the same peak daily conditions is 0.061 inches, which is less than the 0.3-inch thickness of the secondary geocomposite drainage layer. These heads comply with regulatory requirements.

The calculated geocomposite hydraulic transmissivities of the primary and secondary drainage layers as specified in Section 02740 of Appendix O provide a greater flow capacity than the minimum hydraulic conductivity requirements for soil components described in Section 62-701.400(1)(c) and (4)(b). Since the flow capacity of the geocomposites are greater, the drainage layers proposed for the landfill cells exceed FDEP's minimum requirements.

4.5.3 <u>Leachate Collection Pipe Design</u>

4.5.3.1 General

The function of the leachate collection pipes is to assist the conveyance of the leachate collected by the primary drainage layer to the leachate sumps. Collection pipes must have adequate flow capacity to convey the leachate and adequate structural resistance to withstand the applied loads. In addition, since the collection pipes are perforated to permit the flow of leachate into the pipes, the size of the perforations must be large enough to accept the flow of leachate into the pipe without head buildup, and small enough to prevent pipe bedding material from entering the pipe. This section presents an evaluation of the flow capacity and structural stability of the leachate collection pipes.

4.5.3.2 Pipe Design Parameters

Stresses on the Pipe

Pipe stresses were evaluated for two conditions: (i) the initial condition and (ii) the post-closure condition. The initial condition assumes the stresses imparted on the pipe during construction of the landfill. This condition assumes 1 foot of soil cover and traffic loads from a truck weighing 35 tons and a wheel load of 20,000 lbs. This loading combination approximates the maximum loads expected from standard construction equipment. The final condition is the load condition present after waste has reached the maximum permit elevation and the landfill is closed. Detailed descriptions of these conditions are presented in Appendix K.

Bedding Material

The drainage gravel around the drainage pipes is a rounded silica gravel meeting the gradation requirements of ASTM D 428. Section 02235 of the Technical Specifications calls for No. 57 aggregate for the cells and No. 4 aggregate in the sump areas.

4.5.3.3 Pipe Perforation Sizing

The pipe perforations in the leachate collection pipe were sized to prevent the infiltration of the drainage gravel into the pipe. Perforation sizing is dependant upon the gradation of the gravel bedding used. The calculation package attached as Appendix K, provides a detailed description of the sizing evaluation performed for the leachate collection pipes and the sump pipes. Calculations indicate that a 1/2–inch diameter perforations are appropriate for the leachate collection pipes and 5/8-inch diameter perforations appropriate for the sump leachate pipes. Perforations at the base of the sump manholes will be 5/8-inch diameter, the same as sump pipes.

4.5.3.4 Pipe Flow Capacity

The flow capacity of the leachate collection pipes was evaluated for the average peak daily leachate flow. This flow rate was generated by the HELP Model and is based on the worst-case conditions for precipitation and waste deposition. A detailed description of the methods used and the calculations performed are included in Appendix K. The calculations indicate that 6-inch HDPE pipes will have sufficient flow capacity to handle these flows.

4.5.3.5 Pipe Structural Stability

The leachate collection pipe must be able to withstand the loads applied to it. Four pipe failure mechanisms should be considered when designing a buried plastic pipe to be structurally stable under loads including:

- wall crushing;
- wall buckling;
- excessive ring deflection; and
- bending strain.

Wall crushing can occur when the stress in the pipe wall, due to external vertical pressure, exceeds the compressive strength of the pipe material. Wall buckling, a longitudinal wrinkling in the pipe wall, can occur when the external vertical pressure exceeds the critical buckling pressure of the pipe/bedding aggregate system. Ring deflection is the change in vertical diameter of the pipe as the pipe/bedding aggregate system deforms under the external vertical pressure. The actual ring deflection of the pipe must be less than the allowable ring deflection of the pipe. When a pipe deflects under load, bending strains are induced in the pipe wall. Bending strain occurs in the pipe wall as external pressures are applied to the pipe/bedding aggregate system. HDPE pipe can be designed to resist failure by the above mechanisms using design methods presented in the technical literature (for example, see Uni-Bell [1991] and plastic pipe manufacturers' literature, such as Phillips 66 [1988 and 1991]). A detailed discussion of the conditions and design calculations are presented in the design package in Appendix K.

The potential for these pipe structural failure mechanisms have been calculated using the methods recommended by the pipe manufacturer. Based on the results of these calculations, the pipes specified meet or exceed the minimum acceptable values recommended by the pipe manufacturer. Pipe requirements are specified in Section 02715 in Appendix Q.

4.6 Leakage Evaluation

4.6.1 Purpose

The purpose of this section is to evaluate the rate of leakage through the composite liner of the landfill cells during the active life of the landfill. It is necessary to calculate the rate of leakage through the composite liner in order to verify the adequacy of the design of the liner and leachate collection system. This section presents a brief description of the methods used. Design calculations are included in Appendix K.

4.6.2 Evaluation of Leakage through the Composite Liner

The composite liner consists of a HDPE geomembrane placed on top of a GCL. Leakage through composite liners is primarily due to leakage through defects (e.g., holes) in the geomembrane [Giroud and Bonaparte, 1989]. As shown by Giroud and Bonaparte, leakage due to permeation through intact geomembranes are known to be negligible for landfills that receive MSW.

Leakage rates through composite liners are a function of many parameters, including hydraulic head, size and quantity of the holes, thickness and hydraulic conductivity of the GCL layer underlying the geomembrane, and quality of contact between the geomembrane and the underlying GCL. The evaluation for leakage through the liner was performed using the HELP model. The HELP model allows the assumption of manufacturing defects (pinholes) and installation defects during analysis.

For purposes of this evaluation the following assumptions regarding geomembrane quality control and assurance were used:

- manufacturing defects: The evaluation used two pinholes per acre with diameters of 1-mm each.

- installation defects: The evaluation used two defects per acre with areas of 1-cm^2 each.

It is assumed that the landfill cells will be constructed with high quality materials, that good construction practices will be followed, and that a very good construction quality assurance (CQA) program will be implemented. The technical specifications are presented in Appendix P and the CQA Plan is presented in Appendix Q. The assumed geomembrane defects are conservative in consideration of the required manufacturing quality control required by the technical specifications and planned CQA program

4.6.3 Conclusions

Rates of leakage through the composite liner of the landfill cells were calculated using the methods and assumptions generally accepted in liner system design practice. The calculated rate of peak leakage through the secondary liner is on the order of 0.15×10^{-3} to 0.07×10^{-3} gallons per acre per day (gpad). This leakage rate is considered negligible for all practical purposes. The maximum leakage is equivalent to spilling a few drops per acre per day or an 8-ounce cup of leachate over an acre every 400 days.

4.7 Leachate Removal and Transmission Systems

4.7.1 Introduction

The purpose of this section is to present a brief discussion of the calculations performed for the design of the leachate removal and transmissions systems. The components of the leachate removal system include the leachate sump pumps, and the associated piping. The transmission system consists of piping to convey the leachate from the sumps to the leachate storage facility.

4.7.2 Leachate Removal Pumps

Each cell is equipped with three leachate removal pumps. Two pumps are dedicated to the removal of leachate collected by the primary drainage layer system and one pump is dedicated to removing leachate collected by the secondary drainage layer. The selected sump pumps will be stainless steel submersible pumps of the type commonly used for leachate handling. The sump pumps were sized to remove the maximum average leachate generation from the worst-case cell when both primary pumps are operating. During normal leachate generation scenarios only one pump at a time will operate. Pump operation will be programmed to alternate between the two pumps so that the moving parts of both pumps will remain lubricated.

Pump selection is based on a review of pump curves provided by the pump manufacturer. Pump curves provide a graphical representation of an individual pump performance under various pumping heads. For the leachate sump pumps, a pumping capacity of at least 175 gpm per pump was necessary. Based on a review of the expected pumping head and pump capacity requirements, a 7.5 hp pump was selected. This pump will be capable of pumping at approximately 200 gpm at the expected pumping head.

4.7.3 Leachate Transmission Pipeline

The leachate transmission pipeline conveys leachate removed from the leachate sumps to the leachate storage facility. HDPE pipe was selected for the leachate transmission pipeline because of its resistance to the chemicals and compounds contained in MSW leachate. HDPE pipe also provides the additional benefits of ease of construction and maintenance, low coefficient of friction, and resistance to ultraviolet radiation. Sizing the pipeline considered the following parameters.

- Flow rate: The design flow rate was selected based on an assumption that during the construction phase of the landfill, up to four leachate collection pumps may operate simultaneously resulting in a flow rate of 800 gpm. This flow rate exceeds the calculated peak average daily leachate generation of 615 gpm and is considered appropriate based on pump sizing. The selection of four pumps operating simultaneously was based on the assumption that the active cell will require two pumps to meet the leachate generation capacity and two additional cells will require one pump each to keep up with leachate generation. The majority of cells are not expected to produce leachate at rates that will require continuous operation of the sump pumps even during worst case scenarios. Therefore, the selection of four as the number of pumps operating is considered appropriate for this design.

- Maximum sump pump pressure head (deadhead pressure): Deadhead pressure is the pressure that a pump will generate if pumping against a closed valve. Pipelines must be designed to withstand the maximum deadhead pressure. For the pumps selected, the maximum deadhead pressure was 130 ft of water column (56 psi).

- Pipe length: Friction losses in pipes are a factor of flow rate, pipe material and pipe length. In a large system such as the leachate transmission pipeline, pipe length provides the majority of friction losses generated by the system. The maximum friction losses in the pipeline were calculated to be approximately 90 ft of water column (39 psi) by the Darcy-Weisbach formula.

4.7.4 Pumps and Piping

The sizing of pumps and piping must be performed as a unit. As pipe pressure increases in an open-ended pipe, so does the velocity of the fluid in the pipe. This increase in velocity translates directly to increases in the pumping head necessary to push the fluid through the pipe. Therefore, selection of the appropriate sized pumps and pipes becomes an iterative process to develop the appropriate combination. During the initial phases of the landfill, the leachate storage facility will be located within the footprint of the future phases of the landfill as indicated in the permit drawings. During the future phases, the leachate storage area will be moved to a permanent location on the south east side of the landfill. This phased approach was originally conceived to congregate the active landfill operations in a smaller area. This approach has the added benefit that areas where the majority of leachate will be produced are closer to the leachate storage area than closed sections of the landfill where less leachate will be produced. The end result of this approach is that the pipe lengths necessary to convey leachate to the storage facility from the active cells will be shorter than if the storage area were located at the final location. This will result in lower pumping head requirements for the active cells, where the majority of leachate is greater. When the leachate storage area is moved to its permanent location, the cells in the first phases of landfill construction will have significantly reduced pumping requirements because the majority of the cells will be under final cover.

Based on a review of the leachate generation scenarios evaluated, it was estimated that up to four sump pumps may need to operate simultaneously in order to keep up with leachate production. The pumps selected are capable of pumping 200 gpm at the heads calculated in an 8-in HDPE pipeline. Therefore, the pipeline was sized for 800 gpm.

The sump pumps will all be controlled by electronic level switches. These switches will be monitored by a main motor control system located at the site. This system will monitor the number of pumps operating at anyone time and limit the maximum number to four as previously described.

Design calculations performed for the leachate pumping and transmission systems are included in the calculation package attached as Appendix K.

4.8 Leachate Sampling and Analysis

A detailed description of the leachate sampling and analysis to be carried out is provided in Appendix N. In accordance with Section 62-701.510(6)(c), leachate sampling and analysis will be performed on an annual basis. The leachate will be sampled from the primary leachate collection riser. The results will be submitted to the FDEP in accordance with Sections 62-701.500(8)(a), and 62-701.510(9).

SECTION 5. LANDFILL GAS MANAGEMENT

5.1 Introduction

This section describes the procedure and approach for gas management (extraction and monitoring) at the Oak Hammock Disposal (OHD) facility. This section also describes the design and operation of the gas extraction system and the gas monitoring plan in compliance with the Section 62-701.530, FAC. It should be noted that the landfill gas management system will be modified at the time of the air emissions permitting to account for the most current landfill configuration and waste placement status. Application for Air Permit – Title V Source (DEP form no. 62-210-900(1)) will be submitted within 180 days of issuance of the solid waste permit in accordance with the requirements of Section 62-20.800(7)(b)72. This section is intended to provide a minimum level of design suitable for the issuance of a five-year construction and operation permit and a 30-year conceptual plan for the OHD facility.

5.2 Organization

The remainder of this section is organized to:

- describe the gas extraction system; and
- describe the gas monitoring plan.

5.3 Landfill Gas Extraction System

5.3.1 Layout

The gas extraction system (GES) is designed to reduce gas pressure in the interior of the landfill; to prevent lateral migration of gases, explosions, and fires; and to effectively eliminate off-site odors. The GES consists of the vertical gas extraction wells, gas transmission pipes, and flare stations. The layout of the GES is presented in the permit drawings and in Figure 1 of the calculation package entitled "*Gas Management System*", attached as Appendix L to this permit application. As noted in Figure 1 in Appendix L, the GES consists of 105 vertical gas extraction wells, 2 transmission header pipes, and 4 flare stations.

The installation of vertical gas extraction wells at a spacing of approximately 300 feet will begin when the total quantity of waste disposed reaches approximately 2.75 million tons, in compliance with USEPA AP-42 (1998). The gas extraction wells will be installed at the indicated locations in conjunction with the construction of the final cover system. The 3-ft diameter gas extraction wells, consisting of porous backfill and 8-inch diameter perforated pipe, will penetrate the top liner as indicated on the permit drawings. The porous backfill in the gas extraction wells will extend from within 9 feet of the final cover system to a minimum of 20 feet from the liner system. A minimum distance of 20 ft will be maintained to avoid drawing air from the leachate collection system and to protect the liner system.

The top of each gas extraction well will be connected to a 4-inch diameter solid pipe through a short length of 2-inch diameter flexible pipe. Each vertical gas extraction well will be connected to an 8-inch diameter gas transmission header pipe using the 4-inch diameter solid pipe. A 12-inch diameter main pipe will be used to connect the 8-inch diameter transmission header pipe to each flare station. The top of each gas extraction well will contain a control valve and a gas monitoring port. The valve will be used to control suction pressure (corresponding to 6 inches of water column) at each extraction well. The gas monitoring port will be a quick connect type port for gas monitoring and sampling. The transmission header pipes will be sloped to include multiple low points along the header pipes to collect and dispose of gas condensate in the header pipe. A condensate trap will be provided at each low point to collect the gas condensate and dispose it back to the landfill as indicated on the permit drawings.

Four flare stations will be constructed on reinforced concrete slabs along the perimeter berm as indicated on the permit drawings. Each flare station will consist of a vapor/water separator, a condensate pump, a blower, and a flare. Flare stations will be constructed after installation of the gas extraction wells as needed to actively manage the landfill gases.

5.3.2 Gas Generation Rate

The maximum landfill gas generation rate computed using USEPA AP-42 (1998) guidelines was about 4,500 scfm (standard cubic feet per minute). The computations assume an annual waste placement rate of 480,000 tons/year and a 30-year expected life of the OHD facility. The methodology, assumptions, and detailed computations are discussed in the calculation package attached as Appendix L. The gas collection rate for the OHD facility was evaluated assuming 100% collection efficiency i.e., assuming all gas generated will be collected and extracted. Each of the four flare stations will be designed to have a minimum flow capacity of 1,125 scfm (i.e., ¼ the maximum total landfill gas generation rate).

5.3.3 Radius of Influence

The horizontal radius of influence for the vertical gas extraction wells was computed to be 156 feet, using the guidelines in USEPA AP-42 (1998). As a result, the vertical gas extraction wells will be installed at a spacing of about 300 feet. The methodology, assumptions, and detailed computations are discussed in the calculation package in Appendix L.

5.3.4 Head Loss in System

The head loss in the gas transmission system was computed by identifying the longest flow paths between the vertical gas extraction wells and the flare stations. The flow paths were approximated by dividing the number of gas extraction wells along a transmission header pipe equally between the two flare stations at either end of the header pipe. The head loss in the gas transmission system was computed from the furthest gas extraction well to the flare station along a flow path. A suction pressure corresponding to 6 inches of water column will be applied at each vertical gas extraction well. The head loss computations include this suction pressure corresponding to 6 inches of water column at the vertical gas extraction wells. The methodology, assumptions, and detailed computations are discussed in the calculation package attached as Appendix L.

The gas transmission pipes were sized such that the maximum head loss in the gas transmission system was limited to 12 inches of water column. As a result, the blowers will be designed to generate a suction pressure greater than 12 inches to account for the head losses in the fittings and additional pressure that may be needed for proper operation of the flare.

5.4 Landfill Gas Monitoring Plan

The landfill gas monitoring plan proposed for the OHD facility will allow early detection of the lateral migration of landfill gas and verification of the landfill gas management system performance in accordance with the requirements of Section 62-701.530(1) FAC. The following types of landfill gas monitoring will be performed at the site: (i) monitoring for landfill gas in on-site buildings; (ii) monitoring for landfill gas migration along the perimeter berm; and (iii) monitoring at the property boundary for objectionable odors. The following subsections provide a description of the gas monitoring that will be performed at the facility.

5.4.1 Monitoring of On-Site Buildings

The on-site buildings will be located in the entrance area of the landfill. All buildings located within 500 feet of the waste limits on the property will be routinely monitored for methane. Continuous monitoring devices used within on-site buildings will be located in work areas, near any penetrations or cracks in building foundation, or at points where methane might enter the building.

If methane is detected at a concentration greater than 25 percent of the lower explosive limit (LEL) in any on-site building, Omni will perform the activities described in Section 5.4.4.

5.4.2 Monitoring for Landfill Gas Along Perimeter Berm

Gas monitoring probes along the perimeter berm will be used to detect lateral migration of landfill gases. The perimeter gas monitoring probes will be placed at approximately 500-foot intervals along the perimeter berm. The proposed locations of the gas monitoring probes are indicated in Figure 1 in Appendix L and the permit drawings.

The perimeter gas monitoring probes will be constructed using 2-in. (51-mm) nominal diameter polyvinyl chloride (PVC) pipe. The slotted section of the perimeter gas monitoring probes will extend to a depth at least 3 feet below the seasonal low groundwater surface. The top of the probes will include gas-monitoring ports that allow for collecting representative gas samples.

The gas monitoring probes located around the perimeter of the site will be monitored quarterly for methane. Should the results of the quarterly monitoring indicate lateral migration of landfill gases, Omni will install additional gas monitoring probes at the property boundary in the area(s) of concern and perform additional monitoring. If methane is detected at a concentration greater than the LEL in the gas monitoring probes at the property boundary, Omni will perform the activities described in Section 5.4.4 below.

5.4.3 Monitoring for Objectionable Odors at the Property Boundary

Omni's on-site personnel will perform monitoring for objectionable odors at the property boundary on a regular basis. If objectionable odors are detected at the property boundary, Omni will perform the activities described in Section 5.4.4 below. It should be noted that no off-site occupied structures currently exist near the property boundary.

5.4.4 Detecting Exceedances of the Regulations

Should the results of the gas monitoring indicate that the requirements of Section 62-70.530(1) have been exceeded at the facility, Omni will:

- immediately take all necessary steps to ensure protection of human health and notify the FDEP;
- within 7 days of an observed exceedance, Omni will submit to the FDEP for approval, a plan to remediate the landfill gas migration; and
- within 60 days of an observed exceedance, Omni will complete the remediation, unless otherwise directed by FDEP.

SECTION 6. LANDFILL CLOSURE

6.1 Introduction

This section describes the methodology and approach for closure of the Oak Hammock Disposal (OHD) facility. The purpose of this section is to describe how the closure requirements of Chapter 62-701, FAC, will be met.

The remainder of this section is organized to:

- describe the closure schedule;
- describe the closure report;
- present the final cover system design;
- describe the closure operation;
- describe the closure procedures;
- present the long-term care procedures; and
- demonstrate financial responsibility.

6.2 Closure Schedule

6.2.1 Introduction

The footprint of the proposed OHD landfill will cover approximately 264 acres, with a top elevation at closure of approximately 98 ft, NGVD. The proposed landfill has a design capacity of approximately 23.7 million cubic yards. Each portion of the proposed landfill will be closed as it reaches the maximum design height on a close-as-you-go basis. The estimated life of the OHD facility is approximately 30 years, assuming an initial daily waste acceptance rate of 1,700 tons/day, waste density of 1,500 pounds/cubic yard, and 20 percent of the available volume dedicated to initial cover.

6.2.2 Notice to Appropriate Agencies

In accordance with Section 62-701.600(2)(a), FAC, at least one year prior to the projected date when waste will no longer be accepted, Omni will provide to the FDEP and the local pollution control agency (if any) a written notice with a schedule for cessation of waste acceptance and closure of the OHD facility. However, if unforeseen circumstances do not allow the one-year notification, notice will be provided as soon as the need to close the facility becomes apparent.

6.2.3 Notice to Users

In accordance with Section 62-701.600(2)(b), FAC, at least 120 days prior to the date when wastes will no longer be accepted at the landfill, Omni will advise users of the intent to close the OHD facility by posting signs at the entrance of the facility giving the date of closing, the location of alternative disposal facilities, and the name of the person responsible for closing the landfill. These signs will be maintained throughout the closing period. However, if unforeseen circumstances do not allow the 120 day notice, notice will be provided as soon as the need to close the facility becomes apparent.

6.2.4 Notice to the Public

In accordance with Section 62-701.600(2)(c), FAC, within 10 days prior to the date when wastes will no longer be accepted at the OHD facility, a notice of the intent to close the facility will be published in the legal advertising section of a newspaper of general circulation in Osceola County. Proof of publication in the newspaper will then be provided to FDEP within seven days of the publication.

6.2.5 Placement of Final Cover

The ongoing, partial closure of the landfill (i.e., close as you go) is proposed to minimize leachate generation in the landfill. Partial closure will be accomplished concurrent with waste placement in the landfill. Areas that have reached final elevations will receive the final cover system within 180 days of reaching the final elevation, or a 12-inch thick intermediate cover will be placed over the area. Based on the proposed waste fill sequence, the final cover installation on the side slopes of Cells 1 and 2 is expected to begin during waste fill sequence IV, as indicated in the permit drawings.

6.3 Closure Report

This permit application requests authorization for construction and operation of the OHD facility. A closure report will be prepared at the time a closure permit from FDEP is requested. A closure permit application will be submitted to FDEP a minimum of 180 days prior to the initiation of closure construction.

6.4 Final Cover System Design

6.4.1 Introduction

The final cover system of the OHD facility will be constructed after final waste elevations are achieved (i.e., close-as-you-go). The landfill will have side slopes graded at 4 horizontal to 1 vertical (4H:1V), and top slopes graded at 5.0 percent to maximize runoff and minimize erosion. Drainage swales will be constructed on the final cover system to collect and divert surface runoff via downdrains to the storm water dry retention basins at the toe of the landfill. This will help to minimize erosion at the surface of the final cover system. The maximum final elevation of the landfill before settlement will be 178 ft NGVD. The plans and details for the proposed final cover system are provided in the permit drawings. The various components of the final cover system are discussed in the remainder of this section.

6.4.2 Final Cover System Components

The final cover system on the top (5 percent) slopes of the landfill is indicated on the permit drawings and consists of, from top to bottom:

- a 0.5-ft thick vegetative layer;
- a 1.5-ft thick cap protective layer;
- a 40-mil thick smooth polyethylene (PE) geomembrane; and
- a 1-ft thick (minimum) intermediate cover layer over the compacted waste.

The final cover system on the 4H:1V side slopes of the landfill as indicated on the permit drawings consists of, from top to bottom:

- a 0.5-ft thick vegetative layer;

- a 1.5-ft thick cap protective layer;
- a geocomposite drainage layer;
- a 40-mil thick textured PE geomembrane; and
- a 1-ft thick (minimum) intermediate cover layer over the compacted waste.

6.4.3 Final Cover System Materials

6.4.3.1 Vegetation

The surface of the final cover system will be vegetated either by seeding or sodding. The grass seed will be Bahia, which has a high tolerance to drought. The contractor may use alternate grass seed contingent upon proof that the grass is drought-resistance. The sod will be Bahia of firm texture, having a compacted growth and good root development. The minimum requirements of the grass seed and sod are presented in the Technical Specifications attached as Appendix P.

6.4.3.2 Vegetative and Cap Protective Layers

The upper 6 inches of the final cover system will consist of loosely placed vegetative layer and will be vegetated to minimize erosion. The cap protective layer below the vegetative layer will consist of 18 inches of on-site soil (or approved equal). The cap protective layer will be compacted in the upper 6 inches during construction to inhibit root penetration into the drainage layer underlying the cap protective layer on the side slopes.

6.4.3.3 Geocomposite Drainage Layer

A geocomposite drainage layer consisting of a geotextile filter, a geonet drainage layer, and a geotextile friction layer will be placed beneath the cap protective layer on the 4H:1V side slopes. The geotextile filter, the geonet drainage layer, and the geotextile friction layer are bonded together to form the geocomposite drainage layer. The function of the proposed geotextile filter is to prevent soil particles of the overlying cap protective layer from penetrating and clogging the underlying geonet drainage layer. The purpose of the drainage layer is to remove the storm water reaching the geonet and to minimize the potential of pore water pressure build-up in the overlying cap protective layer. The purpose of the geotextile friction layer is to increase the interface friction between the geomembrane and the geonet and thereby increase the stability of the final cover system.

6.4.3.4 Geomembrane

A geomembrane is proposed as a component of the final cover system to reduce infiltration of the storm water through the final cover system into the waste. The specified geomembrane is a 40-mil thick textured polyethylene geomembrane on the 4H:1V side slopes and a smooth polyethylene geomembrane on the 5 percent top surfaces. The texturing is necessary to increase the stability of the final cover system. Specified property values for the final cover geomembrane are provided in the Technical Specifications attached as Appendix P. The specified geomembrane meets the requirements of Section 62-701.600(5)(g)(4), FAC.

6.4.4 Final Cover System Construction Procedure

The surface of the intermediate cover will be graded and compacted to prepare a smooth base for the final cover geomembrane. The geomembrane and the geocomposite drainage layer will be terminated on the perimeter berm. At the termination point, the final cover geomembrane will be welded to the primary geomembrane in the bottom liner system to seal the landfill. The geocomposite drainage layer will be terminated in the drainage gravel in the 10-ft wide drainage corridor. The details of the final cover geomembrane and the geocomposite drainage layer termination are presented in the permit drawings.

6.4.5 Final Cover System Stability

6.4.5.1 Mechanisms Analyzed

Two potential final cover system failure modes were considered: (i) sliding along a shear surface within the components of final cover system both above and below the geomembrane and (ii) global slope failure through the final cover system and a portion of the underlying waste.

6.4.5.2 Sliding Along a Failure Plane Within the Final Cover System

A potential failure surface within the final cover system on the top and the side slopes of the landfill was evaluated using the method of analysis discussed in the calculation package entitled "*Stability of Final Cover System*" in Appendix J. Based on the results of the analyses, the final cover system has a minimum factor of safety greater than 1.50. This calculated factor of safety is considered acceptable and in accordance with the state-of-practice for landfill cover systems.

6.4.5.3 Global Stability of Final Cover System

The global stability of the final cover system is discussed in calculation package entitled "*Slope Stability Analyses*". The global stability of the final cover system was evaluated using the computer program, UTEXAS, and appropriate strength parameters of the waste, cover soil, structural fill, and foundation soils. The computer program was used to calculate the minimum factor of safety against sliding along a large number of potential failure surfaces.

The results of the computer analyses indicate that the critical deep-seated failure mechanism is a sliding block-type failure involving sliding along an interface within the double-composite liner system. The minimum factor of safety calculated for this critical mechanism was 1.89. This calculated factor of safety is considered acceptable.

6.4.6 Final Cover System Settlement Analysis

The side slopes of the final cover will be graded to 4H:1V (25 percent). The top slopes will be sloped at 5.0 percent. The soil components of the final cover system act as a surcharge for the underlying waste. Under this surcharge, the waste compresses and settles. Uneven total and differential settlements of the waste may adversely affect the drainage of storm water from the 5.0 percent top slopes of the final cover system. Based on GeoSyntec's experience with similar projects, the total and differential settlements of the waste under the final cover system are not expected to be significant and adequate top slopes will maintained post-settlement to provide effective drainage of storm water from the top slopes. A detailed analysis of potential waste settlements affecting the final cover system will be prepared for submittal with the closure permit application.

6.4.7 Final Cover Drainage System Design

The final cover drainage system collects the water that percolates through the vegetative and cap protective layers overlying the final cover drainage layer and conveys the water to the drainage gravel in the 10-ft wide drainage corridor along the perimeter of the landfill footprint. The water eventually discharges to the storm water dry retention basins through the downdrain junction boxes (i.e., energy dissipaters at the downdrains from the top of the landfill). The geocomposite drainage layer consists of a geotextile filter, a geonet drainage layer, and a geotextile friction layer with the geotextiles heatbonded to the geonet. Details of the final cover drainage system are presented in the permit drawings. The of geonet drainage layer, computations for maximum hydraulic head in the geocomposite drainage layer, and the geotextile filter design are discussed in the calculation package entitled "*Final Cover System Performance Evaluation*" attached as Appendix M to this permit application.

6.4.8 Surface-Water Drainage System

Drainage swales will be incorporated in the final cover system on the top and on the side slopes of the landfill as indicated in the permit drawings. The grass-lined drainage swales on the top of the landfill will be 1.25-ft deep and will have a slope of 1 percent. These drainage swales will convey water to the drainage swale along the crest of the side slopes, which will transfer the water to the downdrains. The downdrains will convey the storm water runoff to the storm water detention basin at the toe of the landfill. The downdrains consist of 24-inch diameter corrugated HDPE pipe and an energy dissipater/junction box.

Drainage swales on the side slopes of the landfill will be incorporated in the final cover system at approximately 40 ft intervals in elevation to intercept surface-water runoff. The drainage swales will also convey the surface-water runoff to the downdrains, which will transfer the water to the storm water detention basin at the toe of the landfill. The grass-lined drainage swales on the side slopes will be 12-feet wide and 2-feet deep.

Design calculations confirming the adequacy of the drainage swales and the downdrains to convey the storm water runoff are presented in the ERP application (Appendix B) submitted concurrently with this permit application.

6.5 Financial Responsibilities

Omni will execute a financial funding mechanism for the current estimate of closure and long-term care of Phase 1 of the OHD facility prior to the acceptance of waste. A construction and operation permit for Phase 1 is requested by this permit application. To comply with the requirements of Section 62-701.630(4), FAC, Omni will submit annual adjustments to the FDEP of the cost estimates for the closure and long-term care of the landfill. Omni will also revise the cost estimate for closure and long-term-care of the landfill prior to the construction of each phase of the OHD facility. A Financial Assurance Cost Estimate Form (DEP Form #62-701.900(28)) is included with this permit application as Appendix R. A financial assurance document for these estimated costs will be provided to FDEP prior to issuance of the permit to construct and operate Phase 1.

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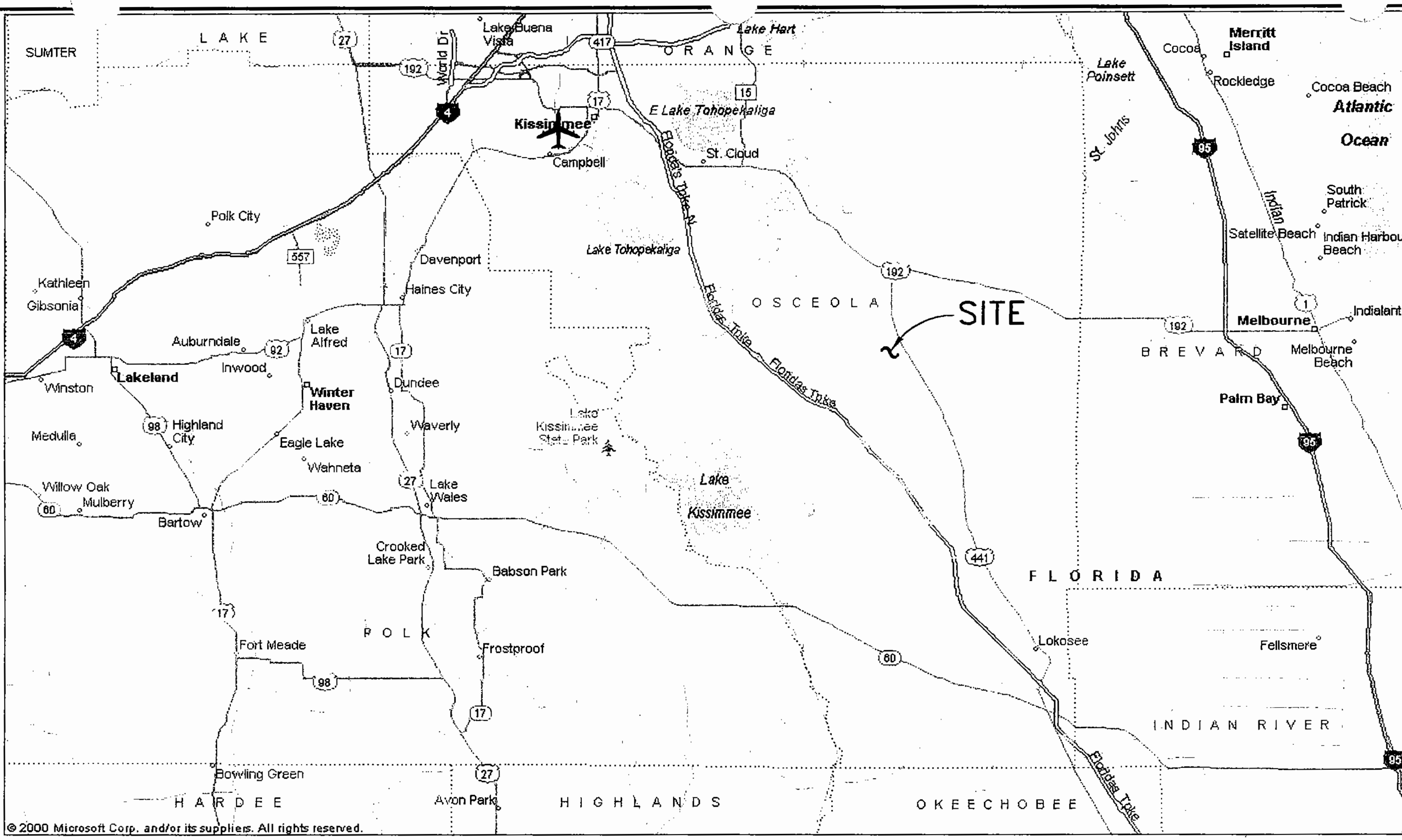

Project	OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION		
Figure Title	**LOCATION OF OHD SITE**		
Project Number: FW0400	Date: MAY 2002	File No.: 0400FA050	Figure No.: 1
Consultant / Engineer	GEOSYNTEC CONSULTANTS, 14055 RIVEREDGE DRIVE, SUITE 300 · TAMPA, FLORIDA 33637 USA, TEL: (813) 558-0990 · FAX: (813) 558-9726		

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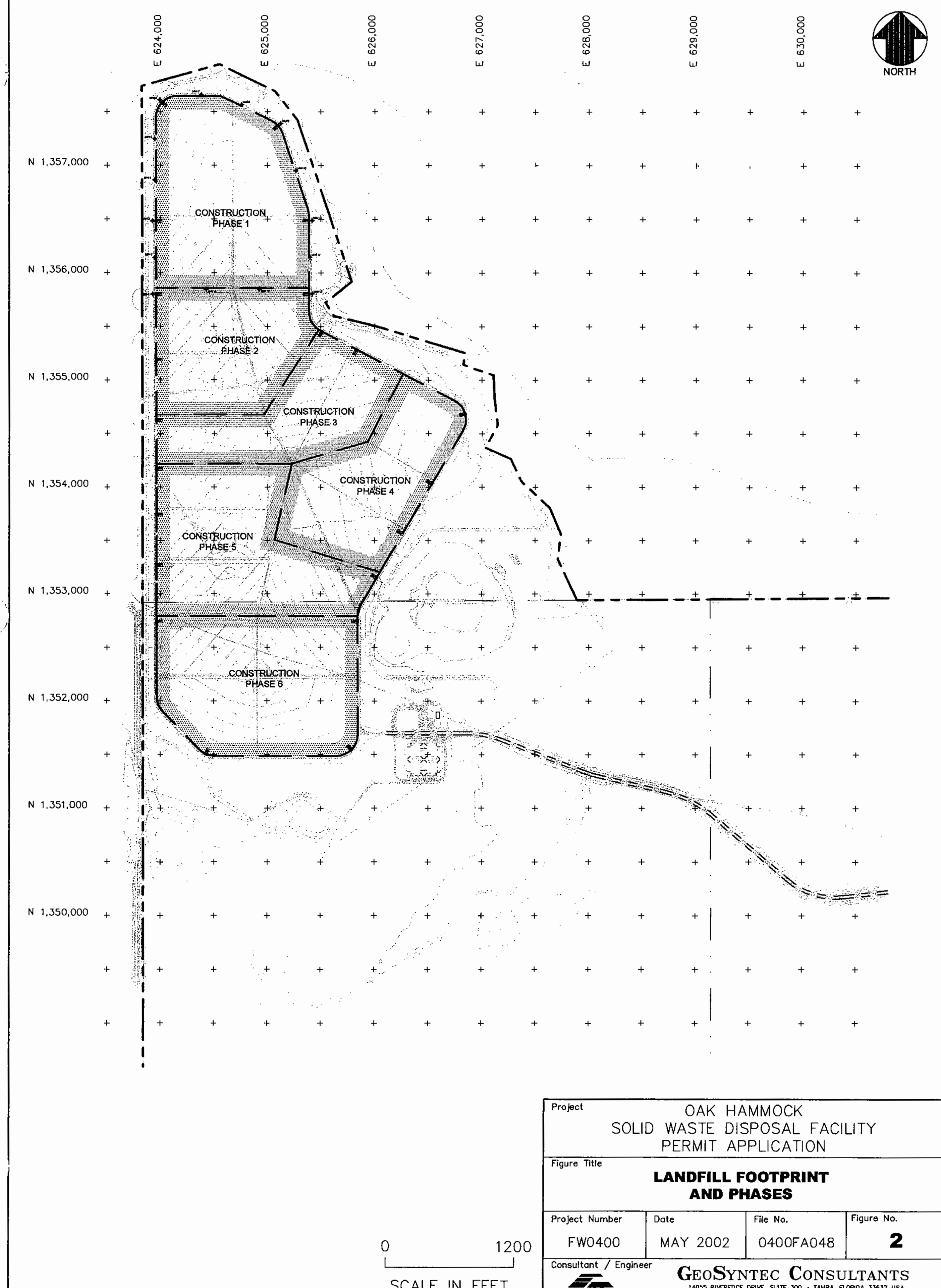

Project	OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION		
Figure Title	**LANDFILL FOOTPRINT AND PHASES**		
Project Number: FW0400	Date: MAY 2002	File No.: 0400FA048	Figure No.: **2**
Consultant / Engineer	GEOSYNTEC CONSULTANTS 14055 RIVEREDGE DRIVE, SUITE 300 · TAMPA, FLORIDA 33637 USA TEL: (813) 558-0990 · FAX: (813) 558-9726		

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Florida Department of Environmental Protection
Twin Towers Office Bldg. 2600 Blair Stone Road Tallahassee, FL 32399-2400

DEP Form # 62-701.900(1)
Form Title Solid Waste Management Facility Permit
Effective Date 05-27-01

DEP Application No. ____________
(Filled by DEP)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

APPLICATION FOR A PERMIT TO CONSTRUCT, OPERATE, MODIFY OR CLOSE A SOLID WASTE MANAGEMENT FACILITY

APPLICATION INSTRUCTIONS AND FORMS

Northwest District	Northeast District	Central District	Southwest District	South District	Southeast District
160 Governmental Center	7825 Baymeadows Way, Ste. B200	3319 Maguire Blvd., Ste. 232	3804 Coconut Palm Dr.	2295 Victoria Ave., Ste. 364	400 North Congress Ave.
Pensacola, FL 32501-5794	Jacksonville, FL 32256-7590	Orlando, FL 32803-3767	Tampa, FL 33619	Fort Myers, FL 33901-3881	West Palm Beach, FL 33401
850-595-8360	904-448-4300	407-894-7555	813-744-6100	941-332-6975	561-681-6600

INSTRUCTIONS TO APPLY FOR A SOLID WASTE MANAGEMENT FACILITY PERMIT

I. General

Solid Waste Management Facilities shall be permitted pursuant to Section 403.707, Florida Statutes,(FS) and in accordance with Florida Administrative Code (FAC) Chapter 62-701. A minimum of four copies of the application shall be submitted to the Department's District Office having jurisdiction over the facility. The appropriate fee in accordance with Rule 62-701.315, FAC, shall be submitted with the application by check made payable to the Department of Environmental Protection (DEP).

Complete appropriate sections for the type of facility for which application is made. Entries shall be typed or printed in ink. All blanks shall be filled in or marked "not applicable" or "no substantial change". Information provided in support of the application shall be marked "submitted" and the location of this information in the application package indicated. The application shall include all information, drawings, and reports necessary to evaluate the facility. Information required to complete the application is listed on the attached pages of this form.

II. Application Parts Required for Construction and Operation Permits

A. Landfills and Ash Monofills - Submit parts A,B, D through T
B. Asbestos Monofills - Submit parts A,B,D,E,F,G,J,L,N, P through S, and T
C. Industrial Solid Waste Facilities - Submit parts A,B, D through T
D. Non-Disposal Facilities - Submit parts A,C,D,E,J,N,S and T

NOTE: Portions of some parts may not be applicable.

NOTE: For facilities that have been satisfactorily constructed in accordance with their construction permit, the information required for A,B,C and D type facilities does not have to be resubmitted for an operation permit if the information has not substantially changed during the construction period. The appropriate portion of the form should be marked "no substantial change".

III. Application Parts Required for Closure Permits

A. Landfills and Ash Monofills - Submit parts A,B,M, O through T
B. Asbestos Monofills - Submit parts A,B,N, P through T
C. Industrial Solid Waste Facilities - Submit parts A,B, M through T
D. Non-Disposal Facilities - Submit parts A,C,N,S and T

NOTE: Portions of some parts may not be applicable.

IV. Permit Renewals

The above information shall be submitted at time of permit renewal in support of the new permit. However, facility information that was submitted to the Department to support the expiring permit, and which is still valid, does not need to be re-submitted for permit renewal. Portions of the application not re-submitted shall be marked "no substantial change" on the application form.

V. Application Codes

S	-	Submitted
LOCATION	-	Physical location of information in application
N/A	-	Not Applicable
N/C	-	No Substantial Change

VI. LISTING OF APPLICATION PARTS

PART A: GENERAL INFORMATION

PART B: DISPOSAL FACILITY GENERAL INFORMATION

PART C: NON-DISPOSAL FACILITY GENERAL INFORMATION

PART D: PROHIBITIONS

PART E: SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL

PART F: LANDFILL PERMIT REQUIREMENTS

PART G: GENERAL CRITERIA FOR LANDFILLS

PART H: LANDFILL CONSTRUCTION REQUIREMENTS

PART I: HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS

PART J: GEOTECHNICAL INVESTIGATION REQUIREMENTS

PART K: VERTICAL EXPANSION OF LANDFILLS

PART L: LANDFILL OPERATION REQUIREMENTS

PART M: WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS

PART N: SPECIAL WASTE HANDLING REQUIREMENTS

PART O: GAS MANAGEMENT SYSTEM REQUIREMENTS

PART P: LANDFILL CLOSURE REQUIREMENTS

PART Q: CLOSURE PROCEDURES

PART R: LONG TERM CARE REQUIREMENTS

PART S: FINANCIAL RESPONSIBILITY REQUIREMENTS

PART T: CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
APPLICATION FOR A PERMIT TO CONSTRUCT, OPERATE, MODIFY OR CLOSE
A SOLID WASTE MANAGEMENT FACILITY

Please Type or Print

A. **GENERAL INFORMATION**

1. Type of facility (check all that apply):

[X] Disposal
- [X] Class I Landfill
- [ ] Class II Landfill
- [ ] Class III Landfill
- [ ] Other Describe: ______
- [ ] Ash Monofill
- [ ] Asbestos Monofill
- [ ] Industrial Solid Waste

[ ] Non-Disposal
- [ ] Incinerator For Non-biomedical Waste
- [ ] Waste to Energy Without Power Plant Certification
- [ ] Other Describe: ______

NOTE: Waste Processing Facilities should apply on Form 62-701.900(4), FAC; Land Clearing Disposal Facilities should notify on Form 62-701.900(3), FAC; Compost Facilities should apply on Form 62-701.900(10), FAC; and C&D Disposal Facilities should apply on Form 62-701.900(6), FAC

2. Type of application:
- [ ] Construction
- [ ] Operation
- [X] Construction/Operation
- [ ] Closure

3. Classification of application:
- [X] New
- [ ] Renewal
- [ ] Substantial Modification
- [ ] Intermediate Modification
- [ ] Minor Modification

4. Facility name: OAK HAMMOCK DISPOSAL

5. DEP ID number: ______ County: OSCEOLA

6. Facility location (main entrance): APPROXIMATELY 5 MILES SOUTH OF HOLOPAW, FLORIDA ON HIGHWAY U.S. 441

7. Location coordinates:

Section: 11 & 14 Township: 28S Range: 33E

Latitude: 28 ° 03 ' 32 " Longitude: 81 ° 05 ' 46 "

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8. Applicant name (operating authority): OMNI WASTE OF OSCEOLA COUNTY, LLC

Mailing address: 100 CHURCH STREET KISSIMMEE FL 34741
Street or P.O. Box City State Zip

Contact person: TIMOTHY J. SALOPEK Telephone: (407) 957-7284

Title: PRESIDENT

tjsomni@aol.com
E-Mail address (if available)

9. Authorized agent/Consultant: GEOSYNTEC CONSULTANTS

Mailing address: 14055 RIVEREDGE DRIVE STE 300 TAMPA, FL 33637
Street or P.O. Box City State Zip

Contact person: KENNETH W. CARGILL, P.E. Telephone: (813) 558-0990

Title: PRINCIPAL AND BRANCH MANAGER

KCargill@geosyntec.com
E-Mail address (if available)

10. Landowner(if different than applicant): ______

Mailing address: ______
Street or P.O. Box City State Zip

Contact person: ______ Telephone: (___) ______

______
E-Mail address (if available)

11. Cities, towns and areas to be served: OSCEOLA COUNTY AND SURROUNDING COUNTIES

12. Population to be served:

Current: 2,000,000 (2001) Five-Year Projection: 2,456,000 (2007)

13. Date site will be ready to be inspected for completion: Est. Mar - Jun 2003

14. Expected life of the facility: 30 years

15. Estimated costs:

Total Construction: $ 15,376,577 Closing Costs: $ 4,317,562

16. Anticipated construction starting and completion dates:

From: NOVEMBER 2002 To: JANUARY 2007

17. Expected volume or weight of waste to be received:

______ yds^3/day 1,700 tons/day ______ gallons/day

B. DISPOSAL FACILITY GENERAL INFORMATION

1. Provide brief description of disposal facility design and operations planned under this application:

THIS PERMIT APPLICATION IS FOR CONSTRUCTION AND OPERATION OF A CLASS I LANDFILL KNOWN AS THE OAK HAMMOCK DISPOSAL FACILITY. UNDER THIS PERMIT, THE INITIAL LANDFILL CELLS, NO.S 1 THROUGH 4, WILL BE CONSTRUCTED AND OPERATED. A CONCEPTUAL DESIGN FOR A TOTAL OF 21 CELLS TOTALING 264 ACRES IS SUBMITTED. THE ANTICIPATED LIFE OF THE COMPLETE FACILITY IS 30 YEARS.

2. Facility site supervisor: Timothy J. Salopek

Title: President Telephone: (407) 957-7284

tjsomni@aol.com
E-Mail address (if available)

3. Disposal area: Total 264 acres; Used N/A acres; Available 264 acres.

4. Weighing scales used: [X] Yes [ ] No

5. Security to prevent unauthorized use: [X] Yes [ ] No

6. Charge for waste received: ________ $/yds^3 ________ $/ton

7. Surrounding land use, zoning:

[ ] Residential
[X] Agricultural
[ ] Commercial
[ ] Industrial
[ ] None
[ ] Other Describe: ________

8. Types of waste received:

[X] Residential
[X] Commercial
[ ] Incinerator/WTE ash
[ ] Treated biomedical
[ ] Water treatment sludge
[ ] Air treatment sludge
[ ] Agricultural
[ ] Asbestos
[ ] Other Describe: ________
[X] C & D debris
[ ] Shredded/cut tires
[ ] Yard trash
[ ] Septic tank
[ ] Industrial
[ ] Industrial sludge
[ ] Domestic sludge

9. Salvaging permitted: [ ] Yes [X] No UNLESS VOLUME OF RECYCLABLE GOODS IS SUFFICIENT FOR SEPARATION

10. Attendant: [ ] Yes [ ] No Trained operator: [X] Yes [ ] No

11. Spotters: Yes [X] No [ ] Number of spotters used: MINIMUM OF 1 PER WORKFACE

12. Site located in: [X] Floodplain [X] Wetlands [ ] Other ________

13. Property recorded as a Disposal Site in County Land Records: [X] Yes [ ] No

14. Days of operation: MONDAY THROUGH FRIDAY, HALF DAY ON SATURDAY

15. Hours of operation: TYPICAL HOURS : 7:00 a.m. - 6:00 p.m. M-F ; 8:00 a.m. - NOON SAT.

16. Days Working Face covered: Each working day.

17. Elevation of water table: 79.0 Ft. (NGVD 1929)

18. Number of monitoring wells: 45

19. Number of surface monitoring points: 4

20. Gas controls used: [X] Yes [ ] No Type controls: [X] Active [ ] Passive

Gas flaring: [X] Yes [ ] No Gas recovery: [ ] Yes [X] No

21. Landfill unit liner type:

[ ] Natural soils
[ ] Single clay liner
[ ] Single geomembrane
[ ] Single composite
[ ] Slurry wall
[ ] Other Describe: ADDITIONAL LOW-PERMEABILITY SOIL LAYER TO BE USED BENEATH SUMP AREAS.
[ ] Double geomembrane
[ ] Geomembrane & composite
[X] Double composite
[ ] None

22. Leachate collection method:

[X] Collection pipes
[X] Geonets (GEOCOMPOSITES)
[ ] Well points
[ ] Perimeter ditch
[ ] Other Describe:
[X] Sand layer
[ ] Gravel layer
[ ] Interceptor trench
[ ] None

23. Leachate storage method:

[ ] Tanks
[X] Surface impoundments WITH FLEXIBLE STORAGE CONTAINERS
[ ] Other Describe:

24. Leachate treatment method:

[ ] Oxidation
[ ] Secondary
[ ] Advanced
[X] None
[ ] Other
[ ] Chemical treatment
[ ] Settling

Revised: 28 Jun 02

25. Leachate disposal method:

[ ] Recirculated
[X] Transported to WWTP
[ ] Injection well
[ ] Evaporation
[ ] Other ______________________________

[ ] Pumped to WWTP
[ ] Discharged to surface water
[ ] Percolation ponds

26. For leachate discharged to surface waters:

Name and Class of receiving water: N/A

27. Storm Water:

Collected: [X] Yes [ ] No

Type of treatment: DRY AND WET RETENTION FOR LANDFILL AND DRY RETENTION FOR ACCESS ROAD

Name and Class of receiving water: BULL CREEK, CLASS III

28. Environmental Resources Permit (ERP) number or status: ERP APPLICATION SUBMITTED CONCURRENTLY WITH THIS APPLICATION.

DEP FORM 62-701.900(1)
Effective 05-27-01

C. NON-DISPOSAL FACILITY GENERAL INFORMATION

1. Provide brief description of the non-disposal facility design and operations planned under this application:

____

____

____

____

2. Facility site supervisor: ______________________

Title: ______________ Telephone: (___) ______________

____
E-Mail address (if available)

3. Site area: Facility ________ acres; Property ________ acres

4. Security to prevent unauthorized use: [ ] Yes [ ] No

5. Site located in: [ ] Floodplain [ ] Wetlands [ ] Other ____________

6. Days of operation: ______________________

7. Hours of operation: ______________________

8. Number of operating staff: ______________

9. Expected useful life: ________ Years

10. Weighing scales used: [ ] Yes [ ] No

11. Normal processing rate: ________ yd^3/day ________ tons/day ________ gal/day

12. Maximum processing rate: ________ yd^3/day ________ tons/day ________ gal/day

13. Charge for waste received: ______________________

14. Storm Water Collected: [ ] Yes [ ] No

Type of treatment: ______________________

Name and Class of receiving water: ______________________

15. Environmental Resources Permit (ERP) number or status: ______________

____

16. Final residue produced:

________ % of normal processing rate ________ % of maximum processing rate

________ Tons/day ________ Tons/day

Disposed of at:

Facility name: ______________________ County: ______________

17. Estimated operating costs: $ ________________

Total cost/ton: $ ______________________ Net cost/ton: $ ______________________

18. Provide a site plan, at a scale not greater than 200 feet to the inch, which shows the facility location and identifies the proposed waste and final residue storage areas, total acreage of the site, and any other features which are relevant to the prohibitions or location restrictions in Rule 62-701.300, FAC, such as water bodies or wetlands on or within 200 feet of the site, and potable water wells on or within 500 feet of the site.

19. Provide a description of how the waste and final residue will be managed to not be expected to cause violations of the Department's ground water, surface water or air standards or criteria

20. Provide an estimate of the maximum amount of waste and final residue that will be store on-site.

21. Provide a detailed description of the technology use at the facility and the functions of all processing equipment that will be utilized. The descriptions shall explain the flow of waste and residue through all the proposed unit operations and shall include: (1) regular facility operations as they are expected to occur; (2) procedures for start up operations, and scheduled and unscheduled shut down operations; (3) potential safety hazards and control methods, including fire detection and control; (4) a description of any expected air emissions and wastewater discharges from the facility which may be potential pollution sources; (5) a description and usage rate of any chemical or biological additives that will be used in the process; and (6) process flow diagrams for the facility operations.

22. Provide a description of the loading, unloading and processing areas.

23. Provide a description of the leachate control system that will be used to prevent discharge of leachate to the environment and mixing of leachate with stormwater. Note: Ground water monitoring may be required for the facility depending on the method of leachate control used.

24. Provide an operation plan for the facility which includes: (1) a description of general facility operations, the number of personnel responsible for the operations including their respective job descriptions, and the types of equipment that will be used at the facility; (2) procedures to ensure any unauthorized wastes received at the site will be properly managed; (3) a contingency plan to cover operation interruptions and emergencies such as fires, explosions, or natural disasters; (4) procedures to ensure operational records needed for the facility will be adequately prepared and maintained; and (5) procedures to ensure that the wastes and final residue will be managed to not be expected to cause pollution.

25. Provide a closure plan that describes the procedures that will be implemented when the facility closes including: (1) estimated time to complete closure; (2) procedures for removing and properly managing or disposing of all wastes and final residues; (3) notification of the Department upon ceasing operations and completion of final closure.

D. **PROHIBITIONS** (62-701.300, FAC)

S	LOCATION	N/A	N/C		
X	SEC. 2.2			1.	Provide documentation that each of the siting criteria will be satisfied for the facility; (62-701.300(2), FAC)
X	SEC. 2.2			2.	If the facility qualifies for any of the exemptions contained in Rules 62-701.300(12) through (16), FAC, then document this qualification(s).
X	SEC. 2.2			3.	Provide documentation that the facility will be in compliance with the burning restrictions; (62-701.300(3), FAC)
X	SEC. 2.2			4.	Provide documentation that the facility will be in compliance with the hazardous waste restrictions; (62-701.300(4), FAC)
X	SEC. 2.2			5.	Provide documentation that the facility will be in compliance with the PCB disposal restrictions; (62-701.300(5), FAC)
X	SEC. 2.2			6.	Provide documentation that the facility will be in compliance with the biomedical waste restrictions; (62-701.300(6), FAC)
X	SEC. 2.2			7.	Provide documentation that the facility will be in compliance with the Class I surface water restrictions; (62-701.300(7), FAC)
X	SEC. 2.2			8.	Provide documentation that the facility will be in compliance with the special waste for landfills restrictions; (62-701.300(8), FAC)
		X		9.	Provide documentation that the facility will be in compliance with the special waste for waste-to-energy facilities restrictions; (62-701.300(9), FAC)
X	SEC. 2.2			10.	Provide documentation that the facility will be in compliance with the liquid restrictions; (62-701.300(10), FAC)
X	SEC. 2.2			11.	Provide documentation that the facility will be in compliance with the used oil restrictions; (62-701.300(11), FAC)

E. SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL (62-701.320, FAC)

S	LOCATION	N/A	N/C		
X	ATTACHED			1.	Four copies, at minimum, of the completed application form, all supporting data and reports; (62-701.320(5)(a),FAC)
X	ATTACHED			2.	Engineering and/or professional certification (signature, date and seal) provided on the applications and all engineering plans, reports and supporting information for the application; (62-701.320(6),FAC)
X	ATTACHED			3.	A letter of transmittal to the Department; (62-701.320(7)(a),FAC)
X	ATTACHED			4.	A completed application form dated and signed by the applicant; (62-701.320(7)(b),FAC)
X	ATTACHED			5.	Permit fee specified in Rule 62-701.315, FAC in check or money order, payable to the Department; (62-701.320(7)(c),FAC)
X	ATTACHED			6.	An engineering report addressing the requirements of this rule and with the following format: a cover sheet, text printed on 8 1/2 inch by 11 inch consecutively numbered pages, a table of contents or index, the body of the report and all appendices including an operation plan, contingency plan, illustrative charts and graphs, records or logs of tests and investigations, engineering calculations; (62-701.320(7)(d),FAC)
X	APPX. O			7.	Operation Plan and Closure Plan; (62-701.320(7)(e)1,FAC)
X	APPX. O			8.	Contingency Plan; (62-701.320(7)(e)2,FAC)
				9.	Plans or drawings for the solid waste management facilities in appropriate format (including sheet size restrictions, cover sheet, legends, north arrow, horizontal and vertical scales, elevations referenced to NGVD 1929) showing; (62-702.320(7)(f),FAC)
X	PD SHT. 1			a.	A regional map or plan with the project location;
X	PD SHT. 1			b.	A vicinity map or aerial photograph no more than 1 year old;
X	PD SHT. 1			c.	A site plan showing all property boundaries certified by a registered Florida land surveyor;

S	LOCATION	N/A	N/C		PART E CONTINUED
X	PD SHTS.			d.	Other necessary details to support the engineering report.
X	SEC. 2.3 & APPX.C			10.	Documentation that the applicant either owns the property or has legal authority from the property owner to use the site; (62-701.320(7)(g),FAC)
		X		11.	For facilities owned or operated by a county, provide a description of how, if any, the facilities covered in this application will contribute to the county's achievement of the waste reduction and recycling goals contained in Section 403.706,FS; (62-701.320(7)(h),FAC)
		X		12.	Provide a history and description of any enforcement actions taken by the Department against the applicant for violations of applicable statutes, rules, orders or permit conditions relating to the operation of any solid waste management facility in this state; (62-701.320(7)(i),FAC)
X	SEC. 2.4 & APPX.D			13.	Proof of publication in a newspaper of general circulation of notice of application for a permit to construct or substantially modify a solid waste management facility; (62-702.320(8),FAC)
X	SEC. 2.5 & FIG. 1			14.	Provide a description of how the requirements for airport safety will be achieved including proof of required notices if applicable. If exempt, explain how the exemption applies; (62-701.320(13),FAC)
X	APPX. O			15.	Explain how the operator training requirements will be satisfied for the facility; (62-701.320(15), FAC)

F. LANDFILL PERMIT REQUIREMENTS (62-701.330, FAC)

S	LOCATION	N/A	N/C		
X	PD SHT. 3			1.	Vicinity map or aerial photograph no more than 1 year old and of appropriate scale showing land use and local zoning within one mile of the landfill and of sufficient scale to show all homes or other structures, water bodies, and roads other significant features of the vicinity. All significant features shall be labeled; (62-701.330(3)(a),FAC)
X	SEC. 2.5 & FIG. 1			2.	Vicinity map or aerial photograph no more than 1 year old showing all airports that are located within five miles of the proposed landfill; (62-701.330(3)(b),FAC)
				3.	Plot plan with a scale not greater than 200 feet to the inch showing; (62-701.330(3)(c),FAC)
X	PD SHT. 8,9			a.	Dimensions;
X	PD SHT. 3,24			b.	Locations of proposed and existing water quality monitoring wells;
X	PD SHT. 5,6			c.	Locations of soil borings;
X	PD SHT. 7			d.	Proposed plan of trenching or disposal areas;
X	PD SHT. 4,33,34			e.	Cross sections showing original elevations and proposed final contours which shall be included either on the plot plan or on separate sheets;
		X		f.	Any previously filled waste disposal areas;
X	PD SHT. 4,42			g.	Fencing or other measures to restrict access.
				4.	Topographic maps with a scale not greater than 200 feet to the inch with 5-foot contour intervals showing; (62-701.330(3)(d),FAC):
X	PD SHT. 8,9			a.	Proposed fill areas;
X	PD SHT. 8,9			b.	Borrow areas;
X	PD SHT. 43-47			c.	Access roads;
X	PD SHT. 33,34,36,37			d.	Grades required for proper drainage;
X	PD SHT. 27,28			e.	Cross sections of lifts;

S	LOCATION	N/A	N/C	PART F CONTINUED
		X		f. Special drainage devices if necessary;
X	PD SHT. 8,9,47			g. Fencing;
X	PD SHT. 9			h. Equipment facilities.
				5. A report on the landfill describing the following; (62-701.330(3)(e),FAC)
X	SEC. 2.7.1			a. The current and projected population and area to be served by the proposed site;
X	SEC. 2.7.2			b. The anticipated type, annual quantity, and source of solid waste, expressed in tons;
X	SEC. 2.7.3			c. The anticipated facility life;
X	SEC. 2.7.4			d. The source and type of cover material used for the landfill.
X	APPX. N			6. Provide evidence that an approved laboratory shall conduct water quality monitoring for the facility in accordance with Chapter 62-160,FAC; (62-701.330(3)(h),FAC)
X	SEC. 6.5			7. Provide a statement of how the applicant will demonstrate financial responsibility for the closing and long-term care of the landfill; (62-701.330(3)(i),FAC)

G. **GENERAL CRITERIA FOR LANDFILLS** (62-701.340,FAC)

S	LOCATION	N/A	N/C	
X	SEC. 2.6.2			1. Describe (and show on a Federal Insurance Administration flood map, if available) how the landfill or solid waste disposal unit shall not be located in the 100-year floodplain where it will restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain unless compensating storage is provided, or result in a washout of solid waste; (62-701.340(4)(b),FAC)
X	SEC. 2.6.3			2. Describe how the minimum horizontal separation between waste deposits in the landfill and the landfill property boundary shall be 100 feet, measured from the toe of the proposed final cover slope; (62-701.340(4)(c),FAC)
X	SEC. 2.6.4			3. Describe what methods shall be taken to screen the landfill from public view where such screening can practically be provided; (62-701.340(4)(d),FAC)

H. **LANDFILL CONSTRUCTION REQUIREMENTS** (62-701.400,FAC)

S	LOCATION	N/A	N/C		
X	SEC. 6.2			1.	Describe how the landfill shall be designed so that solid waste disposal units will be constructed and closed at planned intervals throughout the design period of the landfill; (62-701.400(2),FAC)
				2.	Landfill liner requirements; (62-701.400(3),FAC)
					a. General construction requirements; (62-701.400(3)(a),FAC):
X	APPX. P,Q				(1) Provide test information and documentation to ensure the liner will be constructed of materials that have appropriate physical, chemical, and mechanical properties to prevent failure;
X	APPX. F,G,I				(2) Document foundation is adequate to prevent liner failure;
X	SEC. 4.2.1				(3) Constructed so bottom liner will not be adversely impacted by fluctuations of the ground water;
X	SEC. 4.2.1				(4) Designed to resist hydrostatic uplift if bottom liner located below seasonal high ground water table;
X	SEC. 4.2.1				(5) Installed to cover all surrounding earth which could come into contact with the waste or leachate.
					b. Composite liners; (62-701.400(3)(b),FAC)
X	SEC. 4.4.5, APPX. P				(1) Upper geomembrane thickness and properties;
X	SEC. 4.5.2, APPX. K				(2) Design leachate head for primary LCRS including leachate recirculation if appropriate;
		X			(3) Design thickness in accordance with Table A and number of lifts planned for lower soil component.

S	LOCATION	N/A	N/C	PART H CONTINUED
				c. Double liners; (62-701.400(3)(c),FAC)
X	SEC. 4.5, APPX. P			(1) Upper and lower geomembrane thicknesses and properties;
X	SEC. 4.5.2, APPX. K			(2) Design leachate head for primary LCRS to limit the head to one foot above the liner;
X	APPX. P			(3) Lower geomembrane sub-base design;
X	SEC. 4.5.2			(4) Leak detection and secondary leachate collection system minimum design criteria (k $\geq$ 10 cm/sec, head on lower liner $\leq$ 1 inch, head not to exceed thickness of drainage layer);
				d. Standards for geosynthetic components; (62-701.400(3)(d),FAC)
X	APPX. P,Q			(1) Field seam test methods to ensure all field seams are at least 90 percent of the yield strength for the lining material;
X	APPX. P,Q			(2) Geomembranes to be used shall pass a continuous spark test by the manufacturer;
X	APPX. P,Q			(3) Design of 24-inch-thick protective layer above upper geomembrane liner;
X	APPX. P,Q			(4) Describe operational plans to protect the liner and leachate collection system when placing the first layer of waste above 24-inch-thick protective layer.
X	APPX. P,Q			(5) HDPE geomembranes, if used, meet the specifications in GRI GM13;
		X		(6) PVC geomembranes, if used, meet the specifications in PGI 1197;
X	ADPX. P,Q			(7) Interface shear strength testing results of the actual components which will be used in the liner system;
X	APPX. P,Q			(8) Transmissivity testing results of geonets if they are used in the liner system;
X	APPX. P,Q			(9) Hydraulic conductivity testing results of geosynthetic clay liners if they are used in the liner system;

S	LOCATION	N/A	N/C	PART H CONTINUED
				e. Geosynthetic specification requirements; (62-701.400(3)(e),FAC)
X	APPX. P,Q.			(1) Definition and qualifications of the designer, manufacturer, installer, QA consultant and laboratory, and QA program;
X	APPX. P,Q.			(2) Material specifications for geomembranes, geocomposites, geotextiles, geogrids, and geonets;
X	APPX. P,Q			(3) Manufacturing and fabrication specifications including geomembrane raw material and roll QA, fabrication personnel qualifications, seaming equipment and procedures, overlaps, trial seams, destructive and nondestructive seam testing, seam testing location, frequency, procedure, sample size and geomembrane repairs;
X	APPX. P,Q			(4) Geomembrane installation specifications including earthwork, conformance testing, geomembrane placement, installation personnel qualifications, field seaming and testing, overlapping and repairs, materials in contact with geomembrane and procedures for lining system acceptance;
X	APPX. P,Q			(5) Geotextile and geogrid specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials and any overlying materials;
X	APPX. P,Q			(6) Geonet and geocomposite specifications including handling and placement, conformance testing, stacking and joining, repair, and placement of soil materials and any overlying materials;
X	APPX. P,Q			(7) Geosynthetic clay liner specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil material and any overlying materials;
				f. Standards for soil components (62-710.400(3)(f),FAC):
X	APPX. P,Q			(1) Description of construction procedures including overexcavation and backfilling to preclude structural inconsistencies and procedures for placing and compacting soil component in layers;

S	LOCATION	N/A	N/C	PART H CONTINUED
		X		(2) Demonstration of compatibility of the soil component with actual or simulated leachate in accordance with EPA Test Method 9100 or an equivalent test method;
X	APPX. P,Q			(3) Procedures for testing in-situ soils to demonstrate they meet the specifications for soil liners;
				(4) Specifications for soil component of liner including at a minimum:
X	APPX. P,Q			(a) Allowable particle size distribution, Atterberg limits, shrinkage limit;
X	APPX. P,Q			(b) Placement moisture and dry density criteria;
		X		(c) Maximum laboratory-determined saturated hydraulic conductivity using simulated leachate;
X	APPX. P,Q			(d) Minimum thickness of soil liner;
X	APPX. P,Q			(e) Lift thickness;
X	APPX. P,Q			(f) Surface preparation (scarification);
X	APPX. P,Q			(g) Type and percentage of clay mineral within the soil component;
X	APPX. P,Q			(5) Procedures for constructing and using a field test section to document the desired saturated hydraulic conductivity and thickness can be achieved in the field.
				3. Leachate collection and removal system (LCRS); (62-701.400(4),FAC)
				a. The primary and secondary LCRS requirements; (62-701.400(4)(a),FAC)
X	SEC. 4.4.4 APPX. P			(1) Constructed of materials chemically resistant to the waste and leachate;
X	SEC. 4.4.4 APPX. P			(2) Have sufficient mechanical properties to prevent collapse under pressure;
X	SEC. 4.4.3 APPX. P			(3) Have granular material or synthetic geotextile to prevent clogging;
X	SEC. 4.2.5 APPX. D			(4) Have method for testing and cleaning clogged pipes or contingent designs for rerouting leachate around failed areas;

S	LOCATION	N/A	N/C	PART H CONTINUED
				b. Primary LCRS requirements; (62-701.400(4)(b),FAC)
X	SEC. 4.4.2 APPX. P			(1) Bottom 12 inches having hydraulic conductivity $\geq 1 \times 10^{-3}$ cm/sec;
X	SEC. 4.4.2 APPX. P			(2) Total thickness of 24 inches of material chemically resistant to the waste and leachate;
X	SEC. 4.2.1 APPX. K			(3) Bottom slope design to accomodate for predicted settlement;
X	SEC. 4.4.4 APPX. K			(4) Demonstration that synthetic drainage material, if used, is equivalent or better than granular material in chemical compatibility, flow under load and protection of geomembrane liner.
				4. Leachate recirculation; (62-701.400(5),FAC)
		X		a. Describe general procedures for recirculating leachate;
		X		b. Describe procedures for controlling leachate runoff and minimizing mixing of leachate runoff with storm water;
		X		c. Describe procedures for preventing perched water conditions and gas buildup;
		X		d. Describe alternate methods for leachate management when it cannot be recirculated due to weather or runoff conditions, surface seeps, wind-blown spray, or elevated levels of leachate head on the liner;
X	SEC. 5			e. Describe methods of gas management in accordance with Rule 62-701.530, FAC;
		X		f. If leachate irrigation is proposed, describe treatment methods and standards for leachate treatment prior to irrigation over final cover and provide documentation that irrigation does not contribute significantly to leachate generation.

S	LOCATION	N/A	N/C	PART H CONTINUED
				5. Leachate storage tanks and leachate surface impoundments; (62-701.400(6),FAC)
				a. Surface impoundment requirements; (62-701.400(6)(b),FAC)
X	SEC. 4.2.4			(1) Documentation that the design of the bottom liner will not be adversely impacted by fluctuations of the ground water;
X	SEC. 4.2.4			(2) Designed in segments to allow for inspection and repair as needed without interruption of service;
				(3) General design requirements;
X	PD, APPX. P			(a) Double liner system consisting of an upper and lower 60-mil minimum thickness geomembrane;
X				(b) Leak detection and collection system with hydraulic conductivity $\geq$ 1 cm/sec;
X	PD, APPX. P			(c) Lower geomembrane placed on subbase $\geq$ 6 inches thick with k $\leq$ $1x10^{-5}$ cm/sec or on an approved geosynthetic clay liner with k $\leq$ $1x10^{-7}$ cm/sec;
X	APPX. K			(d) Design calculation to predict potential leakage through the upper liner;
X	APPX. O			(e) Daily inspection requirements and notification and corrective action requirements if leakage rates exceed that predicted by design calculations;
		X		(4) Description of procedures to prevent uplift, if applicable;
X	SEC. 4.2.4			(5) Design calculations to demonstrate minimum two feet of freeboard will be maintained;
X	SEC. 4.2.4			(6) Procedures for controlling disease vectors and off-site odors.

S	LOCATION	N/A	N/C	PART H CONTINUED
				b. Above-ground leachate storage tanks; (62-701.400(6)(c),FAC)
X	SEC. 4.2.4			(1) Describe tank materials of construction and ensure foundation is sufficient to support tank;
X	SEC. 4.2.4			(2) Describe procedures for cathodic protection if needed for the tank;
X	SEC. 4.2.4			(3) Describe exterior painting and interior lining of the tank to protect it from the weather and the leachate stored;
X	SEC. 4.2.4			(4) Describe secondary containment design to ensure adequate capacity will be provided and compatibility of materials of construction;
X	SEC. 4.2.4			(5) Describe design to remove and dispose of stormwater from the secondary containment system;
X	SEC. 4.2.4			(6) Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling;
				(7) Inspections, corrective action and reporting requirements;
X	SEC. 4.2.4 APPX. O			(a) Overfill prevention system weekly;
X	SEC. 4.2.4 APPX. O			(b) Exposed tank exteriors weekly;
X	SEC. 4.2.4 APPX. O			(c) Tank interiors when tank is drained or at least every three years;
X	SEC. 4.2.4 APPX. O			(d) Procedures for immediate corrective action if failures detected;
X	SEC. 4.2.4 APPX. O			(e) Inspection reports available for department review.
				c. Underground leachate storage tanks; (62-701.400(6)(d),FAC)
		X		(1) Describe materials of construction;
		X		(2) A double-walled tank design system to be used with the following requirements;

S	LOCATION	N/A	N/C	PART H CONTINUED
		X		(a) Interstitial space monitoring at least weekly;
		X		(b) Corrosion protection provided for primary tank interior and external surface of outer shell;
		X		(c) Interior tank coatings compatible with stored leachate;
		X		(d) Cathodic protection inspected weekly and repaired as needed;
X	SEC. 4.2.4 APPX. O			(3) Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling and provide for weekly inspections;
X	APPX. O			(4) Inspection reports available for department review.
X	APPX. O			d. Schedule provided for routine maintenance of LCRS; (62-701.400(6)(e),FAC)
				6. Liner systems construction quality assurance (CQA); (62-701.400(7),FAC)
X	APPX. Q			a. Provide CQA Plan including:
X	APPX. Q			(1) Specifications and construction requirements for liner system;
X	APPX. Q			(2) Detailed description of quality control testing procedures and frequencies;
X	APPX. Q			(3) Identification of supervising professional engineer;
X	APPX. Q			(4) Identify responsibility and authority of all appropriate organizations and key personnel involved in the construction project;
X	APPX. Q			(5) State qualifications of CQA professional engineer and support personnel;
X	APPX. Q			(6) Description of CQA reporting forms and documents;

S	LOCATION	N/A	N/C	PART H CONTINUED
X	APPX. Q			b. An independent laboratory experienced in the testing of geosynthetics to perform required testing;
				7. Soil Liner CQA (62-701.400(8)FAC)
X	APPX. P			a. Documentation that an adequate borrow source has been located with test results or description of the field exploration and laboratory testing program to define a suitable borrow source;
X	APPX. P			b. Description of field test section construction and test methods to be implemented prior to liner installation;
X	APPX. P			c. Description of field test methods including rejection criteria and corrective measures to insure proper liner installation.
				8. Surface water management systems; (62-701.400(9),FAC)
X	APPX. B (ERP)			a. Provide a copy of a Department permit for stormwater control or documentation that no such permit is required;
X	PD 36,37			b. Design of surface water management system to isolate surface water from waste filled areas and to control stormwater run-off;
X	PD 38-41			c. Details of stormwater control design including retention ponds, detention ponds, and drainage ways;
				9. Gas control systems; (62-701.400(10),FAC)
X	SEC. 5			a. Provide documentation that if the landfill is receiving degradable wastes, it will have a gas control system complying with the requirements of Rule 62-701.530, FAC;
X	SEC. 4			10. For landfills designed in ground water, provide documentation that the landfill will provide a degree of protection equivalent to landfills designed with bottom liners not in contact with ground water; (62-701.400(11),FAC)

I. **HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS** (62-701.410(1), FAC)

S	LOCATION	N/A	N/C		
				1.	Submit a hydrogeological investigation and site report including at least the following information:
X	APPX. E			a.	Regional and site specific geology and hydrogeology;
X	APPX. E			b.	Direction and rate of ground water and surface water flow including seasonal variations;
X	APPX. E			c.	Background quality of ground water and surface water;
X	APPX. E			d.	Any on-site hydraulic connections between aquifers;
X	APPX. E			e.	Site stratigraphy and aquifer characteristics for confining layers, semi-confining layers, and all aquifers below the landfill site that may be affected by the landfill;
X	APPX. E			f.	Description of topography, soil types and surface water drainage systems;
X	APPX. E PD SHT 3			g.	Inventory of all public and private water wells within a one-mile radius of the landfill including, where available, well top of casing and bottom elevations, name of owner, age and usage of each well, stratigraphic unit screened, well construction technique and static water level;
		X		h.	Identify and locate any existing contaminated areas on the site;
X	PD SHT. 3			i.	Include a map showing the locations of all potable wells within 500 feet, and all community water suupply wells within 1000 feet, of the waste storage and disposal areas;
X	APPX. E			2.	Report signed, sealed and dated by PE or PG.

J. GEOTECHNICAL INVESTIGATION REQUIREMENTS (62-701.410(2),FAC)

S	LOCATION	N/A	N/C		
				1.	Submit a geotechnical site investigation report defining the engineering properties of the site including at least the following:
X	SEC. 3.3 APPX. E,F			a.	Description of subsurface conditions including soil stratigraphy and ground water table conditions;
X	SEC. 3.3			b.	Investigate for the presence of muck, previously filled areas, soft ground, lineaments and sink holes;
X	SEC. 3.2 APPX. E			c.	Estimates of average and maximum high water table across the site;
				d.	Foundation analysis including:
X	APPX. G			(1)	Foundation bearing capacity analysis;
X	APPX. I			(2)	Total and differential subgrade settlement analysis;
X	APPX. H			(3)	Slope stability analysis;
X	APPX. F			e.	Description of methods used in the investigation and includes soil boring logs, laboratory results, analytical calculations, cross sections, interpretations and conclusions;
X	SEC. 3.3			f.	An evaluation of fault areas, seismic impact zones, and unstable areas as described in 40 CFR 258.13, 40 CFR 258.14 and 40 CFR 258.15.
X	APPX. F			2.	Report signed, sealed and dated by PE or PG.

K. VERTICAL EXPANSION OF LANDFILLS (62-701.430,FAC)

S	LOCATION	N/A	N/C		
		X		1.	Describe how the vertical expansion shall not cause or contribute to leachate leakage from the existing landfill or adversely affect the closure design of the existing landfill;
		X		2.	Describe how the vertical expansion over unlined landfills will meet the requirements of Rule 62-701.400, FAC with the exceptions of Rule 62-701.430(1)(c),FAC;
		X		3.	Provide foundation and settlement analysis for the vertical expansion;
		X		4.	Provide total settlement calculations demonstrating that the final elevations of the lining system, that gravity drainage, and that no other component of the design will be adversely affected;
		X		5.	Minimum stability safety factor of 1.5 for the lining system component interface stability and deep stability;
		X		6.	Provide documentation to show the surface water management system will not be adversely affected by the vertical expansion;
		X		7.	Provide gas control designs to prevent accumulation of gas under the new liner for the vertical expansion.

L. LANDFILL OPERATION REQUIREMENTS (62-701.500,FAC)

X	APPX. O	___	___	1.	Provide documentation that landfill will have at least one trained operator during operation and at least one trained spotter at each working face; (62-701.500(1),FAC)
				2.	Provide a landfill operation plan including procedures for: (62-701.500(2), FAC)
X	APPX. O	___	___	a.	Designating responsible operating and maintenance personnel;
X	APPX. O	___	___	b.	Contingency operations for emergencies;
X	APPX. O	___	___	c.	Controlling types of waste received at the landfill;
X	APPX. O	___	___	d.	Weighing incoming waste;
X	APPX. O	___	___	e.	Vehicle traffic control and unloading;
X	APPX. O	___	___	f.	Method and sequence of filling waste;
X	APPX. O	___	___	g.	Waste compaction and application of cover;
X	APPX. O	___	___	h.	Operations of gas, leachate, and stormwater controls;
X	APPX. E,N	___	___	i.	Water quality monitoring.
X	APPX. O	___	___	j.	Maintaining and cleaning the leachate collection system;
X	APPX. O	___	___	3.	Provide a description of the landfill operation record to be used at the landfill; details as to location of where various operational records will be kept (i.e. FDEP permit, engineering drawings, water quality records, etc.) (62-701.500(3),FAC)
X	APPX. O	___	___	4.	Describe the waste records that will be compiled monthly and provided to the Department quarterly; (62-701.500(4),FAC)
X	APPX. O	___	___	5.	Describe methods of access control; (62-701.500(5),FAC)
X	APPX. O	___	___	6.	Describe load checking program to be implemented at the landfill to discourage disposal of unauthorized wastes at the landfill; (62-701.500(6),FAC)
				7.	Describe procedures for spreading and compacting waste at the landfill that include: (62-701.500(7),FAC)
X	APPX. O	___	___	a.	Waste layer thickness and compaction frequencies;

S	LOCATION	N/A	N/C		PART L CONTINUED
X	APPX. O			b.	Special considerations for first layer of waste placed above liner and leachate collection system;
X	APPX. O			c.	Slopes of cell working face and side grades above land surface, planned lift depths during operation;
X	APPX. O			d.	Maximum width of working face;
				e.	Description of type of initial cover to be used at the facility that controls:
X	APPX. O			(1)	Disease vector breeding/animal attraction
X	APPX. O			(2)	Fires
X	APPX. O			(3)	Odors
X	APPX. O			(4)	Blowing litter
X	APPX. O			(5)	Moisture infiltration
X	APPX. O			f.	Procedures for applying initial cover including minimum cover frequencies;
X	APPX. O			g.	Procedures for applying intermediate cover;
X	APPX. O			h.	Time frames for applying final cover;
X	APPX. O			i.	Procedures for controlling scavenging and salvaging.
X	APPX. O			j.	Description of litter policing methods;
X	APPX. O			k.	Erosion control procedures.
				8.	Describe operational procedures for leachate management including; (62-701.500(8),FAC)
X	APPX. N			a.	Leachate level monitoring, sampling, analysis and data results submitted to the Department;
X	SEC. 4.2 APPX. O,N			b.	Operation and maintenance of leachate collection and removal system, and treatment as required;
X	APPX. O			c.	Procedures for managing leachate if it becomes regulated as a hazardous waste;
X	SEC. 4.2			d.	Agreements for off-site discharge and treatment of leachate;
X	APPX. O			e.	Contingency plan for managing leachate during emergencies or equipment problems;

S	LOCATION	N/A	N/C		PART L CONTINUED
X	APPX. O			f.	Procedures for recording quantities of leachate generated in gal/day and including this in the operating record;
X	APPX. O			g.	Procedures for comparing precipitation experienced at the landfill with leachate generation rates and including this information in the operating record;
X	APPX. O			h.	Procedures for water pressure cleaning or video inspecting leachate collection systems.
X	SEC. 5			9.	Describe how the landfill receiving degradable wastes shall implement a gas management system meeting the requirements of Rule 62-701.530, FAC; (62-701.500(9),FAC)
X	APPX. B (ERP)			10.	Describe procedures for operating and maintaining the landfill stormwater management system to comply with the requirements of Rule 62-701.400(9); (62-701.500(10),FAC)
				11.	Equipment and operation feature requirements; (62-701.500(11),FAC)
X	APPX. O			a.	Sufficient equipment for excavating, spreading, compacting and covering waste;
X	APPX. O			b.	Reserve equipment or arrangements to obtain additional equipment within 24 hours of breakdown;
X	APPX. O			c.	Communications equipment;
X	APPX. O			d.	Dust control methods;
X	APPX. O			e.	Fire protection capabilities and procedures for notifying local fire department authorities in emergencies;
X	APPX. O			f.	Litter control devices;
X	APPX. O			g.	Signs indicating operating authority, traffic flow, hours of operation, disposal restrictions.
X	PD SHT 42-50			12.	Provide a description of all-weather access road, inside perimeter road and other roads necessary for access which shall be provided at the landfill; (62-701.500(12),FAC)
X	APPX. O			13.	Additional record keeping and reporting requirements; (62-701.500(13),FAC)

S	LOCATION	N/A	N/C	PART L CONTINUED	
X	ATTACHED			a.	Records used for developing permit applications and supplemental information maintained for the design period of the landfill;
		X		b.	Monitoring information, calibration and maintenance records, copies of reports required by permit maintained for at least 10 years;
		X		c.	Maintain annual estimates of the remaining life of constructed landfills and of other permitted areas not yet constructed and submit this estimate annually to the Department;
X	APPX. O			d.	Procedures for archiving and retrieving records which are more than five year old.

M. **WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS** (62-701.510, FAC)

S	LOCATION	N/A	N/C		
X	APPX. E,N			1.	Water quality and leachate monitoring plan shall be submitted describing the proposed ground water, surface water and leachate monitoring systems and shall meet at least the following requirements;
X	APPX. E,N			a.	Based on the information obtained in the hydrogeological investigation and signed, dated and sealed by the PG or PE who prepared it; (62-701.510(2)(a),FAC)
X	APPX. E,N			b.	All sampling and analysis preformed in accordance with Chapter 62-160, FAC; (62-701.510(2)(b),FAC)
				c.	Ground water monitoring requirements; (62-701.510(3),FAC)
X	APPX. E PD SHT. 24			(1)	Detection wells located downgradient from and within 50 feet of disposal units;
X	APPX. E PD SHT. 24			(2)	Downgradient compliance wells as required;
X	APPX. E PD SHT. 5,6			(3)	Background wells screened in all aquifers below the landfill that may be affected by the landfill;
X	PD SHT. 24			(4)	Location information for each monitoring well;
X	PD SHT. 24			(5)	Well spacing no greater than 500 feet apart for downgradient wells and no greater than 1500 feet apart for upgradient wells unless site specific conditions justify alternate well spacings;
X	APPX. E PD SHT. 24			(6)	Well screen locations properly selected;
X	APPX. E			(7)	Procedures for properly abandoning monitoring wells;
		X		(8)	Detailed description of detection sensors if proposed.

S	LOCATION	N/A	N/C		PART M CONTINUED
				d.	Surface water monitoring requirements; (62-701.510(4),FAC)
X	APPX. E PD SHT. 3			(1)	Location of and justification for all proposed surface water monitoring points;
X	PD SHT. 3			(2)	Each monitoring location to be marked and its position determined by a registered Florida land surveyor;
X	APPX. N			e.	Leachate sampling locations proposed; (62-701.510(5),FAC)
				f.	Initial and routine sampling frequency and requirements; (62-701.510(6),FAC)
X	APPX. E			(1)	Initial background ground water and surface water sampling and analysis requirements;
X	APPX. N			(2)	Routine leachate sampling and analysis requirements;
X	APPX. E			(3)	Routine monitoring well sampling and analysis requirements;
X	APPX. E			(4)	Routine surface water sampling and analysis requirements.
X	APPX. O			g.	Describe procedures for implementing evaluation monitoring, prevention measures and corrective action as required; (62-701.510(7),FAC)
X	APPX. N			h.	Water quality monitoring report requirements; (62-701.510(9),FAC)
X	APPX. N			(1)	Semi-annual report requirements;
X	APPX. N			(2)	Bi-annual report requirements signed, dated and sealed by PG or PE.

N. **SPECIAL WASTE HANDLING REQUIREMENTS** (62-701.520, FAC)

S	LOCATION	N/A	N/C		
X	APPX. O			1.	Describe procedures for managing motor vehicles; (62-701.520(1),FAC)
X	APPX. O			2.	Describe procedures for landfilling shredded waste; (62-701.520(2),FAC)
X	APPX. O			3.	Describe procedures for asbestos waste disposal; (62-701.520(3),FAC)
X	APPX. O			4.	Describe procedures for disposal or management of contaminated soil; (62-701.520(4), FAC)
X	SEC. 2			5.	Describe procedures for disposal of biological wastes; (62-701.520(5), FAC)

O. **GAS MANAGEMENT SYSTEM REQUIREMENTS** (62-701.530,FAC)

S	LOCATION	N/A	N/C		
				1.	Provide the design for a gas management systems that will (62-701.530(1), FAC):
X	SEC. 5.3			a.	Be designed to prevent concentrations of combustible gases from exceeding 25% the LEL in structures and 100% the LEL at the property boundary;
X	SEC. 5.3			b.	Be designed for site-specific conditions;
X	SEC. 5.3			c.	Be designed to reduce gas pressure in the interior of the landfill;
X	SEC. 5.3.1			d.	Be designed to not interfere with the liner, leachate control system or final cover.
X	SEC. 5.4			2.	Provide documentation that will describe locations, construction details and procedures for monitoring gas at ambient monitoring points and with soil monitoring probes; (62-701.530(2), FAC):
X	SEC. 5.4.4			3.	Provide documentation describing how the gas remediation plan and odor remediation plan will be implemented; (62-701.530(3), FAC):
				4.	Landfill gas recovery facilities; (62-701.530(5), FAC):
		X		a.	Information required in Rules 62-701.320(7) and 62-701.330(3), FAC supplied;
		X		b.	Information required in Rule 62-701.600(4), FAC supplied where relevant and practical;
		X		c.	Estimate of current and expected gas generation rates and description of condensate disposal methods provided;
		X		d.	Description of procedures for condensate sampling, analyzing and data reporting provided;

S	LOCATION	N/A	N/C	PART O CONTINUED
		X		e. Closure plan provided describing methods to control gas after recovery facility ceases operation and any other requirements contained in Rule 62-701.400(10), FAC;
		X		f. Performance bond provided to cover closure costs if not already included in other landfill closure costs.

P. LANDFILL FINAL CLOSURE REQUIREMENTS (62-701.600,FAC)

S	LOCATION	N/A	N/C	
				1. Closure schedule requirements; (62-701.600(2),FAC)
X	SEC. 6.2			a. Documentation that a written notice including a schedule for closure will be provided to the Department at least one year prior to final receipt of wastes;
X	SEC. 6.2			b. Notice to user requirements within 120 days of final receipt of wastes;
X	SEC. 6.2			c. Notice to public requirements within 10 days of final receipt of wastes.
				2. Closure permit general requirements; (62-701.600(3),FAC)
		X		a. Application submitted to Department at least 90 days prior to final receipt of wastes;
				b. Closure plan shall include the following:
		X		(1) Closure report;
		X		(2) Closure design plan;
		X		(3) Closure operation plan;
		X		(4) Closure procedures;
		X		(5) Plan for long term care;
		X		(6) A demonstration that proof of financial responsibility for long term care will be provided.
				3. Closure report requirements; (62-701.600(4),FAC)
				a. General information requirements;
		X		(1) Identification of landfill;

S	LOCATION	N/A	N/C	PART P CONTINUED
		X		(2) Location, description and vicinity map;
		X		(3) Total acres of disposal areas and landfill property;
		X		(4) Legal property description;
		X		(5) History of landfill;
		X		(6) Identification of types of waste disposed of at the landfill.
		X		b. Geotechnical investigation report and water quality monitoring plan required by Rule 62-701.330(3),FAC;
		X		c. Land use information report indicating: identification of adjacent landowners; zoning; present land uses; and roads, highways right-of-way, or easements.
		X		d. Report on actual or potential gas migration at landfills containing degradable wastes which would allow migration of gas off the landfill property;
		X		e. Report assessing the effectiveness of the landfill design and operation including results of geotechnical investigations, surface water and storm water management, gas migration and concentrations, condition of existing cover, and nature of waste disposed of at the landfill;
				4. Closure design requirements to be included in the closure design plan: (62-701.600(5),FAC)
		X		a. Plan sheet showing phases of site closing;
		X		b. Drawings showing existing topography and proposed final grades;
		X		c. Provisions to close units when they reach approved design dimensions;
		X		d. Final elevations before settlement;
		X		e. Side slope design including benches, terraces, down slope drainage ways, energy dissipators and discussion of expected precipitation effects;
				f. Final cover installation plans including:
		X		(1) CQA plan for installing and testing final cover;

S	LOCATION	N/A	N/C	PART P CONTINUED
		X		(2) Schedule for installing final cover after final receipt of waste;
		X		(3) Description of drought-resistant species to be used in the vegetative cover;
		X		(4) Top gradient design to maximize runoff and minimize erosion;
		X		(5) Provisions for cover material to be used for final cover maintenance.
				g. Final cover design requirements:
X	SEC. 6.4.3			(1) Protective soil layer design;
		X		(2) Barrier soil layer design;
X	SEC. 6.4.3			(3) Erosion control vegetation;
X	SEC. 6.4.3			(4) Geomembrane barrier layer design;
		X		(5) Geosynthetic clay liner design if used;
X	SEC. 6.4.4			(6) Stability analysis of the cover system and the disposed waste.
X	SEC. 6.4.6 SEC. 6.4.7			h. Proposed method of stormwater control;
X	SEC. 6.4			i. Proposed method of access control;
		X		j. Description of proposed final use of the closed landfill, if any;
X	SEC. 5.3			k. Description of the proposed or existing gas management system which complies with Rule 62-701.530, FAC.
				5. Closure operation plan shall include: (62-701.600(6),FAC)
		X		a. Detailed description of actions which will be taken to close the landfill;
		X		b. Time schedule for completion of closing and long term care;
		X		c. Describe proposed method for demonstrating financial responsibility;
		X		d. Indicate any additional equipment and personnel needed to complete closure.

S	LOCATION	N/A	N/C		
		X			**PART P CONTINUED**
		X			e. Development and implementation of the water quality monitoring plan required in Rule 62-701.510, FAC.
		X			f. Development and implementation of gas management system required in Rule 62-701.530, FAC.
		X		6.	Justification for and detailed description of procedures to be followed for temporary closure of the landfill, if desired; (62-701.600(7),FAC)

Q. CLOSURE PROCEDURES (62-701.610,FAC)

S	LOCATION	N/A	N/C		
		X		1.	Survey monuments; (62-701.610(2),FAC)
		X		2.	Final survey report; (62-701.610(3),FAC)
		X		3.	Certification of closure construction completion; (62-701.610(4),FAC)
		X		4.	Declaration to the public; (62-701.610(5),FAC)
		X		5.	Official date of closing; (62-701.610(6),FAC)
		X		6.	Use of closed landfill areas; (62-701.610(7),FAC)
		X		7.	Relocation of wastes; (62-701.610(8), FAC)

R. LONG TERM CARE REQUIREMENTS (62-701.620,FAC)

S	LOCATION	N/A	N/C		
		X		1.	Maintaining the gas collection and monitoring system; (62-701.620(5), FAC)
		X		2.	Right of property access requirements; (62-701.620(6),FAC)
		X		3.	Successors of interest requirements; (62-701.620(7),FAC)
		X		4.	Requirements for replacement of monitoring devices; (62-701.620(9),FAC)
		X		5.	Completion of long term care signed and sealed by professional engineer (62-701.620(10), FAC).

S. FINANCIAL RESPONSIBILITY REQUIREMENTS (62-701.630,FAC)

S	LOCATION	N/A	N/C		
X	SEC. 6.5 APPX. R			1.	Provide cost estimates for closing, long term care, and corrective action costs estimated by a PE for a third party performing the work, on a per unit basis, with the source of estimates indicated; (62-701.630(3)&(7), FAC).
X	SEC. 6.5			2.	Describe procedures for providing annual cost adjustments to the Department based on inflation and changes in the closing, long-term care, and corrective action plans; (62-701.630(4)&(8), FAC).
X	SEC. 6.5			3.	Describe funding mechanisms for providing proof of financial assurance and include appropriate financial assurance forms; (62-701.630(5),(6),&(9), FAC).

T. CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

1. Applicant:

The undersigned applicant or authorized representative of OMNI WASTE OF OSCEOLA COUNTY, LLC is aware that statements made in this form and attached information are an application for a CONSTRUCTION/OPERATION Permit from the Florida Department of Environmental Protection and certifies that the information in this application is true, correct and complete to the best of his/her knowledge and belief. Further, the undersigned agrees to comply with the provisions of Chapter 403, Florida Statutes, and all rules and regulations of the Department. It is understood that the Permit is not transferable, and the Department will be notified prior to the sale or legal transfer of the permitted facility.

[signature]
Signature of Applicant or Agent

TIMOTHY J. SALOPEK
Name and Title (please type)

tjsomni@aol.com
E-Mail address (if available)

100 CHURCH STREET
Mailing Address

KISSIMMEE, FLORIDA 34741
City, State, Zip Code

(407) 957-7284
Telephone Number

Date: 24 May 2002

Attach letter of authorization if agent is not a governmental official, owner, or corporate officer.

2. Professional Engineer registered in Florida (or Public Officer if authorized under Sections 403.707 and 403.7075, Florida Statutes):

This is to certify that the engineering features of this solid waste management facility have been designed/examined by me and found to conform to engineering principles applicable to such facilities. In my professional judgment, this facility, when properly maintained and operated, will comply with all applicable statutes of the State of Florida and rules of the Department. It is agreed that the undersigned will provide the applicant with a set of instructions of proper maintenance and operation of the facility.

[signature]
Signature

KENNETH W. CARGILL, P.E.
Name and Title (please type)
PRINCIPAL AND BRANCH MANAGER

54435
Florida Registration Number
(please affix seal)

GEOSYNTEC CONSULTANTS
14055 RIVEREDGE DR. SUITE 300
Mailing Address

TAMPA, FLORIDA 33637
City, State, Zip Code

KCargill@geosyntec.com
E-Mail address (if available)

(813) 558-0990
Telephone Number

Date: 24 May 2002

Prepared for

Omni Waste

Omni Waste of Osceola County, LLC
100 Church Street
Kissimmee, Florida 34741

APPLICATION FOR AN

ENVIRONMENTAL RESOURCES PERMIT

OAK HAMMOCK DISPOSAL FACILITY

Prepared by

GEOSYNTEC CONSULTANTS
14055 Riveredge Drive, Suite 300
Tampa, FL 33637

Project Number FW0400

May 2002

TRANSMITTAL LETTER

GEOSYNTEC CONSULTANTS

14055 Riveredge Drive, Suite 300
Tampa, Florida 33637 • USA
Telephone (813) 558-0990 • Fax (813) 558-9726

30 May 2002

Mr. James N. Bradner, P.E.
Program Manager, Solid/Hazardous Waste
Florida Department of Environmental Protection, Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

Subject: Addendum 1, Environmental Resources Permit
Oak Hammock Disposal Facility
Omni Waste of Osceola County, LLC

Dear Mr. Bradner:

As stated in the letter dated 24 May 2002, certain documents were not included in the original submittal. Additionally, Tables 1 and 2 of Section E were inadvertently omitted. Transmitted herewith are five copies of the documents for insertion into the ERP application. This submittal consists of:

- Map E1-I through E1-III, which should be inserted in Section E before figures;
- Figures E9 and E10, which should be inserted in Section E after Figure E8;
- "Wetland Resource Impact and Mitigation Plan", which should be inserted as Appendix E3 of Section E;
- "Conceptual Wildlife and Habitat Management Plan", which should be inserted as Appendix E4 of Section E; and
- Page E-6 (Rev 1) and Tables 1 and 2, which should be inserted in lieu of the current page E-6 of Section E.

Also note that the stated acreage in Section A, Part 4, G and Section C, 5 should be 14.45 acres in lieu of 14.28 acres.

If you, or your staff, have any questions or need additional information, please feel free to contact the undersigned.

Sincerely,

Kenneth W. Cargill, P.E.
Principal

Enclosures
copy: Timothy J. Salopek, Omni Waste

GEOSYNTEC CONSULTANTS

14055 Riveredge Drive, Suite 300
Tampa, Florida 33637 • USA
Telephone (813) 558-0990 • Fax (813) 558-9726

24 May 2002

Mr. James N. Bradner, P.E.
Program Manager, Solid/Hazardous Waste
Florida Department of Environmental Protection, Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

Subject: Environmental Resources Permit Application
Oak Hammock Disposal Facility
Omni Waste of Osceola County, LLC

Dear Mr. Bradner:

Transmitted herewith are five copies of the subject permit application package, which was prepared by GeoSyntec Consultants on behalf of Omni Waste of Osceola County, LLC. This submittal includes information and data responding to the requirements of FDEP Form # 62-343.900(1) and consists of:

- Section A;
- Section C with Figures; and
- Section E with Figures and Appendices (including select Permit Drawings and Storm-Water Design Calculations).

It is noted that Appendices E3 and E4, Map E1, and Figures E9 and E10 are not included in this submittal. The missing documents will be provided to FDEP as soon as possible. It is understood that review time starts with receipt of these documents.

A check in the amount of $7,500 is also enclosed with this permit application. An application for a Class I landfill construct and operate permit is being submitted separately. If you, or your staff, have any questions or need additional information, please feel free to contact the undersigned.

Sincerely,

Kenneth W. Cargill, P.E.
Principal

Enclosures
copy: Timothy J. Salopek, Omni Waste

EXECUTIVE SUMMARY

This Environmental Resources Permit (ERP) Application presents the design of a storm-water management system, an evaluation of wetland and wildlife impacts, and impact mitigation plans for the proposed Class I landfill, known as Oak Hammock Disposal (OHD). GeoSyntec Consultants prepared the application in collaboration with Biological Research Associates (BRA) on behalf of the Omni Waste of Osceola County, LLC. The proposed landfill is located in eastern Osceola County, Florida, west of highway U.S. 441, approximately 6.5 miles south of Holopaw. This application presents a conceptual plan for the development of the proposed 264-acre Class I landfill and requests a permit to construct and operate the first five year phase of landfill development. Information and supporting calculations addressing all applicable parts of the FDEP Form 62-343.900(1) entitled "*Joint Environmental Permit Application*" are provided. Based on the type of proposed development, Sections A, C, and E of the Form 62-343.900(1) are submitted. Sections B, D, F and G of the Form 62-343.900(1) are not required for the development and are not addressed in this permit application.

The OHD facility is part of a 2179-acre site within the South Florida Water Management District. Currently, the site consists of upland areas (fields and flatwoods) and wetlands (forested and herbaceous). Bull Creek, a wetland slough that has been partially drained by an excavated channel flows from northwest to southeast across the central part of the property. A 2.9-mile long access road will be constructed from highway U.S. 441 to the proposed landfill.

The proposed storm-water management system for the OHD facility includes a perimeter drainage system, a final cover drainage system, and an access road drainage system. The storm-water management system for the developed landfill is designed to retain all runoff from the 100-year, 72-hour storm event. The perimeter drainage system consists of dry retention basins connected by ditches that convey storm-water runoff from the landfill to a wet retention basin. The perimeter drainage system is designed to meet flood compensation, allowable discharge, and water quality treatment standards. The final cover drainage system provides erosion protection to the final cover system. The access road drainage system is designed to provide water quality treatment, attenuation of peak flow, and compensatory flood storage in accordance with applicable requirements. The storm-water management system for Phase 1 was designed to assure that adequate storage would be provided to retain the 100-year, 72-hour storm with no discharge to surface waters. In addition to the storm-water management systems to serve the landfill and access road, the proposed OHD facility development includes hydraulic modifications to restore Bull Creek.

Impacts to wetlands within the 264-acre footprint of the landfill itself were needed in order to efficiently use the land. Wetland impacts (filling in wetland areas) have been

minimized to the maximum extent practical. Approximately 14.28 acres of wetlands will be impacted by the proposed development. This impact would be mitigated by setting aside undisturbed uplands and wetlands in a conservation easement and improving the hydrologic condition of wetlands that have been partially drained by the excavated channel of Bull Creek. The report entitled "F*acility Wetland Resource Impact and Mitigation Plan*" prepared by BRA provides a discussion of wetland impact areas and the mitigation plan.

The ERP application also provides a discussion of wildlife impacts and presents a plan for impact mitigation. The report entitled "*Conceptual Wildlife and Habitat Management Plan*" by BRA provides a plan for mitigation and habitat improvements, which offer additional opportunity for the native species to thrive.

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SECTION E: INFORMATION REQUESTED FOR STANDARD GENERAL, INDIVIDUAL AND CONCEPTUAL ENVIRONMENTAL RESOURCE PERMIT APPLICATIONS NOT RELATED TO A SINGLE FAMILY DWELLING UNIT

APPENDIX E3: WETLAND RESOURCE IMPACT AND MITIGATION PLAN

APPENDIX E4: CONCEPTUAL WILDLIFE AND HABITAT MANAGEMENT PLAN

INTRODUCTION

INTRODUCTION

1. TERMS OF REFERENCE

On behalf of Omni Waste of Osceola County LLC (Omni), GeoSyntec Consultants (GeoSyntec) has prepared this Environmental Resources Permit (ERP) application for a proposed Class I landfill in Osceola County, which will be known as the Oak Hammock Disposal (OHD) landfill. The ERP application specifically addresses the storm-water management system design and environmental considerations relevant to the proposed Class I landfill and ancillary features. The ERP application has been prepared to meet the requirements of the Florida Department of Environmental Protection (FDEP) Form No. 62-343.900(1) entitled *"Joint Environmental Resource Permit Application"* (dated 3 October 1995). This ERP application addresses only Sections A, C, and E of the form, which are the sections applicable to this project.

The ERP application preparation was a joint effort by GeoSyntec (landfill and storm-water management system designs) and Biological Research Associates (BRA) (wildlife and wetland impact and mitigation). Mr. Kenneth W. Cargill, P.E. of GeoSyntec is the engineer-of-record for this project.

2. SITE LOCATION

The OHD site is located in eastern Osceola County, Florida, west of highway U.S. 441, approximately 5 miles south of Holopaw. The OHD site is located in Sections 11, 13, and 14 of Township 28 South, Range 32 East, and Sections 17 and 18 of Township 28 South, Range 33 East, Osceola County, Florida. The site location is shown in Figure 1. The main entrance of the facility is located at latitude 28° 02' 57", longitude 81° 03' 10", on highway U.S. 441. Coordinates of the main entrance are a Northing of 1350637 and an Easting of 639127 in the Florida State Plane Coordinate System. The center of the landfill footprint is located at latitude 28° 03' 32" and longitude 81° 05' 46" or a Northing of 1354222 and an Easting of 625229.

3. PROJECT BACKGROUND

In June 2001, Omni's request for approval of a Conditional Use/Site Development Plan to construct and operate the OHD facility was approved by the Osceola Board of County Commissioners. On 25 March 2002, Osceola County signed a 10-year contract with Omni, which requires Omni to transport the County solid waste from the County's transfer station to the OHD facility for disposal. Thus, the development of the OHD facility will serve the municipal solid waste (MSW) needs of Osceola County and will be available for use by surrounding counties.

An application to construct and operate a Class I landfill has also been prepared by GeoSyntec as a separate document and is submitted to FDEP concurrently with this ERP application. The Class I landfill permit application provides information related to design and construction of the landfill and ancillary features.

It should be noted that the Class I landfill permit application and this ERP application are intended to support both a five-year construct and operate permit and a conceptual plan of development at final build-out. FDEP approval is sought for the ERP and the conceptual plan. The five-year construct and operate permit is referenced as Phase 1 and includes the layout and design of four landfill cells covering approximately 53 acres. Other principal features of Phase 1 include a leachate management system, an interim storm water management system, operations area, waste haul road, and access road. The concept plan of development at final build-out includes layout and design of 21 landfill cells covering approximately 264 acres and includes the same principal features mentioned above.

4. ERP SUMMARY

This ERP application describes the proposed design of the storm-water management system for the OHD facility. The system is based the design criteria of the FDEP, the South Florida Water Management District, and Omni. All drainage culverts, swales, and other conveyances are designed to carry, or pass, the 25-year storm event. All landfill and roadway retention basins are designed to retain and infiltrate the required treatment volumes. The landfill storm-water retention basins are designed to retain runoff from the 100-year storm event. The OHD landfill footprint does encroach on the 100-year floodplain of the adjacent Bull Creek. However, calculations are presented to show that the development of the landfill will not exacerbate conditions during the 100-year flood. The area to be developed as part of the landfill area is a net contributor to the 100-year floodwaters in the pre-development state; but the storm-water management system for the landfill has been designed to retain all of the 100-year floodwaters that fall on the developed portions of the landfill in the post-development state. Therefore, the developed landfill storm-water management basins provide flood storage greater than the storage lost from the pre-developed condition. The landfill footprint does not hinder the flow of floodwaters in the Bull Creek basin.

The ERP application also describes the impacts of the landfill development on wetlands and presents the plan for mitigation of these impacts. Wetland impacts will be required in order to construct both the access road and the landfill. Omni has chosen a roadway alignment that avoids wetlands to the greatest extent possible, and thus has minimized wetland impacts for the access road. However, it is not possible to traverse the nearly three-mile distance to the landfill footprint without crossing wetlands. Where wetland crossings are needed, the design of the access roadway has been modified to reduce the cross-section from 130 feet to 52 feet to minimize the impacted areas. This minimum width is required in order to provide two lanes of traffic for large trucks, plus shoulders and side slopes. Impacts to wetlands within the 264-acre footprint of the landfill itself were needed in order to efficiently use the land and meet the solid waste disposal needs of Osceola County. The report entitled "F*acility Wetland Resource Impact and Mitigation Plan*" prepared by BRA and presented in Appendix E3, provides a discussion of wetland impact areas and the mitigation plan.

The ERP application also provides a discussion of wildlife impacts and presents a plan for impact mitigation. The report entitled "*Conceptual Wildlife and Habitat Management Plan*" by BRA and presented in Appendix E4 provides a plan for mitigation and habitat improvements, which offer additional opportunity for the native species to thrive.

5. ORGANIZATION

The organization of this permit application generally follows FDEP Form No. 62-343.900(1). Based on the type of proposed development, Omni is required to submit Sections A, C, and E of the form. Sections B, D, F and G of the form are not required for the development and are not addressed in this ERP application. The remainder of this document presents the information required by Sections A, C, and E of the form. Section A provides a description of the project and general information regarding the facility. Section C provides brief descriptions of the proposed construction, the existing surface-water and wetlands that will be impacted by the project, the quantity of wetlands to be filled, and the proposed wetland mitigation plan. Section E provides detailed information regarding the proposed construction, wetland impacts, mitigation plans, and storm-water management systems, and design calculations. In Section E, each statement of required information is quoted from the FDEP form in italics and is followed immediately by a response in normal font.

APPLICATION FORM

SECTION A

BASIC APPLICATION FORM

SECTION A

FOR AGENCY USE ONLY	
ACOE Application #	DEP/WMD Application #
Date Application Received	Date Application Received
Proposed Project Lat	Fee Received $
Proposed Project Long	Fee Receipt #

PART 1:

Are any of the activities described in this application proposed to occur in, on, or over wetlands or other surface waters?
☒ yes ☐ no

Is this application being filed by or on behalf of a government entity or drainage district? ☐yes ☒no

PART 2:

A. Type of Environmental Resource Permit Requested (check at least one). See Attachment 2 for thresholds and descriptions.

☐ Noticed General - include information requested in Section B.
☐ Standard General (Single Family Dwelling) - include information requested in Sections C and D.
☐ Standard General (all other Standard General projects) - include information requested in Sections C and E.
☐ Individual (Single Family Dwelling) - include information requested in Sections C and D.
☒ Individual (all other Individual projects) - include information requested in Sections C and E.
☐ Conceptual - include information requested in Sections C and E.
☐ Mitigation Bank Permit (construction) - include information requested in Sections C and F. (If the proposed mitigation bank involves the construction of a surface water management system requiring another permit defined above, check the appropriate box and submit the information requested by the applicable section.)
☐ Mitigation Bank (conceptual) - include information requested in Sections C and F.

B. Type of activity for which you are applying (check at least one)

☐ Construction or operation of a new system, other than a solid waste facility, including dredging or filling in, on or over wetlands and other surface waters.
☒ Construction, expansion or modification of a solid waste facility.
☐ Alteration or operation of an existing system which was not previously permitted by a WMD or DEP.
☐ Modification of a system previously permitted by a WMD or DEP.
Provide previous permit numbers:__

☐ Alteration of a system ☐ Extension of permit duration
☐ Abandonment of a system ☐ Construction of additional phases of a system
☐ Removal of a system

C. Are you requesting authorization to use Sovereign Submerged Lands?
☐yes ☒no
(See Section G and Attachment 5 for more information before answering this question.)

D. For activities in, on,or over wetlands or other surface waters, check type of federal dredge and fill permit requested:
☒Individual ☐Programmatic General ☐General
☐Nationwide ☐Not Applicable

E. Are you claiming to qualify for an exemption? ☐yes ☒no
If yes, provide rule number if known. ___

PART 3: A. OWNER(S) OF LAND		B. ENTITY TO RECEIVE PERMIT (IF OTHER THAN OWNER)
Name Evadne Gannerelli	Bronsons, A FL GP	Name Timothy J. Salopek
Title and Company		Title and Company President, Omni Waste of Osceola County, LLC
Address 1401 Coaches Lane	1415 W. Vine St.	Address 100 Church Street
City, State, Zip St. Cloud, FL 34773	Kissimmee, FL 34741	City, State, Zip Kissimmee, FL 34741
Telephone and Fax 407-892-8539	407-847-2847	Telephone and Fax 407-957-7284 Fax: 407-957-7202
C. AGENT AUTHORIZED TO SECURE PERMIT		**D. CONSULTANT (IF DIFFERENT FROM AGENT)**
Name Kenneth W. Cargill, P.E.		Name N/A
Title and Company Principal, GeoSyntec Consultants		Title and Company
Address 14055 Riveredge Drive, Suite 300		Address
City, State, Zip Tampa, FL 33637		City, State, Zip
Telephone and Fax 813-558-0990 Fax: 813-558-9726		Telephone and Fax

PART 4: (Please provide metric equivalent for federally funded projects):

A. Name of Project, including phase if applicable: Oak Hammock Disposal Facility - Phase 1

B. Is this application for part of a multi-phase project?
☒yes ☐no

C. Total applicant-owned area contiguous to the project?
2,179 ac.; N/A ha.

D. Total area served by the system: 473 ac.; N/A ha.

E. Impervious area for which a permit is sought: 12 ac.; N/A ha.

F. Volume of water that the system is capable of impounding:
600 ac. ft.; N/A m

G. What is the total area of work in, on, or over wetlands or other surface waters?
14.28 ac.; N/A ha. 622,037 sq. ft.; N/A sq. m.

H. Total volume of material to be dredged: 0 yd; N/A m

I. Number of new boat slips proposed: 0 wet slips; 0 dry slips

PART 5:

Project location (use additional sheets if needed):
County(ies) Osceola

Section(s) 11, 13, 14	Township 28 South	Range 32 East
Section(s) 17, 18	Township 28 South	Range 33 East
Section(s)	Township	Range

Land Grant name, if applicable: N/A

Tax Parcel Identification Number: N/A

Street AddressRoador other location:N/A

City, Zip Code, if applicable: N/A

PART 6: Describe in general terms the proposed project, system, or activity.

Construct a Class I landfill, access road, ancillary facilities, and stormwater management system. Approximately 53 acres of Class I landfill will be constructed during the first five-year construction period. An ultimate buildout of approximately 264 acres of landfill footprint is planned.

PART 7:

A. If there have been any pre-application meetings, including on-site meetings, with regulatory staff, please list the date(s), location(s), and names of key staff and project representatives.

Design Review Mtgs: Jim Bradner, Scott Wesson, George Cheryan, Saadia Qureshi, Richard Tedder, Lee Martin

01 Nov. 01, 18 Dec. 01, 12 Feb. 02, 27 Feb. 02, 08 Mar. 02

On-Site Mtgs: Jim Carr, John Poulton, Dave Adams

10 Jan. 02, 07 May 02, 08 Jay 02, 09 May 02

B. Please identify by number any MSSW/Wetland Resource/ERP/ACOE Permits pending, issued or denied for projects at the location, and any related enforcement actions.

Agency	Date	No.\Type of Application	Action Taken
ACOE	__	404	To be Submitted
__	__	__	__
__	__	__	__

C. Note: The following information is required for projects proposed to occur in, on or over wetlands that need a federal dredge and fill permit or an authorization to use state owned submerged lands. Please provide the names, addresses and zip codes of property owners whose property directly adjoins the project (excluding application) and/or (for proprietary authorizations) is located within a 500 ft. radius of the applicant's land. Please attach a plan view showing the owner's names and adjoining property lines. Attach additional sheets if necessary.

1.
E. Gannarelli
1401 Coaches Lane
St. Cloud,FL 34773
407-892-8539

2.
Bronson Ranch LTD
1415 W.Vine Street
Kissimmee, FL 34741
407-847-2847

3.
Clay Whaley
4550 N. Kenansville Road
St.Cloud, FL 34773
407-892-4512

4.
Dr. William Broussard
Forever Florida
4755 N. KanansvilleRoad
St. Cooud, FL 34773
407-956-9694

5.
Don Vanosdol
D&M Trucking & Timer
102 Sawmill Road
St. Coud, FL 34773
407-956-9015

6.
N/A

7.
N/A

8.
N/A

PART 8:

A. By signing this application form, I am applying, or I am applying on behalf of the applicant, for the permit and any proprietary authorizations identified above, according to the supporting data and other incidental information filed with this application. I am familiar with the information contained in this application and represent that such information is true, complete and accurate. I understand this is an application and not a permit, and that work prior to approval is a violation. I understand that this application and any permit issued or proprietary authorization issued pursuant thereto, does not relive me of any obligation for obtaining any other required federal, state, water management district or local permit prior to commencement of construction. I agree, or I agree on behalf of the applicant, to operate and maintain the permitted system unless the permitting agency authorizes transfer of the permit to a responsible operation entity. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.

Kenneth W. Cargill, P.E.
Typed/Printed Name of Applicant (If no Agent is used) or Agent (If one is so authorized below)

Signature of Applicant/Agent — Date: 24 May 2002
Principal
(Corporate Title if applicable)

AN AGENT MAY SIGN ABOVE ONLY IF THE APPLICANT COMPLETES THE FOLLOWING:

B. I hereby designate and authorize the agent listed above to act on my behalf, or on behalf of my corporation, as the agent in the processing of this application for the permit and/or proprietary authorization indicated above; and to furnish, on request, supplemental information in support of the application. In addition, I authorize the above-listed agent to bind me, or my corporation, to perform any requirements which may be necessary to procure the permit or authorization indicated above. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. ~~and 18~~ U.S.C. Section 1001.

Timothy J. Salopek		5/21/02
Typed/Printed Name of Applicant	Signature of Applicant	Date

President
(Corporate Title if applicable)

Please note: The applicant's original signature (not a copy) is required above.

PERSON AUTHORIZING ACCESS TO THE PROPERTY MUST COMPLETE THE FOLLOWING:

C. I either own the property described in this application or I have legal authority to allow access to the property, and I consent, after receiving prior notification, to any site visit on the property by agents or personnel from the Department of Environmental Protection, the Water Management District and the U.S. Army Corps of Engineers necessary for the review and inspection of the proposed project specified in this application. I authorize these agents or personnel to enter the property as many times as may be necessary to make such review and inspection. Further, I agree to provide entry to the project site for such agents or personnel to monitor permitted work if a permit is granted.

Timothy J. Salopek		5/21/02
Typed/Printed Name of Applicant	Signature of Applicant	Date

President
(Corporate Title if applicable)

SECTION C

NOTICE OF RECEIPT OF APPLICATION

SECTION C

Environmental Resource Permit Notice of Receipt of Application

Note: this form does not need to be submitted for noticed general permits.
This information is required in addition to that required in other sections of the application. Please submit five copies of this notice of receipt of application and all attachments with the other required information. Please submit all information on 8 1/2" x 11" paper.

Project Name	Oak Hammock Disposal Facility
County	Osceola County, Florida
Owner	Omni Waste of Osceola County, LLC*
Applicant:	Omni Waste of Osceola County, LLC
Applicant's Address:	100 Church Street, Kissimmee, Florida 34741

*Property under option for purchase.

1. Indicate the project boundaries on a USGS quadrangle map. Attach a location map showing the boundary of the proposed activity. The map should also contain a north arrow and a graphic scale; show Section(s), Township(s), and Range(s); and must be of sufficient detail to allow a person unfamiliar with the site to find it.

2. Provide the names of all wetlands, or other surface waters that would be dredged, filled, impounded, diverted, drained, or would receive discharge (either directly or indirectly), or would otherwise be impacted by the proposed activity, and specify if they are in an Outstanding Florida Water or Aquatic Preserve:
Approximately 14 acres of isolated, freshwater wetlands in the watershead of Bull Creek will be filled. Outstanding Florida waters or aquatic preserves are not associated with this project.

3. Attach a depiction (plan and section views), which clearly shows the works or other facilities proposed to be constructed. Use multiple sheets, if necessary. Use a scale sufficient to show the location and type of works.

4. Briefly describe the proposed project (such as "construct dock with boat shelter", "replace two existing culverts", "construct surface water management system to serve 150 acre residential development"):
Construct Class I landfill to serve Osceola County.

5. Specify the acreage of wetlands or other surface waters, if any, that are proposed to be filled, excavated, or otherwise disturbed or impacted by the proposed activity:

filled 14.28 ac.; 0 excavated ac.;

other impacts 0 ac.

6. Provide a brief statement describing any proposed mitigation for impacts to wetlands and other surface waters (attach additional sheets if necessary):
Proposed mitigation for filling of 14.28 acres of isolated wetlands includes conservation and management in perpetuity of a 1,089 acre parcel of land (988 acres of wetlands and 601 acres of uplands) and hydrologic enhancement of wetlands by a stream restoration project in the southern section of Bull Creek within the Oak Hammock Disposal property. In this area, Bull Creek has been transformed into a man-made, excavated channel, which has increased drainage and decresed the hydroperiod of adjacent wetlands. Historic hydrologic conditions will be restored to the maximum extent practical by constructing a series of check dams in the excavated channel.

FOR AGENCY USE ONLY
Application Name
Application Number
Office where the application can be inspected:

Note to Notice recipient: The information in this notice has been submitted by the applicant and has not been verified by the agency. It may be incorrect, incomplete or may be subject to change.

SECTION E

INFORMATION REQUESTED FOR STANDARD GENERAL, INDIVIDUAL AND CONCEPTUAL ENVIRONMENTAL RESOURCE PERMIT APPLICATIONS NOT RELATED TO A SINGLE FAMILY DWELLING UNIT

TABLE OF CONTENTS

I. SITE INFORMATION

Item I (A)

Provide a map(s) of the project area and vicinity delineating USDA/SCS soil types.

The USDA/SCS soil type map is presented as Figure 4 of Appendix E3.

Item I (B)

Provide recent aerials, legible for photo interpretation with a scale of 1" = 400 ft, or more detailed, with project boundaries delineated on the aerial.

A recent aerial photograph including the project boundary is presented as Map E1 (I-III) in Appendix E1.

Item I (C)

Identify the seasonal high water or mean high tide elevation and normal pool or mean low tide elevation for each on-site wetland or surface water, including receiving waters into which runoff will be discharged. Include dates, datum, and methods used to determine these elevations.

The storm-water management system for the 435-acre portion of the site proposed for landfill development, which includes the landfill footprint and the dry and wet retention basins, has been designed to hold all runoff from a 100-year, 72-hour rainfall event. All storm water will be retained on the site. There will be no direct discharge from the areas to wetlands. The only exception to the no direct discharge condition is that the 435-acre portion of the site has been designed so that if two 25-year storm events occur within a 7-day period, the storm-water management system would overflow through four discharge points to Bull Creek and its associated wetland system.

The 37-acre area of the site proposed for construction of the access road will discharge to upland areas and to wetlands. Discharge from treatment areas parallel to the access road into wetlands will occur in five locations. The season high water (SHW) elevation at each of these locations is listed below and is also presented in the environmental report by BRA entitled *"Wetland Resource Impact and Mitigation Plan"* included as Appendix E3. The wetland ID numbers are shown in Figure 6 of the BRA report. Normal pool elevations were not set for these wetlands because it is not intended to use the wetlands for treatment, and thus a treatment volume does not need to be calculated.

Wetland ID	Approximate Station	SHW elevation (feet NGVD)
13	123+00	77.2
19	97+00	73.9
19/22	85+00	73.7
22/23	66+00	73.0
33	30+00	70.8

Item I (D)

Identify the wet season high water tables at the locations representative of the entire project site. Include dates, datum, and methods used to determine these elevations.

A total of 27 piezometers (Figure E1) were installed around the landfill footprint to obtain water-level data and hydraulic characteristics of the uppermost aquifer system beneath the site. All piezometers were constructed of 2-in, Schedule 40 PVC with 5-ft long, number 10-slot well screens. Thirteen (13) of the piezometers were installed in the upper surficial aquifer (A-Zone piezometers) to depths of 15-ft (i.e., screened from 10-15 ft bls.); 11 piezometers were installed in the upper surficial aquifer (C-Zone piezometers) to depths of 55-ft (screened from 45-50 ft bls); and 3 piezometers were installed to depths of 72-78 ft bls in the "shell zone" beneath the first lower permeability layer encountered at the site.

All piezometers were surveyed in and each measuring point (MP) elevation was referenced to NGVD of 1929. A complete round of water-level measurements from all piezometers were collected on two occasions: 3 December 2001 and 9 February 2002. These water level measurements were used to construct potentiometric surface maps for the A-Zone, C-Zone and the "shell zone" as shown in Figures E2 through E7, respectively.

In order to obtain information on long-term water-level fluctuations beneath the site, one of the piezometers cluster locations (DP-7, DP-8, SZ-1) consisting of an A-Zone (DP-7) and a C-Zone (DP-8) surficial and a shell zone (SZ-1) piezometers were instrumented with pressure transducers. The transducers were installed on 3 December 2001 and they

Item II (C)

Provide a narrative description of any proposed mitigation plans, including purpose, maintenance, monitoring, and construction sequence and techniques, and estimated costs.

The *Wetland Resource Impact and Mitigation Plan* prepared by BRA and presented in Appendix E3 discusses mitigation plans. The principal features of the mitigation plan are the minimization of new impacts, restoration of wetlands associated with abandoned roadway, enhancement of the Bull Creek slough through hydroperiod increases, and the establishment of conservation areas on the property. Costs of restoration and Bull Creek enhancements are estimated at $23,750. Costs to establish the conservation area have not been estimated.

Item II (D)

Describe how boundaries of wetlands or other surface waters were determined. If there has ever been a jurisdictional declaratory statement, a formal wetland determination, a formal determination, a validated informal determination, or a revalidated jurisdictional determination, provide the identifying number.

Wetland boundaries have been flagged and surveyed in the proposed development area. Outside the proposed development area, wetland boundaries have been delineated through aerial photography interpretation. A request for a Jurisdictional Declaratory Statement (JDS) has been submitted to FDEP and a letter acknowledging that the submittal is complete has been issued. The project has been assigned the JDS file No. FD-49-0196971-4. The field review was conducted on 7 May through 9 May 2002.

The wetland boundaries at the site were originally field verified by Mr. Jim Carr of the Central District of the FDEP. However, a final survey was never submitted to Mr. Carr as it was subsequently decided to pursue a JDS for the project.

have been recording water levels in this three-well cluster four times per day. On 8 February 2002, a "data dump" was performed and the transducer data was used to construct the hydrographs shown on Figure E8. Water levels in the 15-ft A-Zone (DP-7) and 50-ft C-Zone(DP-8) piezometers are very similar; they fluctuate in tandem in response very rapidly to precipitation events. The deeper "shell zone" piezometer also responds in a similar fashion, but with a longer lag time.

During the two month period between 3 December 2001 and 8 February 2002, water levels in the uppermost aquifer fluctuated from about 0.5-ft to 2.5-ft bls. Although the period of record at this point represents a portion of the classical dry season in Florida, water levels in the uppermost aquifer respond quickly to precipitation events and were noted to rise as much as 2 ft in just over a 24-hour period in mid-January 2002. The water levels receded about 1 foot during the following week, and another foot in the next two weeks. These measurements were used as a basis of estimating the wet season average ground-water table used for storm-water management calculations presented in Appendix E2.

II. ENVIRONMENTAL CONSIDERATIONS

Item II (A)

Provide results of any wildlife surveys that have been conducted on the site, and provide any comments pertaining to the project from the Florida Game and Fresh Water Fish Commission and the U.S. Fish and Wildlife Service.

A report entitled "*Conceptual Wildlife and Habitat Management Plan*" has been prepared by BRA and is presented in Appendix E4. The plan covers the landfill, borrow areas, haul road, and lands proposed for future conservation. Brief descriptions are given for ecological habitats and the results of wildlife surveys conducted at the site.

Item II (B)

Provide a description of how water quantity, quality, hydroperiod, and habitat will be maintained in on-site wetlands and other surface waters that will be preserved or will remain undisturbed.

Water quantity and hydroperiod of wetlands are largely groundwater controlled on this property and thus will remain largely unaffected. Water quality and wildlife habitat will be maintained in the undisturbed on-site wetlands by not discharging directly to the wetlands except for short sections of the access roadway where wetland encroachment is minimized. For the landfill, borrow areas, and storm-water management basins, an upland buffer around wetlands of at least the typical 15-foot minimum, 25-foot average setback has been provided. As an added measure, excavation of the borrow area/wet retention basin will provide storage capacity for the 100-year, 72-hour storm event, thus providing additional groundwater recharge not available from the predevelopment area.

As mitigation for wetland impacts, Omni will preserve, through a conservation easement, approximately 1,089 acres of the site and will restore a portion of Bull Creek where it transects the property through creek modifications. These wetlands were previously dewatered as a result of the excavation of a large ditch system through the network of wetlands. The ditch system is currently referred to as Bull Creek. Providing checkdams in strategic locations along the creek will mitigate the previous dewatering. The report, prepared by BRA and presented in Appendix E3, and the storm-water management system calculations, prepared by GeoSyntec and presented in Appendix E2, discuss the benefits to be derived from installing the checkdams.

Item II (C)

Provide a narrative description of any proposed mitigation plans, including purpose, maintenance, monitoring, and construction sequence and techniques, and estimated costs.

The *Wetland Resource Impact and Mitigation Plan* prepared by BRA and presented in Appendix E3 discusses mitigation plans. The principal features of the mitigation plan are the minimization of new impacts, restoration of wetlands associated with abandoned roadway, enhancement of the Bull Creek slough through hydroperiod increases, and the establishment of conservation areas on the property. Costs of restoration and Bull Creek enhancements are estimated at $23,750. Costs to establish the conservation area have not been estimated.

Item II (D)

Describe how boundaries of wetlands or other surface waters were determined. If there has ever been a jurisdictional declaratory statement, a formal wetland determination, a formal determination, a validated informal determination, or a revalidated jurisdictional determination, provide the identifying number.

Wetland boundaries have been flagged and surveyed in the proposed development area. Outside the proposed development area, wetland boundaries have been delineated through aerial photography interpretation. A request for a Jurisdictional Declaratory Statement (JDS) has been submitted to FDEP and a letter acknowledging that the submittal is complete has been issued. The project has been assigned the JDS file No. FD-49-0196971-4. The field review was conducted on 7 May through 9 May 2002.

The wetland boundaries at the site were originally field verified by Mr. Jim Carr of the Central District of the FDEP. However, a final survey was never submitted to Mr. Carr as it was subsequently decided to pursue a JDS for the project.

Item II (E)

Impact Summary Tables:

1. *For all projects, complete Tables 1, 2 and 3 as applicable.*

2. *For docking facilities or other structures constructed over wetlands or other surface waters, provide the information requested in Table 4.*

3. *For shoreline stabilization projects, provide the information requested in Table 5.*

Tables 1 and 2 are applicable to this project and are presented in the *Wetland Resource Impact and Mitigation Plan*, prepared by BRA and presented as Appendix E3. Tables 3, 4, and 5 are not applicable.

Item II (E)

Impact Summary Tables:

1. For all projects, complete Tables 1, 2 and 3 as applicable.

2. For docking facilities or other structures constructed over wetlands or other surface waters, provide the information requested in Table 4.

3. For shoreline stabilization projects, provide the information requested in Table 5.

Tables 1 and 2 are applicable to this project and are presented on seven separate pages between page E-6 (Rev 1) and E-7 of this ERP application. Tables 1 and 2 are summarized in the *Wetland Resource Impact and Mitigation Plan*, prepared by BRA and presented as Appendix E3. Tables 3, 4, and 5 are not applicable.

TABLE ONE:

PROJECT WETLAND AND OTHER SURFACE WATER SUMMARY

(This information is summarized in table 4-1 and Figure 6 of the Wetland Resource Impact and Mitigation Plan report)

WL & SW ID	WL & SW TYPE	WL & SW SIZE	WL & SW NOT IMPACTED	TEMPORARY WL & SW IMPACTS			PERMANENT WL & SW IMPACTS			MITIGATION AREA ID
				WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	
1	Forested/ herbaceous	0.02	0.02							
2	Cattle Pond	** 0.17	0.0				Cattle Pond	0.17	Road	
3	Forested/ herbaceous	1.79	0.0				Forested/ herbaceous	1.79	landfill	
4	Herbaceous	1.10	0.0				Herbaceous	1.10	landfill	
5	Forested/ herbaceous	3.87	0.0				Forested/ herbaceous	3.87	landfill	
6	Herbaceous	3.36	0.0				Herbaceous	3.36	landfill	
7	Herbaceous	2.11	0.0				Herbaceous	2.11	landfill	
8	Herbaceous	0.71	0.0				Herbaceous	0.71	landfill	
9	Forested/ Herbaceous	26.26	26.25				Forested/ Herbaceous	0.01	Road	
PROJECT TOTALS										

COMMENTS: ** cattle pond extends offsite

Note:
WL = Wetland SW = Other Surface Water ID = Identification Number, letter, etc.
Wetland Type: from an established wetland classification system
Impact Type: D = Dredge; F = Fill; H = Change Hydrology; S = Shading; C = Clearing; O = Other
Multiple entries per cell not allowed, except in the "Mitigation ID" column. If more than one impact is proposed in a given area, indicate the final impact.

TABLE ONE:

PROJECT WETLAND AND OTHER SURFACE WATER SUMMARY

(This information is summarized in table 4-1 and Figure 6 of the Wetland Resource Impact and Mitigation Plan report)

WL & SW ID	WL & SW TYPE	WL & SW SIZE	WL & SW NOT IMPACTED	TEMPORARY WL & SW IMPACTS			PERMANENT WL & SW IMPACTS			MITIGATION AREA ID
				WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	
10	Forested/ Herbaceous	0.21	0.21							
11	Herbaceous	5.64	5.64							
12	Forested/ Herbaceous	3.84	3.84							
13	Herbaceous	197.20	197.09				Herbaceous	0.11	Road	
14	Herbaceous	1.48	1.48							
15	Herbaceous	0.53	0.53							
16	Forested/ Herbaceous	69.02	69.02							
17	Cattle pond	0.11	0.0							
18	Forested/ herbaceous	26.96	26.96							
PROJECT TOTALS										

COMMENTS: * wetland extends offsite

Note:
WL = Wetland SW = Other Surface Water ID = Identification Number, letter, etc.
Wetland Type: from an established wetland classification system
Impact Type: D = Dredge; F = Fill; H = Change Hydrology; S = Shading; C = Clearing; O = Other
Multiple entries per cell not allowed, except in the "Mitigation ID" column. If more than one impact is proposed in a given area, indicate the final impact.

TABLE ONE:

PROJECT WETLAND AND OTHER SURFACE WATER SUMMARY

(This information is summarized in table 4-1 and Figure 6 of the Wetland Resource Impact and Mitigation Plan report)

WL & SW ID	WL & SW TYPE	WL & SW SIZE	WL & SW NOT IMPACTED	TEMPORARY WL & SW IMPACTS			PERMANENT WL & SW IMPACTS			MITIGATION AREA ID
				WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	
19	Forested/ Herbaceous	109.74	109.14				Forested/ Herbaceous	0.60	Road	
20	Cattle pond	0.31	0.31							
21	Forested/ Herbaceous	8.90	8.90							
22	Forested/ Herbaceous	56.62	56.49				Forested/ Herbaceous	0.13	Road	
23	Forested/ Herbaceous	68.86	68.71				Forested/ Herbaceous	0.15	Road	
24	Herbaceous	2.83	2.83							
25	Herbaceous	0.71	0.71							
26	Herbaceous	1.57	1.57							
27	Herbaceous	2.50	2.50							
PROJECT TOTALS										

COMMENTS: * wetland extends offsite

Note:
WL = Wetland SW = Other Surface Water ID = Identification Number, letter, etc.
Wetland Type: from an established wetland classification system
Impact Type: D = Dredge; F = Fill; H = Change Hydrology; S = Shading; C = Clearing; O = Other
Multiple entries per cell not allowed, except in the "Mitigation ID" column. If more than one impact is proposed in a given area, indicate the final impact.

TABLE [illegible]

PROJECT WETLAND AND OTHER SURFACE WATER SUMMARY

(This information is summarized in table 4-1 and Figure 6 of the Wetland Resource Impact and Mitigation Plan report)

WL & SW ID	WL & SW TYPE	WL & SW SIZE	WL & SW NOT IMPACTED	TEMPORARY WL & SW IMPACTS			PERMANENT WL & SW IMPACTS			MITIGATION AREA ID
				WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	
28	Forested/ herbaceous	4.29	4.29							
29	Herbaceous	4.30	4.30							
30	Forested/ herbaceous	33.90	33.90							
31	Herbaceous	0.15	0.04							
32	Forested/ herbaceous	0.83	0.83							
33	Forested/ Herbaceous	27.07	26.84				Forested/ Herbaceous	0.23	Road	
34	Cattle pond	0.11	0.11							
35	Forested/ Herbaceous	58.37	58.09				Forested/ Herbaceous	0.28	Road	
36	Herbaceous	0.46	0.46							
PROJECT TOTALS										

COMMENTS: * wetland extends offsite

Note:
WL = Wetland SW = Other Surface Water ID = Identification Number, letter, etc.
Wetland Type: from an established wetland classification system
Impact Type: D = Dredge; F = Fill; H = Change Hydrology; S = Shading; C = Clearing; O = Other
Multiple entries per cell not allowed, except in the "Mitigation ID" column. If more than one impact is proposed in a given area, indicate the final impact.

TABLE C[illegible]:

PROJECT WETLAND AN[illegible] OTHER SURFACE WATER SUMMARY

(This information is summarized in table 4-1 and Figure 6 of the Wetland Resource Impact and Mitigation Plan report)

WL & SW ID	WL & SW TYPE	WL & SW SIZE	WL & SW NOT IMPACTED	TEMPORARY WL & SW IMPACTS			PERMANENT WL & SW IMPACTS			MITIGATION AREA ID
				WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	
37	Forested/ herbaceous	13.56	13.56							
38	Forested/ herbaceous	7.27	7.27							
39	Herbaceous	0.61	0.61							
40	Herbaceous	2.28	2.17							
41	Forested/ herbaceous	0.04	0.00				Forested/ Herbaceous	0.04	Road	
D1	Upland-cut ditch	0.21	0.21							
D2	Upland-cut ditch	0.02	0.02							
D3	Upland-cut ditch	0.02	0.0				Upland-cut ditch	0.02	Landfill	
D4	Upland-cut ditch	0.03	0.00				Upland-cut ditch	0.03	Landfill	
PROJECT TOTALS										

COMMENTS: * wetland extends offsite

Note:
WL = Wetland SW = Other Surface Water ID = Identification Number, letter, etc.
Wetland Type: from an established wetland classification system
Impact Type: D = Dredge; F = Fill; H = Change Hydrology; S = Shading; C = Clearing; O = Other
Multiple entries per cell not allowed, except in the "Mitigation ID" column. If more than one impact is proposed in a given area, indicate the final impact.

TABLE ONE: **PROJECT WETLAND AND OTHER SURFACE WATER SUMMARY**

(This information is summarized in table 4-1 and Figure 6 of the Wetland Resource Impact and Mitigation Plan report)

WL & SW ID	WL & SW TYPE	WL & SW SIZE	WL & SW NOT IMPACTED	TEMPORARY WL & SW IMPACTS			PERMANENT WL & SW IMPACTS			MITIGATION AREA ID
				WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	WL & SW TYPE	IMPACT SIZE	IMPACT TYPE	
D5	Upland-cut ditch	0.04	0.00				Upland-cut ditch	0.04	Landfill	
D6	Upland-cut ditch	0.56	0.00				Upland-cut ditch l	0.56	Landfill	
D7	Upland-cut ditch	0.09	0.00				Upland-cut ditch	0.09	Landfill	
D8	Upland-cut ditch	0.14	0.14							
D9	Upland-cut ditch	0.33	0.33							
D10	Upland-cut ditch	0.11	0.0				Upland-cut ditch	0.11	Landfill	
PROJECT TOTALS		751.21	735.37					15.51		

COMMENTS: * wetland extends offsite

Note:
WL = Wetland SW = Other Surface Water ID = Identification Number, letter, etc.
Wetland Type: from an established wetland classification system
Impact Type: D = Dredge; F = Fill; H = Change Hydrology; S = Shading; C = Clearing; O = Other
Multiple entries per cell not allowed, except in the "Mitigation ID" column. If more than one impact is proposed in a given area, indicate the final impact.

TABLE [illegible]O:

PROJECT ON-SITE [illegible]IGATION SUMMARY

MITIGATION AREA ID	CREATION		RESTORATION		ENHANCEMENT		WETLAND PRESERVE		UPLAND PRESERVE		OTHER	
	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TYPE	AREA	TYPE	AREA	TARGET TYPE
R-1			0.14	Herb								
R-2			0.12	Herb								
Wetland Preservation							483	Mixed				
Upland Preservation									596	Mixed		
Wetland Enhancement					113	Mixed						
PROJECT TOTALS												

COMMENTS:

Target Type = target or existing habitat from an established wetland classification system or land use classification for non-wetland mitigation.
Note: Multiple entries per cell not allowed.

III. Plans

Item III

Provide clear, detailed plans for the system including specifications, plan (overhead) views, cross sections (with the locations of the cross sections shown on the corresponding plan view), and profile (longitudinal) views of the proposed project. The plans must be signed and sealed by an appropriate registered professional as required by law. Plans must include a scale and a north arrow. These plans should show the following:

Clear, detailed project plans, which are signed and sealed by a professional engineer registered in Florida, are presented in Appendix E1. Compliance of the plans with specific ERP requirements is demonstrated in the following items.

Item III (A)

Project area boundary and total land area, including distances and orientation from roads or other landmarks;

The requested information is shown on permit drawing Sheets 2 and 3 of 50 presented in Appendix E1.

Item III (B)

Existing land use and land cover (acreage and percentages), and on-site natural communities, including wetlands and other surface waters, aquatic communities, and uplands. Use the Florida Land Use Cover & Classification System (FLUCCS)(Level 3) for projects proposed in the South Florida Water Management District, the St. Johns River Water Management District, and the Suwannee River Water Management District and use the National Wetlands Inventory (NWI) for projects proposed in the Southwest Florida Water Management District. Also identify each community with a unique identification number, which must be consistent in all exhibits.

This information is shown in Figure E9 (Pre-Development Land Use) presented at the end of this section.

Item III (C)

The existing topography extending at least 100 feet off the project area, and including adjacent wetlands and other surface waters. All topography shall include the location and a description of known benchmarks, referenced to NGVD. For systems waterward of the mean high water (MHW) or seasonal high water lines, show water depths, referenced to mean low water (MLW) in tidal areas or seasonal low water in non-tidal areas, and list the range between MHW and MLW. For docking facilities, indicate the distance to, location of, and depths of the nearest navigational channel and access routes to the channel.

Existing topography referenced to NGVD is shown on permit drawing Sheet 4 of 50 presented in Appendix E1. There are no known benchmarks on the site. Other requested information is not applicable.

Item III (D)

If the project is in the known flood plain of a stream or other water course, identify the following: 1) the flood plain boundary and approximate flooding elevations; and 2) the 100-year flood elevation and floodplain boundary of any lake, stream or other watercourse located on or adjacent to the site;

Portions of the OHD facility are located in the known flood plain of Bull Creek. Flood plain boundaries are shown on permit drawing Sheet 4 of 50 presented in Appendix E1. There is no specific elevation associated with the floodplain boundary.

Item III (E)

The boundaries of wetlands and other surface waters within the project area. Distinguish those wetlands and other surface waters that have been delineated by any binding jurisdictional determination;

Boundaries of wetlands and surface waters are shown on permit drawing Sheet 4 of 50 presented in Appendix E1. A description of the wetland boundary delineation methods and binding jurisdictional determination status is discussed in the *Wetland Resource Impact and Mitigation Plan,* prepared by BRA and presented in Appendix E3.

Item III (F)

Proposed land use, land cover and natural communities (acreage and percentages), including wetlands and other surface waters, undisturbed uplands, aquatic communities, impervious surfaces, and water management areas. Use the same classification system and community identification number used in III (B) above.

The proposed land use cover is shown in Figure E10 (Post-Development Land Use) presented at the end of this section.

Item III (G)

Proposed impacts to wetlands and other surface waters, and any proposed connections/outfalls to other surface waters or wetlands;

Proposed impacts to wetlands are depicted on permit drawing Sheets 7, 8, 9, 25, 26, 43, 44, 45, and 46. Details of proposed outfalls are shown in permit drawing Sheets 39 and 50. All wetland impacts and the associated mitigation plan are discussed in the *Wetland Resource Impact and Mitigation Plan,* prepared by BRA and presented in Appendix E3. There will be no storm-water discharge to wetlands or surface water from the landfill area for the 100-year, 72-hour storm event. Discharge to wetlands and uplands from the access road is through a riser structure after treatment.

Item III (H)

Proposed buffer zones;

Setbacks of the landfill footprint are indicated on permit drawing Sheets 7, 8, 9, 13 and 39 of 50 presented in Appendix E1. The landfill limit (toe of final cover) is located a minimum of 130 ft from the property line and, on average, over 500 ft from the centerline of Bull Creek (surface water). The storm-water retention system berms for the landfill and wet retention basin are offset a minimum of 15 ft from any adjacent wetlands.

Item III (I)

Pre- and post-development drainage patterns and basin boundaries showing the direction of flows, including any off-site runoff being routed through or around the system; and connections between wetlands and other surface waters;

Pre-development drainage patterns are indicated on permit drawing Sheet 4 of 50 presented in Appendix E1. Post-development drainage patterns are indicated on permit drawing Sheets 36, 37, and 43 through 47 of 50 presented in Appendix E1. Basin boundaries are generally not discernable in the area of development. Available data indicate that except for a portion in the southwest corner of the property and a narrow strip near highway U.S. 441, the project site is in the Bull Creek Sub-Basin, which is a tributary to the Jane Creek Surface Water Basin.

Item III (J)

Location of all water management areas with details of size, side slopes, and designed water depths;

The proposed storm-water management system plan and details are shown on permit drawing Sheets 36 through 50 of 50 presented in Appendix E1. Expected water depth for the 100-year, 72-hour design flood is presented in the calculation package included as Appendix E2.

Item III (K)

Location and details of all water control structures, control elevations, any seasonal water level regulation schedules; and the location and description of benchmarks (minimum of one benchmark per structure);

The storm-water management system for the 435-acre landfill development area has been designed for total retention (i.e., no discharge) of the design storm (100-year, 72-hour storm). Since the system has been designed for total retention, there are no proposed control structures. Emergency overflows are indicated on permit drawing Sheets 36, 37, and 39, presented in Appendix E1.

The access road storm-water management system is designed for the 25-year, 72-hour storm event consists of dry detention basins. Locations and details of the perforated riser structures used to drain these basins are presented on permit drawing Sheets 43 through 50 of 50 presented in Appendix E1. Benchmarks will be established at the site during construction of Phase 1.

Item III (L)

Location, dimensions and elevations of all proposed structures, including docks, seawalls, utility lines, roads, and buildings;

The location, dimensions and elevations of the proposed structures are shown on permit drawing sheets presented in Appendix E1. Utility lines will be established either parallel to the access road or from properties to the north of the landfill at a later time. Temporary generator power and cellular telephones will be used at the site initially.

Item III (M)

Location, size, and design capacity of the internal water management facilities;

The location and size of the internal water management facilities are shown on permit drawing Sheets 36 through 50 of 50 presented in Appendix E1. The design capacities of the hydraulic structures are presented in the calculation package included in Appendix E2.

Item III (N)

Rights-of-way and easements for the system, including all on-site and off-site areas to be reserved for water management purposes, and rights-of-way and easements for the existing drainage system, if any;

There are no rights-of-way or easements for the storm-water management system proposed for this project.

Item III(O)

Receiving waters or surface water management systems into which runoff from the developed site will be discharged;

The storm-water management system for the landfill area has been designed for total retention (i.e., no discharge) of the design storm (100-year 72-hour storm). Runoff from the developed site will not be discharged off-site except under emergency situations (i.e. situations where the water levels on site exceed the design maximum level). Emergency spillways that would discharge to the east from retention basins on the east side of the landfill area and to the north (across the access road) from the wet retention basin are proposed for emergency situations. Emergency spillways are indicated on permit drawing Sheets 36, 37, and 39 of 50 presented in Appendix E1.

The dry detention basins of the access road discharge at the edge of wetlands and in upland areas as indicated on permit drawing Sheets 43 through 47 of 50 presented in Appendix E1.

Item III (P)

Location and details of the erosion, sediment and turbidity control measures to be implemented during each phase of construction and all permanent control measures to be implemented in post-development conditions;

Temporary erosion and sediment control measures required for construction will consist of sodded soil berms and/or silt fences to be constructed at the perimeter of the landfill and access road construction areas. These sodded berms and/or silt fences are shown on permit drawing Sheets 8, 9, 25, 26 and 43 through 47 of 50 presented in Appendix E1 for the landfill and access road areas. These measures are discussed in the Technical Specifications of the Class I landfill permit application.

Item III (Q)

Location, grading, design water levels, and planting details of all mitigation areas;

Wetlands to be restored are indicated on permit drawing Sheets 44 and 45 presented in Appendix E1. Mitigation for the proposed wetland impacts includes approximately 1,089 acres to be placed into a conservation easement as presented in the *Wetland Resource Impact and Mitigation Plan* prepared by BRA and included in Appendix E3. Of this total, approximately 488 acres will be wetlands and approximately 601 acres will be uplands. The existing wetlands along Bull Creek will be enhanced by selectively filling portions of the ditch system currently cut through the network of wetlands. The environmental narrative report prepared by BRA presented in Appendix E3 provides a discussion of the mitigation plans.

Item III (R)

Site grading details, including perimeter site grading;

Site grading details are shown on permit drawings presented in Appendix E1.

Item III (S)

Disposal site for any excavated material, including temporary and permanent disposal sites;

Temporary stockpiles of excavated materials will be placed within the landfill area for use in future development of the landfill. Temporary stockpile areas are designated in permit drawing Sheets 25 and 26 of 50 presented in Appendix E1.

Item III (T)

Dewatering plan details;

There is no permanent dewatering planned for the site. Temporary dewatering required for construction of the leachate sumps at landfill cells, the leachate storage area, and access road culverts is expected to encompass very localized areas for not more than 2 days in each area. If borrow area dewatering is used, plans will be submitted with any water-use permit application, which may be required.

Item III (U)

For marina facilities, locations of any sewage pumpout facilities, fueling facilities, boat repair and maintenance facilities, and fish cleaning stations;

The project does not include marina facilities.

Item III (V)

Location and description of any nearby existing offsite features which might be affected by the proposed construction or development such as stormwater management ponds, buildings or other structures, wetlands or other surface waters.

The facilities proposed to be constructed as part of this project will not impact any off-site features. Modifications to Bull Creek are proposed, however the analyses presented in Section 8 of Appendix E2 indicates that the proposed modifications to Bull Creek do not impact surface waters or wetland of adjacent property upstream or downstream of the site.

Item III (W)

For phased projects, provide a master development plan.

The master development plan is illustrated in permit drawing Sheet 24 of 50 presented in Appendix E1. The staged development of Phase 1 is illustrated on Sheets 25 and 26 of 50 presented in Appendix E1.

IV. CONSTRUCTION SCHEDULE AND TECHNIQUES

Item IV

Provide a construction schedule, and a description of construction techniques, sequencing and equipment. This information should specifically include the following:

The proposed sequence for construction is presented in permit drawings 24, 25, and 26 of 50 presented in Appendix E1. Construction of both permanent and interim features of the surface-water management system is scheduled to be completed in the first 5 years. The current Class I permit application will be followed by subsequent 5-year applications until the landfill is completely built. The landfill final closure will be performed as landfill surfaces reach final elevations and should be completed in 31 years.

Standard construction techniques and earthmoving equipment will be used for the following landfill construction operations:

- clearing and grubbing;
- excavation and soil fill placement;
- grading and compaction;
- vegetative soil placement; and
- seeding and sodding.

Specialized construction techniques will include procedures for installation of geosynthetic materials in the landfill liner and final cover system.

Item IV (A)

Method for installing any pilings or seawalls slabs;

Pilings or seawall slabs are not proposed in this project.

Item IV (B)

Schedule of implementation of temporary or permanent erosion and turbidity control measures;

The schedule of implementation of temporary and permanent erosion control measures is indicated on permit drawing Sheets 25 and 26 of 50 presented in Appendix E1..

Item IV (C)

For projects that involve dredging or excavation in wetlands or other surface waters, describe the method of excavation, and the type of material to be excavated;

A minimal amount of construction of culverts in Bull Creek and other wetlands will be required. The following construction process will be employed:

- construction involving excavation will be planned for a period with a favorable weather forecast;
- silt fences will be installed between construction area and wetland area;
- a diversion ditch will be excavated adjacent to the culvert placement area to divert stream flow around the construction area, if required;
- a temporary soil coffer dam will be placed around the culvert construction area, if required;
- a temporary discharge area will be located in upland pasture at least 100 ft from any wetland and will be surrounded by hay bales to control sediment;
- a temporary sump will be excavated within the culvert construction area and a pump will be installed to dewater the area with discharge to the temporary discharge area;
- the culvert bedding will be placed, compacted, and graded;
- the culverts and a portion of embankment fill will be placed;
- the precast concrete headwalls will be placed;

- the sump and diversion ditch (if used) will be removed; and
- the embankment fill will be completed.

Item IV (D)

For projects that involve fill in wetlands or other surface waters, describe the source and type of fill material to be used. For shoreline stabilization projects that involve the installation of riprap, state how these materials are to be placed, (i.e., individually or with heavy equipment) and whether the rocks will be underlain with filter cloth;

Fill to be placed in wetlands for construction of storm-water management berms will consist of a mixture of stripped soil and, fine sand. Fill to be placed in wetlands for construction of landfill cells, perimeter berm, or roadway embankments will consist of fine-to-medium sand with silt. All fill will be clean, uncontaminated, native soil obtained from on-site borrow sources.

Item IV (E)

If dewatering is required, detail the dewatering proposal including the methods that are proposed to contain the discharge, methods of isolating dewatering areas, and indicate the period dewatering structures will be in place (Note: a consumptive use or water use permit may be required);

Temporary dewatering for roadway culvert construction is discussed in the response to item IV (C) above. Temporary dewatering for the construction of landfill sump and leachate storage areas is discussed in Section 5.11 of the calculation package presented in Appendix E2. Dewatering of the borrow area, if used, will be described in any water-use permit application, which may be required. Based on discussions with FDEP personnel, a water-use permit application will not be submitted until the need is evident.

Item IV (F)

Methods for transporting equipment and materials to and from the work site. If barges are required for access, provide the low water depths and draft of the fully loaded barge;

Equipment and materials will be transferred to and from the work site by truck using existing roads and eventually using improved roadways.

Item IV (G)

Demolition plan for any existing structures to be removed; and

There are no existing structures to be demolished for this project.

Item IV (H)

Identify the schedule and party responsible for completing monitoring, record drawings, and as-built certifications for the project when completed.

The owner is the party responsible for completing monitoring, record drawings and as-built certifications for the project when completed. The owner will contract with a qualified engineering firm to provide third-party construction quality assurance in accordance with the CQA Plan submitted with the Class I landfill permit application. For each phase of construction, monitoring will be carried out throughout the construction period, record drawings and as-built certifications for the project will be completed and submitted to FDEP for each major feature of construction.

V. DRAINAGE INFORMATION

Item V (A)

Provide pre-development and post-development drainage calculations, signed and sealed by an appropriate registered professional, as follows:

Pre-development and post-development drainage calculations signed and sealed by a professional engineer registered in Florida are provided in Appendix E2 and are described in the remainder of this item.

Item V (A)(1)

Runoff characteristics, including area, runoff curve number or runoff coefficient, and time of concentration for each drainage basin;

Runoff characteristics are evaluated in Section 4 and summarized in Tables 1, 2, and 3 of the calculation package presented in Appendix E2.

Item V (A)(2)

Water table elevations (normal and seasonal high) including aerial extent and magnitude of any proposed water table draw down;

Water table elevations are discussed in Section 2.4 of the calculation package presented in Appendix E2 and have been previously discussed in Item I (D).

Item V (A)(3)

Receiving water elevations (normal, wet season, design storm);

Receiving water elevations are not applicable for the landfill storm-water management systems because the system is designed for total retention (i.e., no discharge) of the design storm. The access road dry detention basins discharge to wetland areas and receiving water elevations for these wetland areas are discussed in the report entitled *"Wetland Resource Impact and Mitigation Plan"* prepared by BRA and presented in Appendix E3.

Item V (A)(4)

Design storms used including rainfall depth, duration, frequency, and distribution.

Design storms are presented in Section 2.3 of the calculation package presented in Appendix E2.

Item V (A)(5)

Runoff hydrograph(s) for each drainage basin, for all required design storm event(s);

Runoff hydrograph summary reports are provided in the attachments to the calculation package presented in Appendix E2. The organization of the attachments is explained in the calculation package text.

Item V (A)(6)

Stage-storage computations for any area such as a reservoir, close basin, detention area, or channel, used in storage routing;

Stage-storage computations are provided as appropriate and summarized in Tables 4 and 12 of the calculation package presented in Appendix E2.

Item V (A)(7)

Stage-discharge computations for any storage areas at a selected control point, such as control structure or natural restriction;

Stage-discharge computations were performed using the adICPR surface-water modeling software as a part of storm routing. The calculations and storm routing simulation are discussed in Sections 4, 5, and 7, and computer outputs are summarized in Attachments 5, 6, 7, 12, and 13, of the calculation package presented in Appendix E2.

Item V (A)(8)

Flood routings through on-site conveyance and storage areas;

Results of flood routings through on-site conveyance and storage areas are provided in the calculation package presented in Appendix E2.

Item V (A)(9)

Water surface profiles in the primary drainage system for each required design storm event(s);

Maximum water surface elevations for the landfill perimeter drainage system are summarized in Table 7 and calculation input and output details are provided in the attachments of Appendix E2.

Item V (A)(10)

Runoff peak rates and volumes discharged from the system for each required design storm event(s);

The peak runoff rates and volumes for the landfill and access areas were calculated using the adICPR computer program. Results are discussed in Sections 4, 5, and 7, and computer outputs are provided in Attachments 5, 6, 7, 12, and 13 of the calculation presented in Appendix E2.

Item V (A)(11)

Tail water history and justification (time and elevation); and

Tail water history and justification is not required since the storm-water management system serving the landfill is designed for total retention (i.e., no discharge) of the design storm. The storm-water management system serving the access road discharges to wetland and upland areas, but a tail water history is not required for the design since the seasonal high water level was considered.

Item V (A)(12)

Pump specifications and operating curves for range of possibilities operating conditions (if used in system).

There are no storm-water management system pumps proposed for the system.

Item V (B)

Provide the results of any percolation tests, where appropriate, and soil borings that are representative of the actual site conditions;

Hydraulic conductivity testing and soil borings are discussed in Section 2.6 of the calculation package presented in Appendix E2.

Item V (C)

Provide the acreage, and percentages of the total project, of the following:

1. *Impervious surfaces, excluding wetlands;*
2. *Pervious surfaces (green areas, not including wetlands);*
3. *Lakes, canals, retention areas, other open water areas; and*
4. *Wetlands.*

The requested acreages and percentages are provided below. These areas are relevant to storm-water management system design only.

Type of Area	Acreage (Acres)	Percentage of Total Area (Percent)
Total Site Area	2,179	100
Impervious surfaces	12	0.5
Pervious surfaces	1250	57.4
Open water	166	7.6
Wetlands	751	34.5

Item V (D)

Provide an engineering analysis of floodplain storage and conveyance (if applicable), including:

1. *Hydraulic calculations for all proposed traversing works;*
2. *Backwater water surface profiles showing upstream impact of traversing works;*
3. *Location and volume of encroachment within regulated floodplain(s); and*
4. *Plan for compensating floodplain storage, if necessary, and calculations required for determining minimum building and road flood elevations.*

Items 1 and 2 are addressed in Section 8 of the calculation package presented in Appendix E2. Items 3 and 4 are addressed in Sections 5.2, 5.3, 7.4, and 7.6.3 of the calculation package presented in Appendix E2.

Item V (E)

Provide an analysis of the water quality treatment system including:

1. A description of the proposed stormwater treatment methodology that addresses the type of treatment, pollution abatement volumes, and recovery analysis; and

2. Construction plans and calculations that address stage-storage and design elevations, which demonstrate compliance with the appropriate water quality treatment criteria.

A discussion of the storm water treatment methodology is discussed in Sections 5 and 7 of the calculation package presented in Appendix E2. Construction plans are presented in the permit drawing Sheets 8, 9, 25, and 26, presented in Appendix E1 and calculations demonstrating compliance are presented in Sections 5 and 7 of the calculation package presented in Appendix E2.

Item V (F)

Provide a description of the engineering methodology, assumptions and references for the parameters listed above, and a copy of all such computations, engineering plans, and specifications used to analyze the system. If a computer program is used for the analysis, provide the name of the program, a description of the program, input and output data, two diskette copies, if available, and justification for model selection.

The engineering methodology, assumptions, and references for the various parameters are provided in the calculation package presented in Appendix E2. The engineering plans and specifications are provided in Appendix E1. The computer programs adICPR and HEC RAS were used for analysis of the surface water management system. A description of these models, including a justification for their selection of this model, is provided in Sections 4 and 8 of the calculation package presented in Appendix E2. Input and output data on CD are included in Attachment 15 of Appendix E2.

VI. OPERATION AND MAINTENANCE AND LEGAL DOCUMENTATION

Item VI (A)

Describe the overall maintenance and operation schedule for the proposed system.

Operation and maintenance activities for the storm-water management systems for the landfill and roadways are described in the Operations Plan, an appendix to the Class I landfill permit application.

Item VI (B)

Identify the entity that will be responsible for operating and maintaining the system in perpetuity if different than the permittee a draft document enumerating the enforceable affirmative obligations on the entity to properly operate and maintain the system for its expected life, and documentation of the entity's financial responsibility for long-term maintenance. If the proposed operation and maintenance entity is not a property owner's association, provide proof of the existence of an entity, or the future acceptance of the system by an entity, which will operate and maintain the system. If a property owner's association is the proposed operation and maintenance entity, provide copies of the articles of incorporation for the association and copies of the declaration, restrictive covenants, deed restrictions, or other operational documents that assign responsibility for the operation and maintenance of the system. Provide information ensuring the continued adequate access to the system for maintenance purposes. Before transfer of the system to the operating entity will be approved, the permittee must document that the transferee will be bound by all terms and conditions of the permit.

The owner is responsible for maintenance and operation activities at the OHD facility. As a part of the landfill construction and operation permit, FDEP requires submission of operation and maintenance closure cost estimates and financial assurance that the activities will be continued through the post-closure care period. After the post-closure care period, routine maintenance of the storm-water management system will continue to be the responsibility of the owner.

Item VI (C)

Provide copies of all proposed conservation easements, storm-water management system easements, property owner's association documents, and plats for the property containing the proposed system.

The proposed conservation easement at the site is identified in the *Wetland Resource Impact and Mitigation Plan* prepared by BRA and presented in Appendix E3. No storm-water management system easements are proposed.

Item VI (D)

Provide indication of how water and wastewater service will be supplied. Letters of commitment from off-site suppliers must be included.

The owner intends to provide wastewater service through a septic system to be permitted by the county. Non-potable water for cleaning and incidental use will be supplied by a well to be permitted. Potable water will be supplied by one of several local vendors of bottled water.

Item VI (E)

Provide a copy of the boundary survey and/or legal description and acreage of the total land area of contiguous property owner/controlled by the applicant.

The boundary survey with legal description is presented in permit drawing Sheet 2 of 50 in Appendix E1.

Bronsons
A FLORIDA GENERAL PARTNERSHIP

July 16, 1999

Osceola County Board of County Commissioners
17 S. Vernon Avenue
Kissimmee, Florida 34741

Gentlemen:

This letter will authorize R. Stephen Miles, Jr. and the law firm of Overstreet, Miles, Ritch & Cumbie, P.A., to apply for CU/SDP approval by Osceola County, Florida for the construction of a landfill and related appurtenances by Omni Waste LLC upon lands owned by Bronsons, a Florida General Partnership, in Sections 13 and 14, Township 28 South, Range 32 East, and Section 18, Township 28 South, Range 33 East, Osceola County, Florida.

Sincerely,

Bronsons, a Florida General Partnership

By: ______________________
Dan Lackey – General Manager

IRLO "BUD" BRONSON, JR.
MANAGING PARTNER

COMMERCIAL CATTLE AND CITRUS
1415 West Vine St. • P.O. Box 420879 • Kissimmee, Florida 34742-0879 • Phone (407) 847-2847 • Fax (407) 847-6074

MAY 13, 1999

TO WHOM IT MAY CONCERN:

WITH THIS LETTER, I HEREBY AUTHORIZE OMNI WASTE LLC TO PROCEED WITH PLANS TO APPLY FOR ANY AND ALL PERMITS AT THEIR EXPENSE NECESSARY TO OPERATE A LAND FILL ON MY PROPERTY.

EVADNE J. GANNARELLI
159 RED GAP ROAD
PERKINSTON, MS 39573

OMNI WASTE LLC
P. O. BOX 2116
DAYTON, OHIO 45401

GeoSyntec Consultants

14055 Riveredge Drive, Suite 300
Tampa, Florida 33637 • USA
Telephone (813) 558-0990 • Fax (813) 558-9726

22 May 2002

Honorable Paul Owen, Chairman
Osceola County Board of County Commissioners
1 Courthouse Square, Suite 5700
Kissimmee, Florida 34741

Certified Mail No. 7002 0510 0003 0581 6022

Dear Chairman Owen:

On behalf of Omni Waste of Osceola County, LLC, I am sending you this letter to formally notify you that Omni has filed an application with the Florida Department of Environmental Protection (FDEP) for a permit to construct and operate a new "Class I" landfill (i.e., a landfill that will receive typical household garbage and similar materials). The landfill will be located in unincorporated Osceola County, approximately five miles south of Holopaw, on the west side of U.S. 441.

To comply with the requirements of Section 62-701.320(8), F.A.C., this notice is being provided to you, State Senator Howard E. Futch and State Representative Frank Attkisson. In addition, the attached notice will be published in the Orlando Sentinel.

This firm has been hired to design the landfill and provide other engineering services for Omni. Please call me at 813-558-0990 if you have any questions about this project.

Sincerely,

Kenneth W. Cargill, P.E.
Principal

KWC:vds
Attachment: Notice of Application

cc: Mr. Lenny Marion, Osceola County
Mr. Ray Tobey, City of St. Cloud
Mr. Timothy J. Salopek, Omni Waste
Mr. James Bradner, P.E., FDEP

GEOSYNTEC CONSULTANTS

14055 Riveredge Drive, Suite 300
Tampa, Florida 33637 • USA
Telephone (813) 558-0990 • Fax (813) 558-9726

22 May 2002

Honorable Frank Attkisson
State Representative
District 79
323 Pleasant Street
Kissimmee, Florida 34741-5763

Certified Mail No. 7002 0510 0003 0581 6039

Dear Representative Attkisson:

On behalf of Omni Waste of Osceola County, LLC, I am sending you this letter to formally notify you that Omni has filed an application with the Florida Department of Environmental Protection (FDEP) for a permit to construct and operate a new "Class I" landfill (i.e., a landfill that will receive typical household garbage and similar materials). The landfill will be located in unincorporated Osceola County, approximately five miles south of Holopaw, on the west side of U.S. 441.

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Sincerely,

Kenneth W. Cargill, P.E.
Principal

KWC:vds
Attachment: Notice of Application

cc: Mr. Lenny Marion, Osceola County
Mr. Ray Tobey, City of St. Cloud
Mr. Timothy J. Salopek, Omni Waste
Mr. James Bradner, P.E., FDEP

GEOSYNTEC CONSULTANTS

14055 Riveredge Drive, Suite 300
Tampa, Florida 33637 • USA
Telephone (813) 558-0990 • Fax (813) 558-9726

22 May 2002

Honorable Howard E. Futch
State Senator
District 18
134 Fifth Avenue, Suite 103
Indialantic, Florida 32903

Certified Mail No. 7002 0510 0003 0581 6046

Dear Senator Futch:

On behalf of Omni Waste of Osceola County, LLC, I am sending you this letter to formally notify you that Omni has filed an application with the Florida Department of Environmental Protection (FDEP) for a permit to construct and operate a new "Class I" landfill (i.e., a landfill that will receive typical household garbage and similar materials). The landfill will be located in unincorporated Osceola County, approximately five miles south of Holopaw, on the west side of U.S. 441.

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Sincerely,

Kenneth W. Cargill, P.E.
Principal

KWC:vds
Attachment: Notice of Application

cc: Mr. Lenny Marion, Osceola County
Mr. Ray Tobey, City of St. Cloud
Mr. Timothy J. Salopek, Omni Waste
Mr. James Bradner, P.E., FDEP

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NOTICE OF APPLICATION

The Department of Environmental Protection announces receipt of an application for permit from Omni Waste of Osceola County, LLC to construct and operate a Class I landfill to be known as Oak Hammock Disposal. This project is located approximately five miles south of Holopaw, Osceola County, Florida on the west side of highway U.S. 441.

This application is being processed and is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays at the Department of Environmental Protection, 3319 Maguire Boulevard, Suite 232, Orlando, Florida 32803-3767, telephone (407) 893-3328. Any comments or objections should be filed in writing with the Department at this address. Comments or objections should be submitted as soon as possible to ensure that there is adequate time for them to be considered in the Department decision on the application.

Orlando Sentinel

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FOUNDED 1876

WEDNESDAY

MAY 22, 2002

Osceola

Orlando Sentinel
OrlandoSentinel.com
WEDNESDAY, MAY 22, 2002
SECTION H

STATE OF FLORIDA
DEPARTMENT OF
ENVIRONMENTAL PROTECTION
NOTICE OF APPLICATION

The Department of Environmental Protection announces receipt of an application for permit from Omni Waste of Osceola County, LLC to construct and operate a Class I landfill to be known as **Oak Hammock Disposal**. This project is located approximately five miles south of Holopaw, Osceola County, Florida on the west side of highway U.S. 441.

This application is being processed and is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays at the Department of Environmental Protection, 3319 Maguire Boulevard, Suite 232, Orlando, Florida 32803-3767, telephone (407) 893-3328. Any comments or objections should be filed in writing with the Department at this address. Comments or objections should be submitted as soon as possible to ensure that there is adequate time for them to be considered in the Department decision on the application.

OSCL4474868 May 22, 2002

Hydrogeologic Investigation Report and Water-Quality Monitoring Plan

Oak Hammock Disposal
A Solid Waste Disposal Facility
Osceola County, Florida

Submitted to

Florida Department of Environmental Protection
Central District Office
Orlando, Florida

Prepared for

OMNI Waste of Osceola County, LLC
Kissimmee, Florida

April 2002

Kubal-Furr & Associates

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Statement of Geologic Review

In accordance with Chapter 492.111(3), Florida Statutes and Sections 62-701.410(1) and 62-701.510(2)(a), Florida Administrative Code, the geologic portions of this document have been prepared by and/or under the supervision and review of the below signed Florida Licensed Professional Geologist.

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1.0 Introduction

Kubal-Furr & Associates (Kubal-Furr) has been retained by OMNI Waste of Osceola County, LLC (OMNI), to conduct site investigations and to prepare this hydrogeologic investigation report and monitoring plan for its proposed Oak Hammock Solid Waste Disposal Facility (Oak Hammock) located in Osceola County, Florida (Figure 1). This report has been prepared in support of OMNI's solid waste permit application and in compliance with the hydrogeologic investigation requirements specified in Chapter 62-701.410, F.A.C, and water quality monitoring requirements of Chapter 62-701.510, F.A.C.

Information presented in this report includes a description of geologic conditions, occurrence and movement of ground water, aquifer characteristics, ground and surface water quality, and other data to support the permit application. In addition, it includes a ground water and surface water quality monitoring plan to be implemented upon permit issuance and prior to any waste being accepted at the site.

2.0 Overview of Field Investigation and Data Collection Activities

Field activities conducted at Oak Hammock in support of the hydrogeologic report and water-quality monitoring plan were conducted during the period from October 2001 through February 2002. Activities consisted of test drilling, piezometer installation, water-level measurements, slug testing, ground-water sampling and surface water sampling. A more detailed discussion of the individual field activities is presented in the following sections.

The general scope and sequence of field data collection for Oak Hammock consisted of the following tasks:

- Installation of three "deep" sonic borings (SB-1, SB-2 and SB-3, Figure 2) to determine the thickness and lithology of the surficial aquifer and to locate the top of the Hawthorn Group.

- Collection of two Shelby tube samples from the Hawthorn Group for laboratory analysis of vertical hydraulic conductivities.

- Collection of shallower, direct-push, macrocore samples at 11 locations (DP-locations, Figure 2) to further define site-wide lithology; to locate the top of the first clay layer/confining unit ("intermediate clay") beneath the site; and, for grain size and porosity determinations of upper surficial aquifer formation materials.

- Collection of three Shelby tube samples of the intermediate clay for laboratory analysis of vertical hydraulic conductivities.

- Installation of 27 piezometers (DP- and SZ-locations, Figure 2) and determination of hydraulic characteristics of the upper permeable units beneath the site.

- Collection of water levels from all piezometers on three occasions (November 30, 2001, December 3, 2001 and February 8, 2002) to construct potentiometric surface maps, establish ground-water flow direction and hydraulic gradients in the upper permeable units beneath the site (Figures 7 through 12).

- Slug testing of 13 piezometers distributed vertically and horizontally across the site (5 upper surficial A-zone, 5 upper surficial C-zone and 3 shell zone piezometers) to determine hydraulic conductivities in the upper permeable units (Table 2 and Attachment 3).

- Collection and analysis of samples from 10 piezometers (5 upper surficial A-zone and 5 upper surficial C-zone piezometers) to establish general, sitewide ground-water quality conditions (Table 5 and Attachment 4).

- Installation of pressure transducers in a three piezometer cluster (DP-7, DP-8, and SZ-1, Figure 2) for the collection of periodic water-level measurements which were used in the construction of long-term hydrographs (Figure 13).

- Collection and analysis of four surface water samples (SW-1 through 4, Figure 14) to establish background surface water quality (Table 6 and Attachment 4).

3.0 Detailed Description of Work Performed

3.1 Test Drilling Program

Test boring and soil sample collection were performed using two different drilling techniques including sonic drilling and direct push technology (i.e., GeoProbe™). The test borings were installed to determine the lithologic units beneath the landfill footprint; the presence of confining and/or semiconfining units beneath the site; and, to collect formation samples for physical testing of hydraulic conductivity, grain size and porosity.

3.1.1 Sonic Borings

Three test holes were drilled by the Boart Longyear Company using the sonic drilling method at the locations shown on Figure 2 (SB-1, SB-2, SB-3). Sonic drilling was conducted to collect lithologic information on the formation materials beneath the site and to "tag" the top of the Hawthorn Group. The Hawthorn is the principal confining unit separating the uppermost, surficial aquifer system from the underlying Floridan aquifer. Confirmation of the presence and depth of the Hawthorn beneath the site was important for both its hydrogeologic significance and use in engineering settlement calculations.

Sonic boring was conducted during the period October 30 - November 2, 2001. At each sonic boring location, a continuous, 4-in core sample was collected from land surface down into the upper 10- to 15-ft of the Hawthorn Group. Sampling occurred in 10-ft intervals, with each core sample being extruded into 5-ft long clear, flexible plastic casings which were cut open to allow for viewing by the field geologist. Lithologic descriptions of the core samples were prepared as collected and the samples were later placed in wooden core boxes and stored for future reference.

A literature search and review of regional and local geologic publications which included this part of Osceola County indicated that the top of the Hawthorn in this area was expected to be encountered approximately 150-ft to 160-ft below land surface (bls). The top of the Hawthorn Group varied from the south to the north and east across the site and was encountered at depths of approximately 169-ft bls at SB-1, 129-ft bls at SB-2 and 146-ft bls at SB-3. Complete lithologic descriptions of formation materials encountered at the sonic boring locations is presented in Attachment 1. Generalized geologic cross sections prepared from the sonic boring logs are shown on Figures 3, 4 and 5, while a generalized fence diagram is shown on Figure 6.

Once the Hawthorn was encountered at each sonic boring location, an attempt was made to collect Shelby tube samples for subsequent testing of vertical permeability by the soils laboratory (PSI, Attachment 2). Shelby tubes were successfully pushed at locations SB-2 and SB-3. At location SB-1, the tube was crushed during pushing and upon retrieval the sample was unusable for permeability testing. Following collection of the Shelby tube samples, each sonic boring test hole was pressure grouted back to land surface, the boring was flagged and its location was later determined using a submeter GPS unit and by a registered land surveyor.

3.1.2 Direct Push Soil Sampling

The sonic boring information was reviewed prior to direct push sampling and piezometer installation to better define permeable zones, target depths and lithologic units of interest across the entire disposal site. The focus of the direct push sampling was to collect samples at each piezometer location/cluster down to the top of the first confining unit/clay layer (i.e., the intermediate clay) identified by the sonic borings. This intermediate clay layer, positioned above the Hawthorn Group, was generally encountered at from 55-ft to 70-ft bls.

In addition to the three sonic borings installed by Boart, samples were collected with a direct push, GeoProbe™ drilling rig at 13 additional locations shown on Figure 2. The direct push drilling was done by Precision Sampling during the period from November 5th to November 28th, 2001. The piezometer locations shown on Figure 2 represent either a single, shallow (15-ft) piezometer (e.g., DP-13); a shallow and deep (50-ft) piezometer pair (e.g., DP-1, DP-2); or a three piezometer cluster consisting of a shallow, deep and "shell zone" (72- to 78-ft) piezometer (e.g., DP-7, DP-8, SZ-1). One direct push sample was collected at the location of each piezometer pair or cluster location shown on this figure (i.e., 11 discrete, direct push locations) and therefore, the direct push lithologic logs provided in Attachment 1 are identified by reference to a DP location (e.g., DP-1/2, DP-18/19, etc.). No direct push samples were collected at the single, shallow piezometer locations (i.e., DP-13 and DP-24).

At each direct push location, continuous macrocore samples were collected and described in the field. The macrocore samples were collected in 1.5-in diameter by 4-ft long, clear butyrate "sleeves" which were cut in half and split lengthwise for viewing by the field geologist. After the samples were logged, the sample ends were capped and placed in wax coated, cardboard sample boxes for storage and future reference. The lithologic descriptions from the 11 direct push samples are provided in Attachment 1 along with the 3 sonic boring logs.

At five direct push locations distributed across the disposal site (i.e., DP 1/2, DP 5/6, DP 7/8, DP 20/21 and DP 22/23), ten soil samples were selected from intervals screened by the upper surficial A-zone and C-zone piezometers (five each from the 14- to 16-ft samples and 46- to 48-ft samples) to be analyzed by PSI Laboratories of Tampa for grain size and porosity. The grain size and porosity determinations are provided in Attachment 2.

3.2 Piezometer Installation

Based on information collected during the sonic and direct push sampling events, piezometers were installed to establish the occurrence and movement of ground water and to determine aquifer characteristics. Ground-water samples were also collected from 10 of the piezometers to provide an indication of general, site-wide, water-quality conditions although this was a secondary purpose and the piezometers are not intended to serve as long-term, water-quality monitoring points. Background water quality will still need to be established prior to the site accepting any waste as provided by rule (Chapter 62-701.510, F.A.C.) and as described in the Water-Quality Monitoring Plan, Section 5.

During a project status/kick-off meeting with the Department of Environmental Protection (DEP) Central District Office in Orlando on November 1, 2001, piezometer locations and depths were proposed to the DEP staff based on the preliminary sonic boring data and the conceptual configuration of the landfill footprint. The DEP concurred with an approach consisting of placing piezometers at locations spread across the site in up to three permeable zones: the upper surficial aquifer at depths of 15-ft ("A-zone") and 50-ft ("C-zone") bls; and, in the permeable "shell zone" encountered beneath the first clay/confining unit (intermediate clay) at depths of 72-ft to 78-ft bls. Installation of piezometers in these permeable zones was considered important in order to establish direction and rate of ground-water movement, hydraulic gradients and the hydrologic relationship of the upper surficial aquifer and the shell zone.

A total of 27 piezometers (DP- and SZ-locations, Figure 2) were installed by Precision Sampling during the period from November 5th to November 28th, 2001. Of the 27 piezometers, 13 were installed in the upper surficial aquifer/A-zone (15-ft bls); 11 were installed in the upper surficial aquifer/C-zone (50-ft bls); and, 3 were installed in the shell zone (from 72-ft to 78-ft bls). The piezometers were installed using hollow-stem augers and all were constructed of 2-in diameter, schedule 40 PVC and 5-ft number 10-slot PVC screens. A sand pack (20/30 sand) was installed around the well screen to approximately 2-ft above the screen, followed by a 2-ft fine sand cap (30/45 sand) and the remaining annular space was pressure grouted with a tremie line back to land surface. The piezometers were finished at the surface with an approximate 3-ft stick up inside a locked, protective steel casing. A summary of the piezometer construction details is provided in Table 1 and shown graphically in the boring logs contained in Attachment 1.

Each piezometer was developed by alternately pumping and surging with a submersible pump in an attempt to obtain a clear discharge. Because the upper surficial aquifer beneath the site consists principally of fine to medium silty sands, a number of piezometers (16 out of 24 in the upper surficial, and 1 out of 3 in the shell zone) remained turbid even after an extended period of development. While the turbidity did not compromise the piezometers use to accurately measure water levels, it did require that several ground-water samples collected for general, background water-quality information be filtered in the laboratory and run for dissolved as well as total metals. As described in the water-quality monitoring plan, the piezometers will be replaced by monitor wells installed around the first phase of the landfill for the purpose of obtaining high quality ground-water samples to establish background water quality. These wells will be installed and sampled during landfill construction and prior to the site receiving any waste.

3.3 Physical Testing of Formation Materials

Two Shelby tube samples were collected from the Hawthorn Group and three from the first confining unit/clay layer (intermediate clay) encountered beneath the site. A Shelby tube of the Hawthorn was pushed from 145-ft to 147-ft bls at sonic boring location SB-2 and from 155-ft to 157-ft at sonic boring location SB-3. A Shelby tube was also pushed at sonic boring location SB-1 from 175-ft to 177ft, but the tube was crushed during pushing and produced no useable sample.

Shelby tube samples were also collected from the locations where shell zone piezometers were installed. These included samples from 66-ft to 68-ft at SZ-1, from 60-ft to 62-ft at SZ-2, and from 64-ft to 66-ft at SZ-3. All Shelby tube samples were delivered to PSI Laboratories in Tampa for testing of vertical permeability in a back pressure permeameter.

The vertical permeabilities of the Hawthorn Group samples ranged from 4.49×10^{-6} cm/sec at SB-2 to 3.65×10^{-7} cm/sec at SB-3. Vertical permeabilities of the intermediate clay ranged from 3.03×10^{-4} cm/sec at SZ-2 to 6.27×10^{-7} cm/sec at SZ-3. Complete results of the vertical permeability testing by PSI Laboratories is contained in Attachment 2.

3.4 Hydraulic Conductivity Determinations

Twenty six slug tests (13 "slug in" and 13 "slug out") were conducted at piezometer locations distributed across the site to assess hydraulic conductivities of the upper surficial aquifer (A-zone and C-zone depths) and the shell zone. Both a slug in and a slug out aquifer test was performed at the following locations:

- Upper surficial aquifer A-zone piezometers: DP-2, DP-10, DP-11, DP-19, DP-22.

- Upper surficial aquifer/C-zone piezometers: DP-1, DP-9, DP-12, DP-18, DP-23.

- Shell Zone piezometers: SZ-1, SZ-2 and SZ-3.

A pressure transducer/data logger was lowered into each piezometer to be tested and once the water level had stabilized, a manual water-level measurement was taken prior to the test run. After the water level equilibrated, the data logger was started and the "slug in" test was begun by lowering a 1.5-in by 24.7-in "slug" into the piezometer with a nylon rope. The slug was constructed of galvanized steel pipe, filled with deionized water, capped on both ends, and decontaminated before insertion.

When the transducer readings equilibrated again, the "slug in" portion of the test was considered complete and the data logger continued to record water levels as the slug was removed, beginning the "slug out" portion of the test. Readings during the slug out portion of the test continued until the water levels equilibrated. All slug test data were compensated for barometric pressure and were analyzed using the Bouwer & Rice module of the "Super Slug™" aquifer slug test analysis software (Starpoint Software, Inc.). The graphical plots and analysis of each slug test are contained in Attachment 3 and the data are summarized in Table 2.

3.5 Water-Level Measurements

Water levels were collected from the entire piezometer network on three separate occasions during the field investigation (November 30, 2001, December 3, 2001 and February 8, 2002). The water levels measured on November 30, 2001 in the shell zone piezometers (SZ-piezometers), however, were collected prior to the SZ-piezometers being developed and this data set was not used to construct potentiometric surface maps for the site. The subsequent two complete rounds of water-level measurements (December 3, 2001 and February 8, 2002), summarized in Table 3, were used to construct potentiometric surface maps of the upper surficial aquifer/A-zone (15-ft piezometers; Figures 7, 8), upper surficial aquifer/C-zone (50-ft piezometers; Figures 9, 10) and for the semiconfined, shell zone (Figures 11, 12).

A "data dump" was also performed at piezometer cluster DP-7, DP-8, SZ-1 on February 8, 2002. Each piezometer in this cluster was instrumented on December 3, 2001 with a pressure transducer collecting water levels four times per day. These data were downloaded for that approximate two month period and hydrographs constructed to assess trends and fluctuations in ground-water levels beneath the landfill footprint (Figure 13).

3.6 Water-Quality Sampling

Water-quality samples were collected during the field investigation to satisfy several objectives. These included collecting samples of drilling water to establish any drilling-related constituents which may have been introduced into the aquifer systems; ground-water sampling to assess general water-quality conditions at the site; and, surface water sampling to establish background surface water quality.

3.6.1 Drilling Water

Four drilling water samples were collected during the project and analyzed for volatile organics by EPA Method 8260B and semivolatile organics by EPA Method 8270C. All samples were analyzed by Accutest Laboratories of Orlando, a State-approved, NELAC-certified laboratory. Samples were collected from the following:

- The Boart Longyear water truck (Boart-1, Table 4) which was filled from a hydrant at the City of St. Cloud Landfill and which was used to drill all sonic borings.
- One each from Precision Sampling's Mobile Combo Rig 1 (Prec. Mob. Combo Rig, Table 4) and Mobile Combo Rig 2 (MC2, Table 4) which initially carried water to the site from their shop in Apopka. These same Mobile Combo rigs were used to install all piezometers at the site.

- After Precision's start-up water was depleted, all subsequent drilling water was derived from the westernmost "Ganarelli Ranch" well (GSW, Figure 14). A sample was collected from this well, which is located approximately 3800-ft northeast of the landfill (Table 4). This well provided essentially all of the water used for drilling, piezometer installation, grouting and rig clean-up.

No volatile or semivolatile constituents were reported as present in the Ganarelli Ranch (GSW) well sample. The Boart and Precision Mobile Combo samples reportedly contained low levels of several disinfection by-products including bromodichloromethane, dibromochloromethane and chloroform, none of which exceeded any applicable water-quality standard or MCL. These constituents are typically found in chlorinated, municipal water supplies and were not unexpected. The Boart rig and one of the Precision Mobile Combo rigs (Prec. Mob. Combo Rig) also contained low levels of bis(2-ethylhexyl)phthalate, possibly from the fire hose used to fill the Boart water truck and either the hose or polyethylene storage tank used by Precision. Neither of the reported bis(2-ethylhexyl)phthalate results were above the MCL.

The analytical results for all drilling water samples are contained in Attachment 4 along with a data assessment summary, sampling logs, and chains of custody. A summary of the constituents detected in the drilling water samples is provided in Table 4.

3.6.2 Ground Water

In order to establish general, site-wide ground-water quality conditions in the upper surficial aquifer, piezometers distributed across the site were sampled using low-flow sampling techniques. Ten water samples (five each from the upper surficial aquifer A- and C-zones) and 1 duplicate were collected from piezometers DP-1, DP-2, DP-9, DP-10, DP-11, DP-12, DP-18, DP-19, DP-19 Dupe, DP-22 and DP-23. The samples were analyzed in the field for pH, temperature, conductivity, oxidation/reduction potential (ORP), dissolved oxygen and turbidity; and, in the laboratory (Accutest Laboratories) for total and dissolved metals, nitrates, volatile organics and semivolatile organics, herbicides and pesticides. The nitrates, herbicides and pesticides were analyzed specifically to assess any impacts to ground water from operation of the former sod farm which occupied the site.

As noted earlier, many piezometers remained turbid after development. In general, the A-zone and the shell zone piezometers developed out best but 17 of 27 piezometers remained turbid even after an extended period of development. Although the field indicator parameters stabilized in all of the piezometers sampled during low-flow purging, the turbidities remained above 20 NTUs in most piezometers and it required that eight of the ten ground-water samples collected for general, background water-quality information be filtered in the laboratory and analyzed for dissolved metals as well as total metals. Piezometers DP-2 and DP-19, both A-zone (15-ft) piezometers, produced the samples with the lowest turbidities and were analyzed only for total metals.

The analytical results for all ground-water samples are contained in Attachment 4 along with a data assessment summary, sampling logs, and chains of custody. A summary of the constituents detected in the ground-water samples is provided in Table 5.

3.6.3 Surface Water

Surface water samples were collected in an attempt to establish background surface water quality at four locations (plus one duplicate). Three sampling locations were situated along Bull Creek (SW-1, SW-3 and SW-4) and one was located along an unnamed tributary to Bull Creek (SW-2) where it enters OMNI property (Figure 14). At the time the surface water samples were collected, there was no flow in either Bull Creek or the unnamed tributary. The surface water samples and results, therefore, represent standing, rather than flowing, surface water conditions.

All surface water samples were analyzed for the parameters specified in Chapter 62-701.510(8)(b), F.A.C. The analytical results for all surface water samples are contained in Attachment 4 along with a data assessment summary, sampling logs and chains of custody. A summary of constituents detected in the surface water samples is provided in Table 6.

3.7 Water Well Inventory

No potable water wells are located within 500-ft of the landfill footprint (Chapter 62-701-300(2)(c), F.A.C.) nor are there any potable water wells serving a community water system within 1000-ft (Chapter 62-702.300(2)(h), F.A.C.) of the footprint. A request was made of the South Florida Water Management District (SFWMD) to search its GIS system and database to identify any public or private water wells within a one mile radius of the limit of waste as provided in Chapter 62-701.410(1)(b), F.A.C.

The SFWMD has no record of any wells within this one-mile search radius although three water supply wells are known to exist within a mile of the limit of waste (Figure 14). Two of these wells (GSW and GANN) are located approximately 3800-ft northeast of the landfill footprint on

Ganarelli Ranch property. The third is located about 3500-ft to the west-northwest at the Bronson Ranch (5T).

The westernmost of the two wells at the Ganarelli Ranch (GSW) was used as a source of drilling water. The other well just to the east (GANN) is located at a residence and is used for domestic potable water purposes. Both the GSW and GANN wells appear to be 4-in in diameter. The Bronson Ranch well (5T) appears to be 2-in in diameter, but no other construction details regarding depth, date of installation, water level, etc. are available for any of these wells. That the SFWMD has no record of the existence of these wells may mean that completion reports were never submitted, or that these wells were installed prior to 1985, when the District started requiring completion reports.

4.0 Physical Setting

4.1 Physiography, Topography and Drainage

Physiographically, the Oak Hammock site, and most of Osceola County, resides atop the Osceola Plain, a distinct physiographic feature found along the Atlantic Coastal Lowlands in the central or mid-peninsular physiographic zone of Florida (Puri and Vernon, 1964; White, 1970). The major land forms in Osceola County and the site vicinity include the Pleistocene marine terraces formed by ancient seas which stood at different levels in the past. Topographically, the terraces are expressed as steplike flatlands bordered by scarps and ridges. The site, like most of the county, is situated atop the Penholoway Terrace. Successive terraces east of the site, toward the coast, include the Talbot and Pamlico, both lower in altitude and younger in geologic age, which were formed during progressively lower stands of sea level during Pleistocene times (Schiner, 1993).

Topographic relief across the site is slight and the land surface slopes gently from west to east towards Bull Creek. Land surface elevations range from just above 81-ft NGVD along the western part of the disposal area, to just below 79-ft NGVD along the east-central portion of the site. Drainage and surface water runoff from the disposal area is controlled for the most part by the shallow, man-made drainage swales and ditches which bisect the site and route water toward Bull Creek. In the vicinity of the site, Bull Creek is intermittent and not well defined.

4.2 Geologic Conditions

4.2.1 Lithology

Data from the sonic drilling and direct push test boring programs indicate that the disposal site is underlain by undifferentiated, Pleistocene to Recent deposits of unconsolidated sediments overlying the Miocene age Hawthorn Group. A generalized description of the lithology encountered beneath the site from land surface down to the top of the Hawthorn consists of:

- Sands and silty sands extending from land surface to a depth of about 55-ft in the southern part of the site (SB-2), thickening to about 65-ft in the northern and eastern part (SB-1, SB-3).

- A lower permeability, semiconfining unit (intermediate clay) consisting of sandy clay, clayey sand and sandy shelly clay approximately 10-ft (SB-2, SB-3) to 20-ft (SB-1) thick .

- A highly permeable "shell zone", approximately 6-ft (SB-1) to 23-ft (SB-3) thick, underlying the intermediate clay and consisting of a shell hash mixed with varying amounts of sand and clay.

- Clayey sands, sandy clays and silty sands mixed with varying amounts of shell fragments, approximately 47-ft (SB-2) to 78-ft (SB-1) thick, from the base of the shell zone to the top of the Hawthorn Group which was encountered at depths of from about 129-ft bls in the southern part of the site (SB-2) to about 169-ft bls in the northern part (SB-1).

- Only the upper 10-ft to 15-ft of the Hawthorn Group was penetrated during the sonic boring program which consisted of a stiff, olive gray clay, the upper part of which contained abundant phosphate nodules, minor shell fragments and an occasional shark's tooth.

Generalized geologic cross sections constructed from the sonic boring logs are presented in Figures 3, 4 and 5 and a generalized fence diagram is shown on Figure 6. While the drilling program concluded upon reaching the Hawthorn Group, a literature search indicates that the Hawthorn is estimated to be approximately 180-ft to 200-ft thick beneath the site. Underlying the Hawthorn is a thick sequence of limestones, dolomites and dolomitic limestones comprising the Floridan aquifer and extending to depths of several thousand feet.

4.2.2 Structural Features

Review of FEMA, U.S. Geological Survey and other seismic building zone maps indicate the Oak Hammock site, and all of Florida, to be seismically inactive. There are no nearby or near surface structural features, faults, sinkholes, or unstable areas affecting Oak Hammock's use as a disposal site. No cavities or problems with lost circulation were encountered during the test drilling program, no sinkholes are present at the site, nor has any sinkhole activity been reported. In this part of the county, the limestone bedrock is covered by a thick sequence (estimated to be more than 300-ft thick) of low permeability sediments and little, if any, recharge to the Floridan aquifer is occurring locally. These geologic conditions are not conducive to sinkhole development and the occurrence of sinkholes in such an area is highly unlikely.

The Oak Hammock site and much of Osceola County is located in an area identified by Puri and Vernon (1964) as the Osceola Low, a graben-like feature formed by an ancient fault system running along the Kissimmee River to the west and another along the St. Johns River to the east. This faulting produced a small amount of vertical displacement in the Eocene Age limestones comprising the upper Floridan aquifer which was later infilled by the Miocene age deposits overlying the limestones. These structural features are more than 10 miles from the site and have seen no active displacement since the Eocene. They may have an effect on ground-water movement in the Floridan aquifer but are not significant with respect to use of the Oak Hammock site as a disposal facility.

4.3 Occurrence and Movement of Ground Water

Ground water beneath the site occurs in two distinct water-bearing units: an uppermost, or surficial aquifer generally occurring under water-table conditions; and, the underlying Floridan aquifer which occurs under confined, or artesian, conditions and which is divided into the upper and lower Floridan aquifer. The surficial and the Floridan aquifer are separated by the low permeability sediments comprising the Hawthorn Group which confine the Floridan under artesian conditions and preclude hydraulic communication between these two aquifer systems.

4.3.1 Surficial Aquifer

Ground water occurs under water-table conditions in the permeable sands and silty sands in the upper 50-ft to 60-ft (upper surficial aquifer) which overly the first low permeability, confining/semiconfining unit (intermediate clay) encountered beneath the site (Figures 3, 4 and 5). Ground water also occurs in the shell zone underlying the intermediate clay which tends to confine, or semiconfine, the shell zone locally. Comparison of water levels in the three piezometer cluster, DP-7, DP-8 and SZ-1, indicates that this intermediate clay unit supports a downward vertical hydraulic gradient of about half a foot between the upper surficial aquifer and the shell zone.

Although not evaluated during the present hydrogeologic investigation, ground water also occurs in the more permeable sediments underlying the shell zone and overlying the Hawthorn Group (i.e., lower surficial aquifer, Figures 3, 4 and 5). Primary emphasis was placed on investigating the uppermost permeable zones (upper surficial aquifer A- and C-zones) because these are the aquifers reasonably expected to be affected by the landfill should any water-quality impacts ever occur.

4.3.1.1 Ground-Water Flow Direction

All piezometers were surveyed in and each measuring point (MP) elevation was referenced to NGVD of 1929 (Table 1). A complete round of water-level measurements from all piezometers was collected on two occasions: December 3, 2001 and February 8, 2002 (Table 3). These water-level measurements were used to construct potentiometric surface maps for the upper surficial aquifer/A-zone (Figures 6 and 7), upper surficial aquifer/C-zone (Figures 8 and 9) and the shell zone (Figures 10 and 11).

As inferred from the potentiometric surface maps for these two measurement periods, the horizontal direction of ground-water movement in the three permeable zones monitored is generally from west to east across the site, in the direction of Bull Creek. Although there is a downward hydraulic gradient across the confining unit between the upper surficial aquifer and the shell zone, ground-water movement is predominantly horizontal beneath the site, with no substantial vertical component of flow. While a small amount of ground water from the very upper portion of the surficial aquifer may at times discharge locally to Bull Creek, the creek is not incised deeply enough along this reach to act as a major discharge point for the surficial aquifer. Most of the ground water in the upper surficial aquifer and shell zone would be expected to continue to flow beneath Bull Creek towards the east, to major regional or subregional discharge points such as Crabgrass Creek or the St. Johns River.

4.3.1.2 Ground-Water Flow Rate

Data from the slug testing, laboratory testing and potentiometric surface mapping were used to estimate ground-water flow rates in the upper surficial aquifer (A- and C-zones) and the shell zone. Using the values summarized in Table 2, the average hydraulic conductivities for the upper surficial A-zone and C-zones were calculated to be approximately 5.28 ft/day (feet per day) and 6.38 ft/day, respectively. An average of the hydraulic conductivities for the shell zone wells was calculated to be 16.09 ft/day.

Porosity testing by the laboratory (Attachment 2) on remolded samples of upper surficial aquifer materials produced values ranging from 42.6% to 50.5%. Because in-situ soils would be expected to be more dense, the laboratory estimated in-situ porosity values on the order of 0.3 to 0.35. For the purposes of flow rate calculations, an assumed effective porosity of 0.25 was utilized for the upper surficial aquifer based on the nature of the materials, published literature values and laboratory data. No porosity testing was performed on the shell zone samples but visual observation would indicate the bulk porosity of this zone is greater than that for the overlying upper surficial sediments. An assumed effective porosity value of 0.35 was used in the flow rate calculations for the shell zone.

The gradients in the upper surficial aquifer across the northern part of the site are slightly steeper than in the south and were used in the flow rate calculations. The gradients in the shell zone are fairly uniform across the site and between the two measurement periods. Because the direction of ground-water movement and hydraulic gradients in the upper surficial and shell zone for the two measurements periods were essentially the same, the gradients from December 3, 2001 selected as representative of site conditions. The gradients were calculated to be approximately 1.76 x 10^{-3} ft/ft in the upper surficial A-zone between DP-6 and DP-4; approximately 1.67 x 10^{-3} ft/ft in the upper surficial C-zone between DP-5 and DP-3; and, approximately 4.19 x 10^{-4} ft/ft in the shell zone between SZ-2 and SZ-3.

Ground-water flow rates were calculated using a form of Darcy's Law in which velocity (v) equals hydraulic conductivity (k) times hydraulic gradient (i) divided by the effective porosity (e). The flow rates on December 3, 2001 in the upper surficial aquifer A- and C-zones were calculated to be approximately 3.7 x 10^{-2} ft/day (13.6 ft/yr) and 4.26 x 10^{-2} ft/day (15.6 ft/yr), respectively. The flow rate in the shell zone on December 3, 2001, was calculated to be approximately 1.93 x 10^{-2} ft/day (7.03 ft/yr).

4.3.1.3 Water-Level Fluctuations

The surficial aquifer is recharged by rainfall and water levels respond rapidly to local precipitation events. In order to obtain information on long-term water-level fluctuations beneath the site, one of the piezometer cluster locations (DP-7, DP-8, and SZ-1) consisting of an A-zone (DP-7) and C-zone (DP-8) surficial and a shell zone (SZ-1) piezometer were instrumented with pressure transducers. The transducers were installed on December 3, 2001 and they have been recording water levels in this three well cluster four times per day. On February 8, 2002, a "data dump" was performed and the transducer data was used to construct the hydrographs shown on Figure 13. Water levels in the A-zone (15-ft) and the C-zone (50-ft) piezometers are very similar; they fluctuate in tandem in response to precipitation events. The deeper, shell zone piezometer also responds in a similar but more subdued fashion and the hydrographs would indicate a hydraulic connection between the upper surficial and shell zone and leakance across the intermediate clay.

During the two month period between December 2001 and February 2002, water levels in the uppermost aquifer fluctuated from about 0.5-ft to 2.5-ft bls. Although the period of record developed to this point represents a portion of the classical dry season in Florida, water levels in the uppermost aquifer respond quickly following rainfall events and were noted to rise as much as 2-ft in just over a 24-hr period in mid-January 2002. The water levels receded about 1-ft during the following week, and another foot in the following two weeks. While the water table remained about 6-in below land surface during the period of record, it is expected to rise to land surface at times during the wet season, particularly in periods when back-to-back or sustained rainfall events occur.

4.3.2 Floridan Aquifer

Although the Floridan aquifer was not investigated directly during the field investigation, a description of this aquifer system is provided in order to place the site into an overall regional context. The Floridan aquifer occurs under confined or artesian conditions beneath the site. Based on a literature review, the top of the Floridan is expected to be encountered approximately 350-ft bls in this area. The shallower, surficial aquifer and the Floridan aquifer are separated by a low permeability unit which is referred to in the literature as the intermediate confining unit. This intermediate unit is composed of Miocene age, Hawthorn Group sediments consisting principally of clays, sandy clays and silty sands, intermixed with thin, discontinuous shell beds and limestone lenses.

The Floridan aquifer supplies the majority of the more than 60 million gallons of ground water estimated to be used in Osceola County each day. This aquifer system is very productive and is capable of supplying high demand irrigation and municipal needs at rates in the hundreds of gallons per minute range. Regional ground-water movement in the upper Floridan aquifer across Osceola County is an easterly direction from major recharge areas along the Lake Wales Ridge in Polk County, toward discharge areas along the Intracoastal Waterway and the Atlantic Ocean.

Chloride and dissolved solids concentrations in the Floridan aquifer are generally lowest in recharge areas in the northwest part of the county and highest in the east and northeast part of the county. The concentration of dissolved solids in this part of Osceola County are reported to increase minimally with depth in the upper Floridan, variably in the middle semiconfining unit, and rapidly in the lower Floridan aquifer. The Oak Hammock site is situated in an area where the Floridan aquifer is of marginal to poor water quality, with the concentration of several secondary drinking water parameters such as total dissolved solids and chlorides being near, or exceeding, the maximum contaminant levels of 500 mg/L and 250 mg/L, respectively.

The Oak Hammock site is considered a poor recharge area for the Floridan aquifer by the U.S. Geological Survey, with recharge rates estimated to be from 0-in to 3-in per year. Potentiometric surface maps of the Floridan aquifer place the water level beneath the site at about 40-ft to 45-ft NGVD. This water level is approximately 35-ft to 40-ft lower than that in the overlying surficial aquifer, a head difference which is supported by the low permeability, intermediate confining unit (i.e., Hawthorn Group) separating these two aquifer systems.

4.4 Water-Quality Conditions

To obtain information on general, site-wide water quality conditions, 10 ground-water samples (plus one duplicate) and 4 surface water samples (plus one duplicate) were collected during the field investigation. The complete results of analyses are contained in Attachment 4, and are summarized in Table 5 (ground water) and Table 6 (surface water).

4.4.1 Ground-Water Quality

Ground-water samples were collected on December 4-5, 2001 using low flow sampling procedures from the five upper surficial piezometer pairs: DP-1/DP-2, DP-9/DP-10, DP-11/DP-12, DP-18/DP-19 and DP-22/DP-23 (Figure 2). The samples were analyzed in the field for pH, temperature, conductivity, ORP, dissolved oxygen and turbidity; and, in the laboratory (Accutest Laboratories) for total and dissolved metals, nitrates, volatile organics and semivolatile organics, herbicides and pesticides. As noted earlier, eight piezometers produced turbid samples which were later filtered by the lab and analyzed for dissolved as well as total metals.

In general, the ground-water quality across the site was found to be good. No pesticides or herbicides were detected, and nitrates were not reported as present in the ground water with the exception of an estimated value of 0.42 mg/L (milligrams per liter) at DP-1. As expected, a number of total metals results exceeded an MCL, which is related more to the condition of the turbid samples rather than in-situ ground-water quality. The only dissolved metals reported to exceed an

MCL were aluminum and iron. The only other parameters reported as present, none of which exceeded an MCL, were: (1) toluene at DP-10 (0.00053J mg/L), DP-22 (0.0021 mg/L) and DP-23 (0.0025 mg/L); (2) acetone at DP-18 (0.0252JX mg/L); and, (3) 3&4-methylphenol at DP-19 (0.0036J) and DP-19 Dupe (0.0029J).

4.4.2 Surface Water Quality

Four surface water samples were collected as shown on Figure 14 and analyzed for the parameters specified in Chapter 62-701.510(8)(b), F.A.C. As noted earlier, these samples were collected on Bull Creek and an unnamed tributary during a period of no-flow and represent standing water grab samples.

All samples exceeded the surface water standard for iron. One sample (SW-3) exceeded the coliform standard; one exceeded the pH standard (SW-2); and two exceeded the dissolved oxygen standard (SW-1 and SW-3). Toluene was the only volatile reported as present at SW-2 (0.0012J mg/L) and SW-4 (0.0164 mg/L).

5.0 Water-Quality Monitoring Plan

Based on the information collected during the field investigation and described in the hydrogeological investigation report, a ground and surface water quality monitoring plan has been prepared in accordance with the provisions of Chapter 62-701.510, F.A.C.

5.1 Ground-Water Quality Monitoring

While the hydrogeological investigation encompassed the entire disposal area and surrounding vicinity, the ground-water quality monitoring plan is focused specifically on the portion of the site where disposal will occur during the five-year life of the initial operating permit. This area includes cells 1-4 in the northern part of the site as shown on Figure 15. A detection monitor well network consisting of 45 wells in 15 well clusters (i.e., 3 monitor wells per cluster) is proposed for the initial operating permit. Figure 15 also shows the locations of proposed monitor wells/clusters which are described in more detail below.

5.1.1 Monitor Well Placements

In accordance with Chapter 62-701.510(2)(b), F.A.C. detection monitor wells will be installed at appropriate locations and depths to yield ground-water samples from the aquifer(s) reasonably expected to be affected by the landfill; in this case, the upper surficial aquifer system located above the first confining unit (intermediate clay) encountered beneath the site (Figures 3, 4, 5). The rationale for selecting the placements shown on Figure 15 include the following considerations:

- The lithology of the formation materials above the first confining unit (intermediate clay) were fairly uniform and found to consist principally of fine to medium sands and silty sands. Some variation in color, grain size and silt content were noted but the nature of the materials was consistent across the site and no indications of preferential flow paths were identified.

- Based on the horizontal and vertical hydraulic gradients, conductivities, flow rates and nature of the materials in the upper surficial aquifer, transport of any constituents entering the ground-water system would be through advection and lateral and vertical dispersion. The lithology and ground-water conditions are such that no discrete, preferential flow zones were identified that would dictate well placement vertically or horizontally in the upper surficial aquifer system.

- All disposal of waste will occur above grade, on top of a double composite liner with a leachate collection system. Prior to being lined, the disposal area will be elevated above land surface and crowned so that any leachate generated will move toward the perimeter where it will collect in leachate collection sumps. The material used to build the sub-base beneath the disposal area will be dredged from the borrow pit and deposited as a slurry or placed in the dry. Although existing site conditions indicate a direction of ground-water movement from west to east across the site, placement of fill material in a wet condition will affect ground-water movement such that, at least temporarily, there may be no predominant upgradient locations to monitor and flow may be radial off of, and away from, the disposal area.

- Based on an analysis of the liner and landfill design (Fluet, 2000), it is highly unlikely that leachate will leak through the double composite liner and enter the ground-water system beneath the disposal facility. Considering the hydrogeologic conditions and landfill design, the locations most likely to experience water-quality impacts, should they occur, would be at the sumps which collect any leachate before it is pumped out and sent off for treatment. Therefore, the primary consideration in locating monitor wells was to situate a cluster at the location of each leachate collection sump (locations MW-1, MW-3, MW-6, MW-9, MW-11 and MW-13) and to place supplemental well clusters between sump locations based on their distribution and distances.

- For the purposes of monitor well placement for the initial five year permit, it is assumed that at least temporarily, the entire perimeter of the area to be filled will be considered as downgradient for the purposes of detection monitoring. Therefore, supplemental monitor well clusters have been located between leachate collection sumps such that the spacing between wells is no greater than 500-ft apart, in accordance with the provisions of Chapter 62-701.510(3)(d)3, F.A.C.

- Vertically, three wells will be installed at each ground-water monitoring location shown on Figure 15. Based on discussions with the FDEP in a meeting held on March 1, 2002, wells will be installed across the water table to monitor the upper surficial aquifer/A-zone (wells designated with an "A"); in the upper surficial aquifer/C-zone above the intermediate clay (wells designated with a "C"); and, at a position intermediate to the A-zone and C-zone wells (wells designated with a "B"). Should any water-quality impacts occur, this vertical placement should allow for the detection of dissolved constituents as well as any constituents that are lighter or heavier than water.

- In order to comply with the provisions of Chapter 62-701(3)(a), F.A.C. requiring placement of detection wells within 50-ft of the limit of waste, the well clusters will be installed through the berm which forms the perimeter access road around the disposal area (or through the cell-dividing interior dikes in the case of clusters at MW-14 and MW-15). This placement will allow the upper surficial aquifer A-wells to straddle the water table, which at times of the year is within 6-in or less of land surface. The top of the A-wells will be screened starting 2-ft above the existing, pre-development land surface to 8-ft below.

5.1.2 Well Construction Details

Proposed well construction details for the ground-water monitoring network are as follows:

- All wells will be installed using hollow-stem augers having a minimum inside diameter of 6-7/8-in. Wells will be constructed with 2-in PVC casing and attached well screen and all connections will be threaded, not glued. Well screen will be #6-slot (0.006-in), 10-ft in length. A fine (30/45) sand will be placed around the screen with a tremie pipe to a height of 3-ft above the top of the screen. The remaining annular space from the top of the sand pack to land surface will be grouted with a bentonite/cement mixture using a tremie line. The well casing will extend approximately 2.5-ft to 3-ft above land surface and will be covered with a PVC slip cap. The well installation will be completed at the surface by installing a protective steel casing and locking cap. The grout will be allowed to cure for approximately 24-hr at which time the wells will be developed by alternately pumping and swabbing the screen until a clear discharge is achieved.

- The A-zone upper surficial wells will be screened from 2-ft above the existing, pre-development land surface to a depth of 8-ft below.

- The C-zone upper surficial aquifer wells will be screened above the first confining unit (intermediate clay) which in this part of the site was encountered at approximately 65-ft bls. In order to screen the lower zone without breaching the intermediate clay, the bottom of the well screens in the C-zone wells will terminate at a depth of 60-ft below existing land surface and therefore will be screened from 50-ft to 60-ft below existing, pre-development land surface.

- At the FDEP's request, monitor wells will also be installed to screen the intermediate zone between the A-zone and C-zone surficial aquifer wells. Therefore, the B-zone wells will be installed with screens extending from 24-ft to 34-ft below existing, pre-development land surface.

- Following installation of the detection monitor wells, their latitude and longitude will be established by a registered Florida land surveyor who will also determine top of casing measuring point elevations referenced to NGVD of 1929.

5.1.3 Sampling Protocols/Parameters/Frequency/Reporting

All ground-water sampling will be performed in accordance with Chapter 62-160, F.A.C. using FDEP low-flow purging and sampling techniques. In order to establish background water quality, the initial set of samples will be analyzed for the parameters specified in Chapter 62-701.510(8)(a), F.A.C. and Chapter 62-701.510(8)(d), F.A.C. Subsequent samples will be collected and analyzed semiannually for the parameters specified in Chapter 62-701.510(8)(a), F.A.C.

Based on the configuration and design of the landfill with respect to the property boundary and limit of waste, the detection monitor wells cannot be installed and background water quality further established until such time as the perimeter road and cell-dividing interior dikes are constructed. Once the perimeter road is completed, the monitor well clusters will be installed in the berm and interior dike at the proposed locations shown on Figure 15. All monitor wells will be installed, sampled and analyzed for the requisite background parameter list and these data will be submitted to the FDEP prior to the site receiving any waste.

5.1.4 Piezometer/Monitor Well Abandonment

During the initial five year permit, cells 1-4 will be constructed over piezometers DP-1, DP-2, DP-3 and DP-4. During site preparation activities, the protective steel casings around the piezometers will be removed, the casings will be dug out and cut off 1-ft below land surface and the piezometers will be properly abandoned by pressure grouting the holes from the bottom back to land surface. All other piezometers unaffected by landfill operations during the initial five-year permit will remain in place and will be used to collect water-level data during the semiannual sampling events. As the landfill expands, all remaining piezometers will eventually be abandoned.

In addition to piezometer abandonment, six monitor wells at two of the interior cluster locations (i.e., A-, B- and C-zone wells at locations MW-14 and MW-15) will need to be abandoned when construction of future cells 5 and 6 commences. These wells will be abandoned as a precautionary measure to prevent potential ground-water quality impacts in the event they are destroyed or damaged during new cell construction. The monitor wells will be abandoned in accordance with the piezometer abandonment procedure described above and the FDEP will be provided with a schedule for this work as existing cells are filled and new cell construction begins.

5.2 Surface Water-Quality Monitoring

The engineering design of the stormwater management system provides for retention of stormwater runoff up to and including the 100-year storm event. No routine stormwater discharge is planned for the site and therefore there are no discrete discharge points planned along Bull Creek to designate as surface water monitoring stations.

During the field investigation, four surface samples were collected and analyzed for the parameters in Chapter 62-701.510(8)(b), F.A.C. in order to gather background surface water-quality data. Based on the configuration of the landfill, two of these locations (SW-3 and SW-4, Figure 14) are best situated to evaluate impacts from any potential discharge from the site. SW-4 is an upgradient location situated off site and northwest of the disposal area which will be used to establish surface water quality before it passes the disposal site. SW-3 is a downgradient location along Bull Creek at the point where it first crosses onto OMNI property east of the disposal site.

As noted earlier, Bull Creek is intermittent, and the surface water samples collected during the field investigation coincided with a period of no flow in the creek. In the future, an attempt will be made to collect surface water samples during the semiannual ground-water sampling events assuming Bull Creek is flowing at the time. No surface water sample will be collected during a semiannual sampling event in which the creek is not flowing. However, this does not preclude OMNI Waste from voluntarily sampling the creek on an irregular frequency during the rainy season, or at other times, when there is flow in Bull Creek.

The surface water samples collected at SW-3 and SW-4 will be analyzed for the parameters specified in Chapter 62-701.510(8)(b), F.A.C.

6.0 References

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Tables

Table 1. Oak Hammock Summary of Piezometer Construction Details

Piezometer[1,2]	Approximate Depth (ft, bls)	Aquifer Monitored[3]	Date Constructed	Measuring Point Elevation (ft, NGVD)	Land Surface Elevation (ft, NGVD)	Northing[4]	Easting
DP-1	50	US/C	11/5/01	84.12	81.20	1,356,797.9136	624,537.7892
DP-2	15	US/A	11/6/01	84.11	81.20	1,356,802.9300	624,536.9614
DP-3	50	US/C	11/7/01	82.22	79.30	1,356,050.8461	625,213.9475
DP-4	15	US/A	11/6/01	82.24	79.30	1,356,053.8396	625,219.5786
DP-5	50	US/C	11/6/01	84.13	81.60	1,355,353.2515	624,128.0768
DP-6	15	US/A	11/6/01	84.23	81.60	1,355,356.3692	624,125.4511
DP-7	15	US/A	11/7/01	82.63	79.60	1,355,177.8832	625,941.5348
DP-8	50	US/C	11/7/01	82.78	79.60	1,355,182.2349	625,941.3094
DP-9	50	US/C	11/8/01	81.58	78.90	1,354,970.4078	626,691.2252
DP-10	15	US/A	11/8/01	81.59	78.90	1,354,970.1580	626,687.8415
DP-11	50	US/C	11/16/01	84.06	81.20	1,354,608.9961	625,190.2667
DP-12	15	US/A	11/12/01	84.18	81.20	1,354,604.5236	625,187.6552
DP-13	15	US/A	11/12/01	83.09	80.00	1,354,519.8616	626,168.2905
DP-14	15	US/A	11/8/01	81.97	78.90	1,354,321.3483	626,873.1896
DP-15	50	US/C	11/8/01	81.98	78.90	1,354,318.1582	626,873.3416
DP-16	15	US/A	11/9/01	82.57	79.50	1,354,048.1703	626,132.2304
DP-17	50	US/C	11/9/01	82.58	79.50	1,354,047.5803	626,135.3321
DP-18	50	US/C	11/19/01	84.38	81.20	1,353,592.4449	624,195.9020
DP-19	15	US/A	11/15/01	84.34	81.20	1,353,596.0691	624,200.3947
DP-20	15	US/A	11/12/01	83.07	79.80	1,353,034.6663	625,503.3252
DP-21	50	US/C	11/12/01	83.00	79.80	1,353,030.0119	625,502.8210
DP-22	15	US/A	11/9/01	81.00	78.30	1,353,637.7665	627,171.4866
DP-23	50	US/C	11/9/01	81.27	78.30	1,353,641.3083	627,170.8775
DP-24	15	US/A	11/12/01	82.22	79.20	1,353,736.2199	626,342.3984
SZ-1	78.3	SZ	11/28/01	82.43	79.60	1,355,170.2520	625,942.4306
SZ-2	72	SZ	11/27/01	83.16	79.80	1,353,030.4718	625,511.0984
SZ-3	75.9	SZ	11/28/01	81.27	78.30	1,353,629.4261	627,175.4544

Notes:
1 / Piezometer locations shown on Figure 2.
2 / All piezometers are 2-in diameter, Sch 40 PVC, with 5-ft, #10 slot screens
3 / US/A = Upper surficial aquifer/A-zone
US/C = Upper surficial aquifer/C-zone
SZ = Shell zone
4 / Northing and Easting based on Florida State Plane East NAD 1983

Table 2. Oak Hammock Summary of Slug Test Data

Piezometer[1/]	Approximate Depth (ft, bls)	Aquifer Monitored[2/]	Slug-in Hydraulic Conductivity (ft/day)[3/]	Slug-out Hydraulic Conductivity (ft/day)
DP-1	50	US/C	7.553	7.423
DP-2	15	US/A	5.745	5.458
DP-9	50	US/C	7.461	8.39
DP-10	15	US/A	4.63	5.255
DP-11	50	US/C	9.624	5.264
DP-12	15	US/A	7.786	6.873
DP-18	50	US/C	3.112	2.2
DP-19	15	US/A	5.044	4.223
DP-22	15	US/A	4.334	3.408
DP-23	50	US/C	7.048	5.69
SZ-1	78.3	SZ	3.321	3.413
SZ-2	72	SZ	35.04	30
SZ-3	75.9	SZ	19.09	5.665

Notes:
1 / Piezometer locations shown on Figure 2.
2 / US/A = Upper surficial aquifer/A-zone
US/C = Upper surficial aquifer/C-zone
SZ = Shell zone
3 / Graphical plots of slug test data are provided in Attachment 2.

Table 3. Oak Hammock Piezometer Water-Level Measurements

		Measurement Date					
		11/30/01		12/3/01		2/8/02	
Piezometer[1/]	MP Elevation (ft, NGVD)	DTW (ft below MP)	Water Level (ft, NGVD)	DTW (ft below MP)	Water Level (ft, NGVD)	DTW (ft below MP)	Water Level (ft, NGVD)
DP-1	84.12	5.42	78.70	5.51	78.61	5.66	78.46
DP-2	84.11	5.27	78.84	5.36	78.75	5.57	78.54
DP-3	82.22	4.65	77.57	4.76	77.46	4.36	77.86
DP-4	82.24	4.67	77.57	4.77	77.47	4.30	77.94
DP-5	84.13	4.66	79.47	4.82	79.31	4.77	79.36
DP-6	84.23	4.76	79.47	4.88	79.35	4.86	79.37
DP-7	82.63	5.18	77.45	5.27	77.36	5.05	77.58
DP-8	82.78	5.38	77.40	5.48	77.30	5.24	77.54
DP-9	81.58	4.84	76.74	5.01	76.57	4.74	76.84
DP-10	81.59	4.99	76.60	5.09	76.50	4.71	76.88
DP-11	84.06	5.48	78.58	5.56	78.50	5.41	78.65
DP-12	84.18	5.38	78.80	5.46	78.72	5.43	78.75
DP-13	83.09	5.48	77.61	5.47	77.62	5.37	77.72
DP-14	81.97	5.14	76.83	5.25	76.72	4.98	76.99
DP-15	81.98	5.20	76.78	5.30	76.68	5.02	76.96
DP-16	82.57	5.05	77.52	5.14	77.43	4.77	77.80
DP-17	82.58	5.10	77.48	5.18	77.40	4.80	77.78
DP-18	84.38	5.13	79.25	5.20	79.18	4.91	79.47
DP-19	84.34	5.04	79.30	5.12	79.22	4.83	79.51
DP-20	83.07	5.11	77.96	5.18	77.89	4.62	78.45
DP-21	83.00	5.08	77.92	5.17	77.83	4.58	78.42
DP-22	81.00	4.34	76.66	4.53	76.47	4.01	76.99
DP-23	81.27	4.10	77.17	4.35	76.92	3.95	77.32
DP-24	82.22	4.58	77.64	4.91	77.31	4.34	77.88
SZ-1	82.43	(5.58)[2/]	(76.85)[2/]	5.58	76.85	5.64	76.79
SZ-2	83.16	(6.29)	(76.87)	5.97	77.19	6.02	77.14
SZ-3	81.27	(5.22)	(76.05)	4.86	76.41	4.86	76.41

Notes: 1 / Piezometer locations shown on Figure 2.
2 / Shell zone water levels collected prior to piezometer development

Table 4. Oak Hammock Summary of Drilling Water-Quality Data

Volatile Organics (mg/L)	MCL[1/]	BOART-1	MC2	Precision Mobile Combo Rig	Gannarelli Ranch Well (GSW)
Bromodichloromethane[(2)]	0.10	0.0085	0.0052	0.0026	ND
Chloroform[(2)]	0.10	ND[3/]	0.0091	0.0079	ND
Dibromochloromethane[(2)]	0.10	ND	ND	0.0024	ND
Semivolatile Organics (mg/L)					
bis(2-ethylhexyl)phthalate	0.4	0.0036J[3/]	ND	0.0039J	ND

Notes: 1/ MCL values taken from Chapter 62-550, F.A.C.
2/ MCL for Total Trihalomethanes - sum of the concentrations of bromodichloromethane, chloroform, dibromochloromethane, and bromoform
3/ ND = Not detected
4/ J = Estimated value

Table 5. Oak Hammock Summary of Ground-Water Quality Analytical Results

Metals (mg/L)	**MCL**	**DP-1**	**DP-2**	**DP-9**	**DP-10**	**DP-11**	**DP-12**	**DP-18**	**DP-19**	**DP-19 (Dupe)**	**DP-22**	**DP-23**
Aluminum (T)	0.2	46.6	0.824	82.5J	48.6	191J	16.3J	190J	0.35J	0.314J	50.6	71.8J
Aluminum (D)		ND	NA	1.97	10	4.95	2.41	16	NA	NA	0.658	0.859
Arsenic (T)	0.05	0.0158	ND	0.0285	ND	0.0813	ND	0.0468	ND	ND	0.0039B	0.0273
Arsenic (D)		ND	NA	0.0043B	ND	0.021	ND	0.0062B	NA	NA	ND	ND
Barium (T)	2	0.391	0.0084B	1.14J	0.144B	2.15J	0.0357JB	1.95J	0.0091JB	0.0099JB	0.146B	1.43J
Barium (D)		0.0132B	NA	0.0421B	0.030B	0.0605B	0.0152B	0.166B	NA	NA	0.0165B	0.0507B
Beryllium (T)	0.004	ND	ND	0.0149J	ND	0.0186J	ND	0.0092J	ND	ND	ND	0.0111J
Beryllium (D)		ND	NA	ND	ND	ND	ND	ND	NA	NA	ND	ND
Cadmium (T)	0.005	ND	ND	0.0021B	ND	0.0042B	ND	0.0052	ND	ND	ND	0.0039B
Cadmium (D)		ND	NA	ND	ND	ND	ND	ND	NA	NA	ND	ND
Calcium (T)	NE	5.92J	2.01J	33.2J	2.89J	28.9J	5.81J	40.5J	20.9J	22.1J	5.2J	23.3J
Calcium (D)		1.68J	NA	5.12J	1.63J	6.31J	3.87J	13.5J	NA	NA	3.35J	8.45J
Chromium (T)	0.1	0.0341	ND	0.108J	0.0347	0.224J	0.0181J	0.221J	ND	ND	0.0409	0.104J
Chromium (D)		ND	NA	0.0034B	ND	0.0139	0.0057B	0.0637	NA	NA	ND	0.0033B
Cobalt (T)	NE	ND	ND	0.0118B	ND	0.0180B	0.0026B	0.0125B	ND	ND	ND	0.0154B
Cobalt (D)		ND	NA	ND	ND	0.00091B	0.00068B	0.0014B	NA	NA	ND	0.0012B
Copper (T)	1	0.0025B	ND	0.0037B	0.0035B	0.0185B	0.0019B	0.0225B	ND	ND	0.0020B	0.0055B
Copper (D)		ND	NA	0.0020B	ND	0.0116B	0.0065B	0.0079B	NA	NA	ND	0.0019B
Iron (T)	0.3	5.72J	1.83J	13.1J	5.25J	34.3J	3.43J	14.6J	1.08J	1.17J	6.02J	16.5J
Iron (D)		0.809J	NA	0.276B	1.79J	0.695	1.1	1.16	NA	NA	1.41J	0.287B
Lead (T)	0.015	ND	ND	0.0385	0.0387	0.0713	0.0122	0.103	ND	ND	0.0404	0.0249
Lead (D)		ND	NA	ND	ND	ND	ND	ND	NA	NA	ND	ND
Magnesium (T)	NE	2.06JB	0.958JB	4.08JB	3.73JB	4.38JB	2.51JB	3.33JB	1.46JB	1.58JB	3.96JB	3.64JB
Magnesium (D)		1.29JB	NA	2.03B	1.77JB	1.65B	1.46B	0.729B	NA	NA	2.13JB	2.12B
Manganese (T)	0.05	0.0165	0.0091B	0.0186J	ND	0.0357J	0.0095JB	0.0181J	0.0205J	0.0217J	0.0162	0.0274J
Manganese (D)		0.0092B	NA	0.0042B	ND	0.0065B	0.0062B	0.0050B	NA	NA	0.0087B	0.0104B
Nickel (T)	0.1	0.0104B	ND	0.0313B	0.0137B	0.0442	0.0052B	0.0666	ND	ND	0.0107B	0.0282B
Nickel (D)		ND	NA	0.0015B	ND	0.0021B	0.0020B	0.0092B	NA	NA	ND	0.0024B

Table 5. Oak Hammock Summary of Ground-Water Quality Analytical Results (Cont'd)

Metals (mg/L)	MCL	DP-1	DP-2	DP-9	DP-10	DP-11	DP-12	DP-18	DP-19	DP-19 (Dupe)	DP-22	DP-23
Potassium (T)	NE	ND	ND	8.26J	4.59B	9.29J	7.12J	30.8J	ND	ND	ND	5.14J
Potassium (D)		ND	NA	9.36	3.15B	6.12	5.69	21.9	NA	NA	ND	4.20B
Selenium (T)	0.05	ND	ND	0.0054B	ND	0.013	ND	0.0184	ND	ND	ND	0.0032B
Selenium (D)		ND	NA	ND	ND	ND	ND	ND	NA	NA	ND	ND
Silver (T)	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (D)		0.0035B	NA	ND	ND	ND	ND	ND	NA	NA	0.00065B	ND
Sodium (T)	160	5.75	5.4	10.4	15.1	8.32	13.7	35.5	9.26	10.1	8.72	9.76
Sodium (D)		4.47B	NA	20.3J	10.5	9.9J	16.3J	34.4J	NA	NA	7.97	14.9J
Vanadium (T)	NE	0.0417JB	0.0031JB	0.142J	0.0503J	0.266J	0.0234JB	0.286J	ND	ND	0.0572J	0.131J
Vanadium (D)		0.0056JB	NA	0.0621	0.0135JB	0.0678	0.0100B	0.126	NA	NA	0.0104JB	0.0368B
Zinc (T)	5	0.0241J	ND	0.0291J	0.0128JB	0.0912J	0.019JB	0.0564J	ND	ND	0.012JB	0.0467J
Zinc (D)		0.0373J	NA	ND	0.0329J	ND	ND	ND	NA	NA	0.0234J	ND
Inorganics (mg/L)												
Nitrates	10	0.42J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Volatile Organics (mg/L)												
Toluene	0.04	ND	ND	ND	0.00053J	ND	ND	ND	ND	ND	0.0021	0.0025
Acetone	NE	ND	ND	ND	ND	ND	ND	0.0252JX	ND	ND	ND	ND
Semivolatile Organics (mg/L)												
3&4-Methylphenol	NE	ND	ND	ND	ND	ND	ND	ND	0.0036J	0.0029J	ND	ND

Notes:
1/ MCLs taken from Chapter 62-550, F.A.C.
2/ (T) = Total Metals
3/ (D) = Dissolved metals
4/ NE = Not Established
5/ ND = Not detected
6/ NA = Not analyzed for this constituent

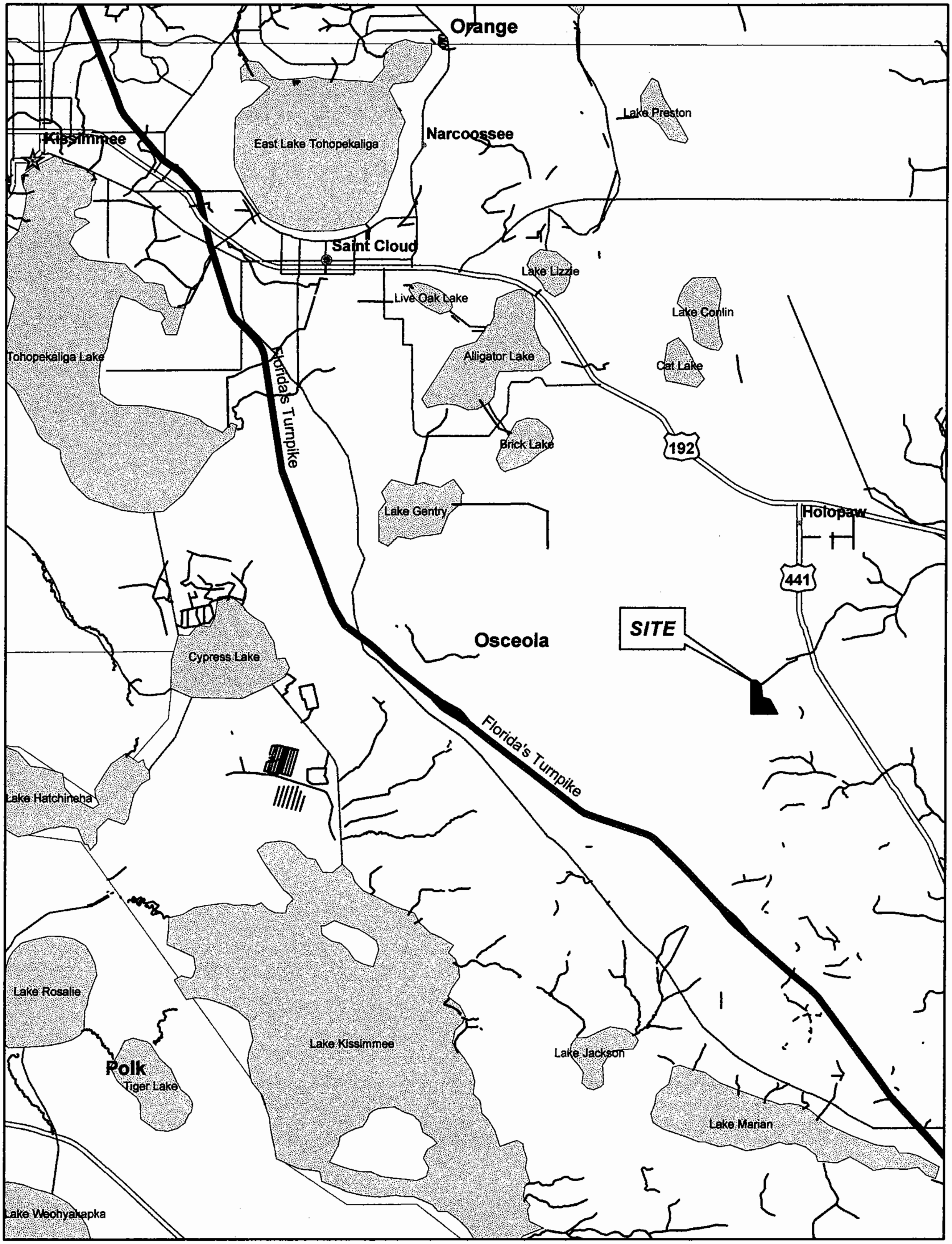
Data Qualifiers (see Attachment 4 for data assessment summary)
J = Estimated value
B = Result between the IDL and RL
X = Reviewer assigned qualifier

Table 6. Oak Hammock Summary of Surface Water Quality Data

Metals (mg/L)	Florida SW Std.[1/]	SW-1[2/]	SW-1 (DUP)	SW-2	SW-3	SW-4
Barium	NE[3/]	ND[5/]	ND	0.652	ND	ND
Chromium	≤ 0.153[4/]	ND	ND	ND	ND	0.0111
Iron	≤ 1.0	1.67J[6/]	2.87J	2.20J	2.93J	14.1J
Lead	≤ 0.002[4/]	ND	ND	ND	ND	0.0163U[7/]
Zinc	≤ 0.077[4/]	ND	ND	ND	ND	0.0576
Inorganics (mg/L)						
Unionized Ammonia	≤ 0.02	0.00084J	0.00057J	0.000014	0.00020	0.00029
Nitrates	NE	ND	ND	ND	0.10	ND
Total Nitrogen	NE	1.9J	4.6J	2.2	2.6	36.9
Total Phosphorus	NE	0.13J	2.2J	ND	0.16J	1.8J
Total Hardness (as $CaCO_3$)	NE	27.5	28.7	22.2	40.5	69
BOD-5 Day	NE	5.6J	3.8J	55.1	5.3	45.8
Chemical Oxygen Demand	NE	52.8	58.8	132	84.5	151
Total Organic Carbon	NE	21.5	20.8	31.1	28.8	86.4
Total Dissolved Solids	NE	122	132	208	190	188
Total Suspended Solids	NE	17J	13J	14	5.0	270
Biological						
Fecal Coliform	800 cfu/100ml	30	32	392J	1050J	20
Chlorophyll A (mg/m^3)	NE	2.74J	5.12J	6.07	7.26	10.24
Volatile Organics (mg/L)						
Toluene	NE	ND	ND	0.0012J	ND	0.0164
Field Readings						
pH[8/]	5.4 - 6.4 std units	6.39	NA[10/]	4.65	5.86	5.40
Dissolved Oxygen	≥ 5.0 mg/L	4.57	NA	7.3	4.2	4.0
Specific Conductance	1275 uhmos/cm	133.5	NA	173.9	187.2	170.5
Turbidity	≤ BG[9/]+29 ntu	3.4	NA	1.06	4.23	16.4
Temperature °C	NE	23.6	NA	25.3	23.9	24.8

Notes: 1/ FLDEP 62-320.530, Criteria for Surface Water Quality Classifications - Class III: Predominantly Fresh Waters
2/ Surface water sampling locations shown on Figure 14
3/ NE = Not Established
4/ Based on calculation using log of Total Hardness as $CaCO_3$
5/ ND = Not detected
6/ J=estimated value
7/ Not detected at the associated value due to blank contamination; U = not detected
8/ BG <6.0 su; standard based on BG pH + 1.0 su
9/ Background sample (BG)
10/ NA = Not analyzed

Figures



Kubal-Furr & Associates

-Environmental Consultants-

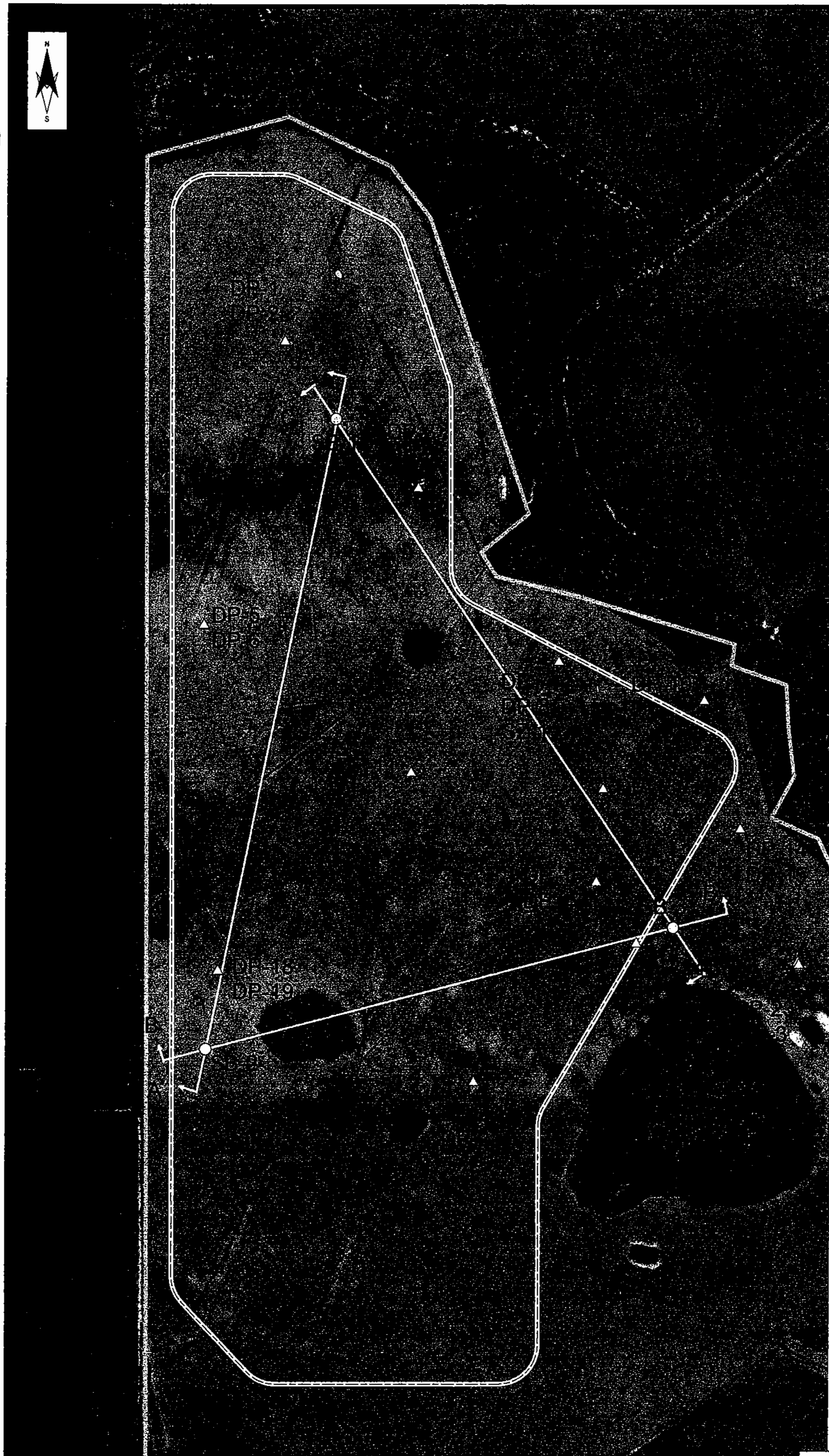
0 3.5 7 Miles

Figure 1. Site Location Map

OMNI Waste of Osceola County, LLC

Oak Hammock Disposal

Osceola County, Florida



Legend

Piezometer

▲ *DP-1*

Sonic Boring Location

● *SB-1*

Cross Section Location

Limit of Waste

Property Line

Location	Approx. Depth (ft, bls)
DP-1	50
DP-2	15
DP-3	50
DP-4	15
DP-5	50
DP-6	15
DP-7*	15
DP-8*	50
DP-9	50
DP-10	15
DP-11	50
DP-12	15
DP-13	15
DP-14	15
DP-15	50
DP-16	15
DP-17	50
DP-18	50
DP-19	15
DP-20	15
DP-21	50
DP-22	15
DP-23	50
DP-24	15
SZ-1*	78.3
SZ-2	72
SZ-3	75.9
SB-1	177
SB-2	147
SB-3	157

*Note: Piezometer instrumented with transducer / data logger.

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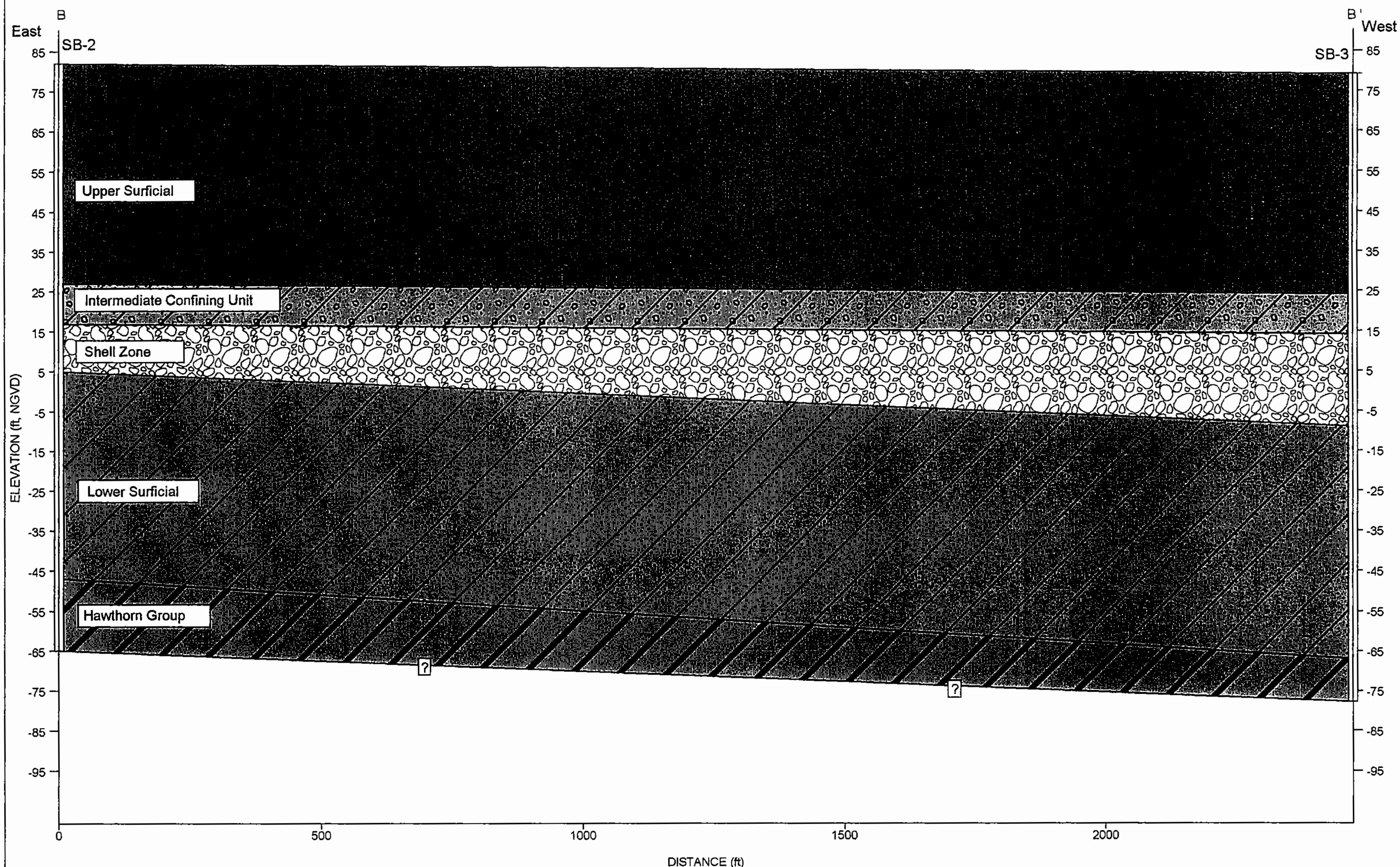
-Environmental Consultants-

0 360 720 1,440 Feet

Figure 2. Site Plan
OMNI Waste of Osceola County, LLC
Oak Hammock Disposal
Osceola County, Florida



OMNI Waste Oak Hammock Site Investigation	LEGEND	Figure 4
Holopaw, FL	SANDS and SILTY SANDS	Generalized Geologic Cross Section
Project # 48OH01	SANDY CLAY / CLAYEY SAND / SANDY SHELLY CLAY	B - B'
Kubal-Furr & Associates -Environmental Consultants-	"SHELL ZONE" - SHELL HASH MIXED WITH VARYING AMOUNTS OF SAND AND CLAY	Section East-West SB-2 to SB-3
	CLAYEY SANDS / SANDY CLAYS / SILTY SANDS (MIXED WITH VARYING AMOUNTS OF SHELL FRAGMENTS)	
	HAWTHORN GROUP	

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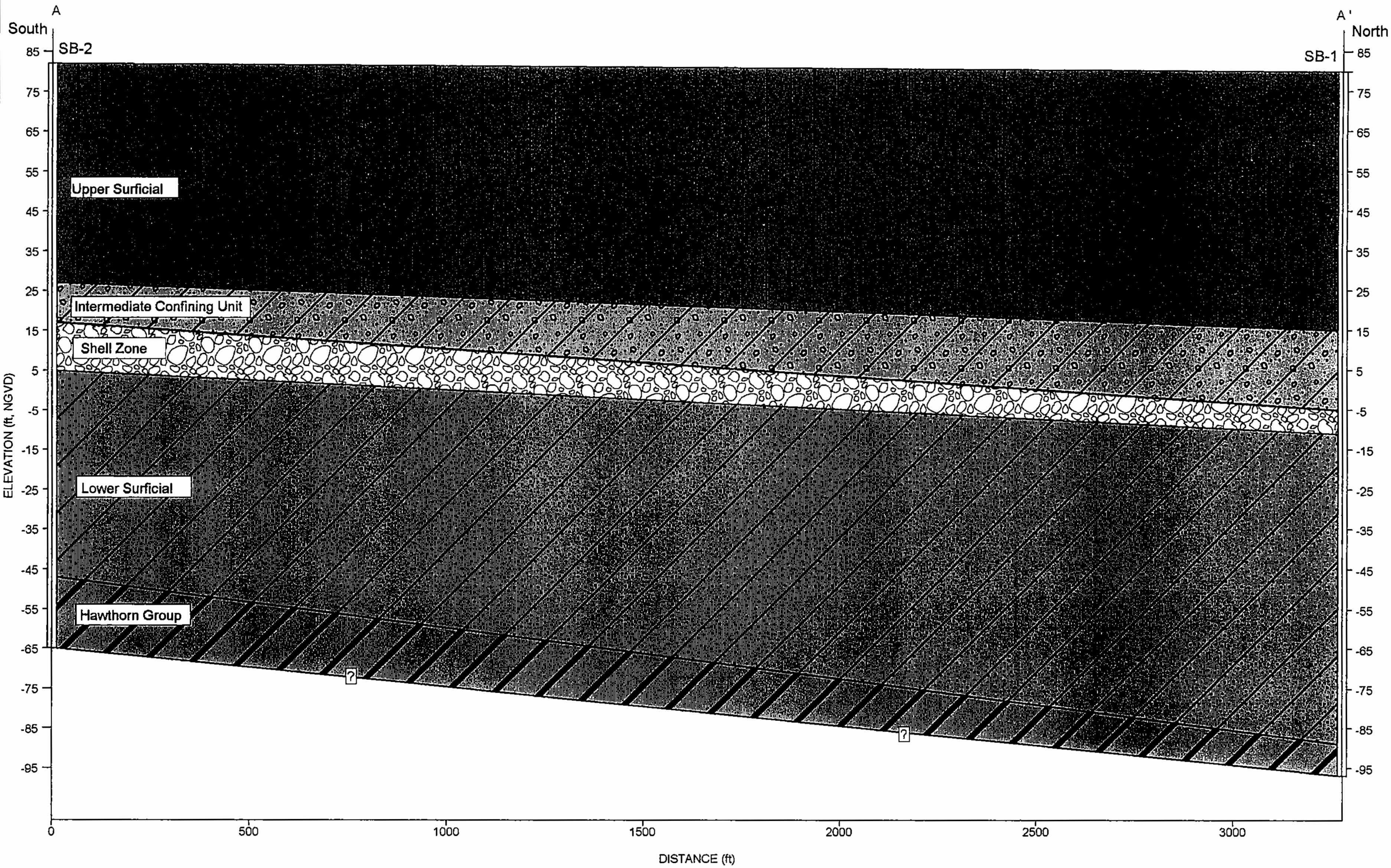

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Kubal-Furr & Associates
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LEGEND

- SANDS and SILTY SANDS
- SANDY CLAY / CLAYEY SAND / SANDY SHELLY CLAY
- "SHELL ZONE" - SHELL HASH MIXED WITH VARYING AMOUNTS OF SAND AND CLAY
- CLAYEY SANDS / SANDY CLAYS / SILTY SANDS (MIXED WITH VARYING AMOUNTS OF SHELL FRAGMENTS)
- HAWTHORN GROUP

Figure 3

Generalized Geologic Cross Section
A - A'
Section South-North
SB-2 to SB-1

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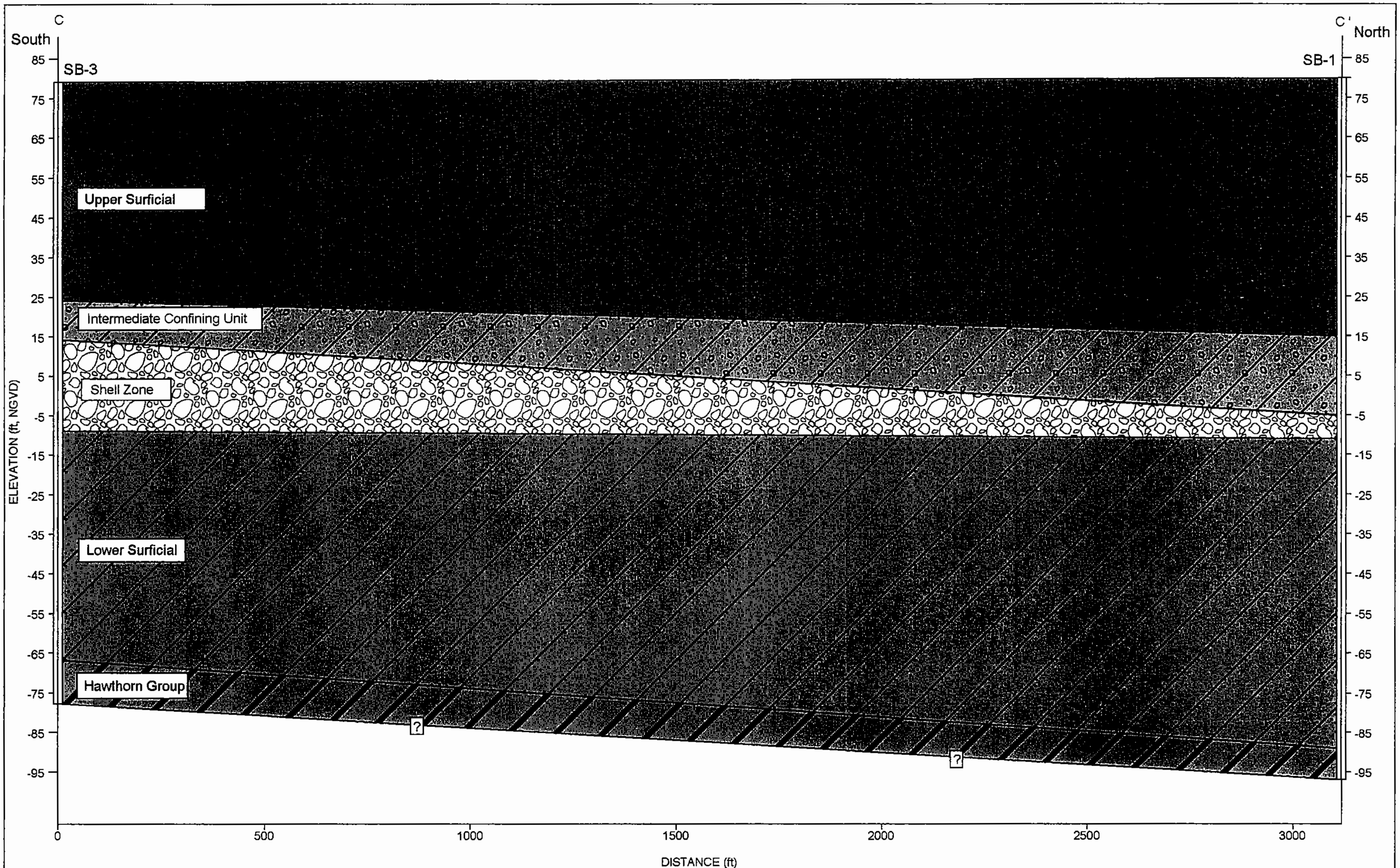

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Kubal-Furr & Associates
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LEGEND

- SANDS and SILTY SANDS
- SANDY CLAY / CLAYEY SAND / SANDY SHELLY CLAY
- "SHELL ZONE" - SHELL HASH MIXED WITH VARYING AMOUNTS OF SAND AND CLAY
- CLAYEY SANDS / SANDY CLAYS / SILTY SANDS (MIXED WITH VARYING AMOUNTS OF SHELL FRAGMENTS)
- HAWTHORN GROUP

Figure 5

Generalized Geologic Cross Section
C - C'
Section South-North
SB-3 to SB-1

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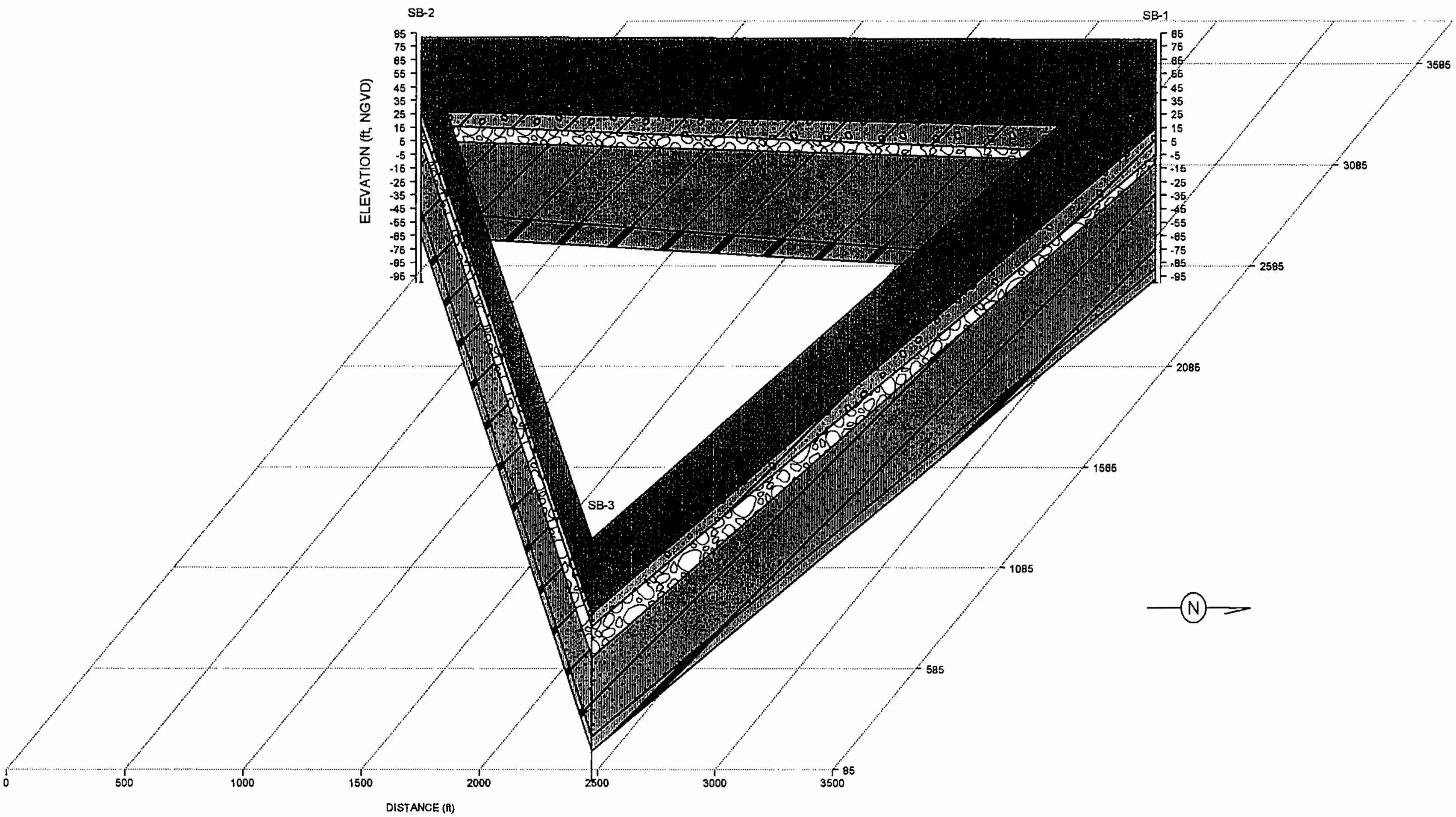

LEGEND

- SANDS and SILTY SANDS
- SANDY CLAY / CLAYEY SAND / SANDY SHELLY CLAY
- "SHELL ZONE" - SHELL HASH MIXED WITH VARYING AMOUNTS OF SAND AND CLAY
- CLAYEY SANDS / SANDY CLAYS / SILTY SANDS (MIXED WITH VARYING AMOUNTS OF SHELL FRAGMENTS)
- HAWTHORN GROUP

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

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Figure 6

Generalized Fence Diagram

Facing West

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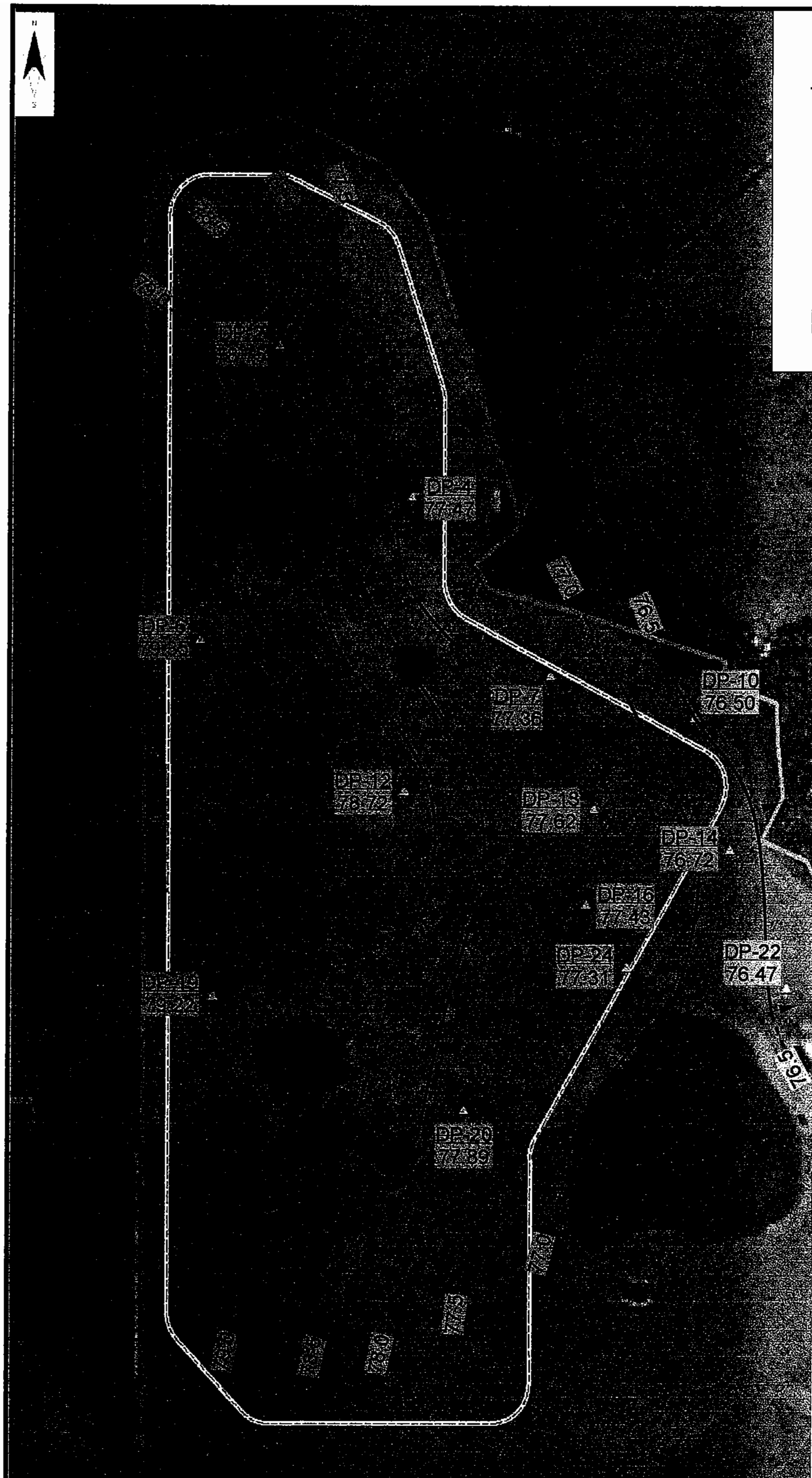


Legend

—78.5—	**Potentiometric Contour** *(Dashed where Inferred)*
➝	**Inferred Direction of Ground-Water Flow**
DP-2 78.75	**Piezometer** **Water-Level Elevation** *(ft, NGVD)*
⌐ - - ¬	**Limit of Waste**
▭	**Property Line**

Kubal-Furr & Associates
-Environmental Consultants-

0 270 540 1,080 Feet

Figure 7. Potentiometric Surface Map
Upper Surficial Aquifer / A-Zone (15-ft)
December 3, 2001
OMNI Waste of Osceola County, LLC
Oak Hammock Disposal
Osceola County, Florida

Legend

—78.5— **Potentiometric Contour** *(Dashed where Inferred)*

Inferred Direction of Ground-Water Flow

DP-2 78.75 **Piezometer Water-Level Elevation** *(ft, NGVD)*

Limit of Waste

Property Line

Kubal-Furr & Associates
-Environmental Consultants-

0 270 540 1,080 Feet

Figure 8. Potentiometric Surface Map
Upper Surficial Aquifer / A-Zone (15-ft)
February 8, 2002
OMNI Waste of Osceola County, LLC
Oak Hammock Disposal
Osceola County, Florida

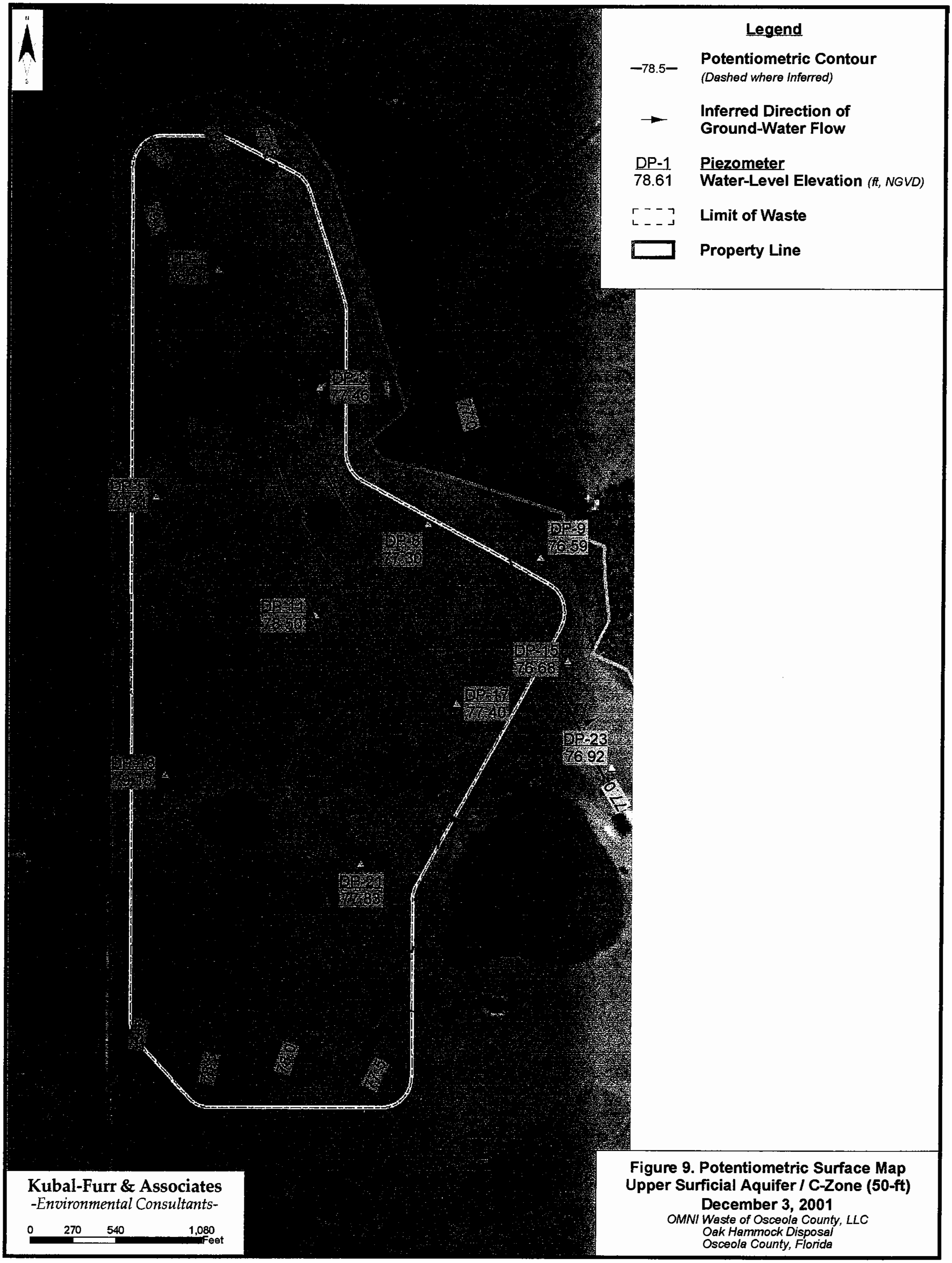


Figure 9. Potentiometric Surface Map
Upper Surficial Aquifer / C-Zone (50-ft)
December 3, 2001
OMNI Waste of Osceola County, LLC
Oak Hammock Disposal
Osceola County, Florida

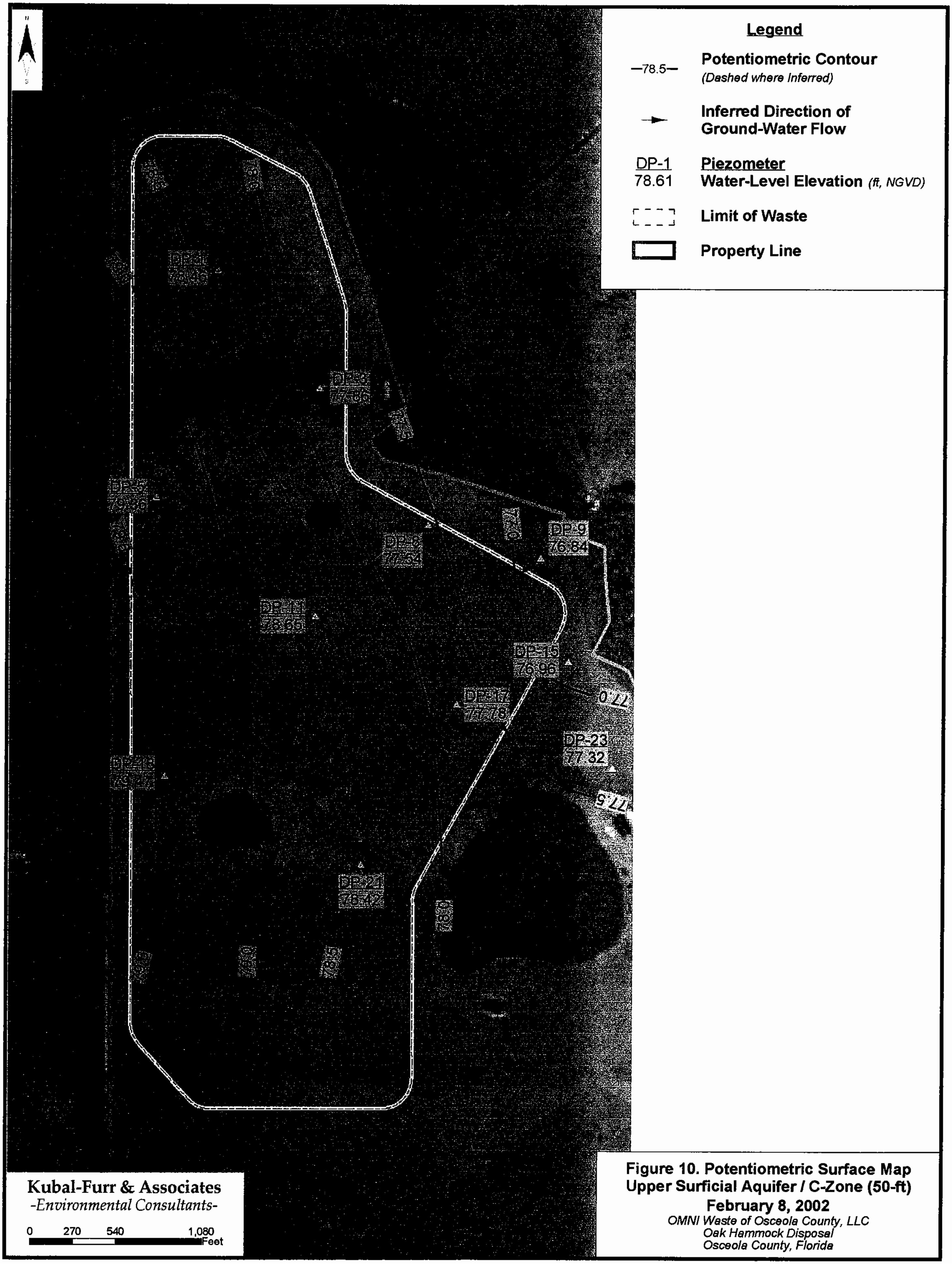


Figure 10. Potentiometric Surface Map
Upper Surficial Aquifer / C-Zone (50-ft)
February 8, 2002
OMNI Waste of Osceola County, LLC
Oak Hammock Disposal
Osceola County, Florida

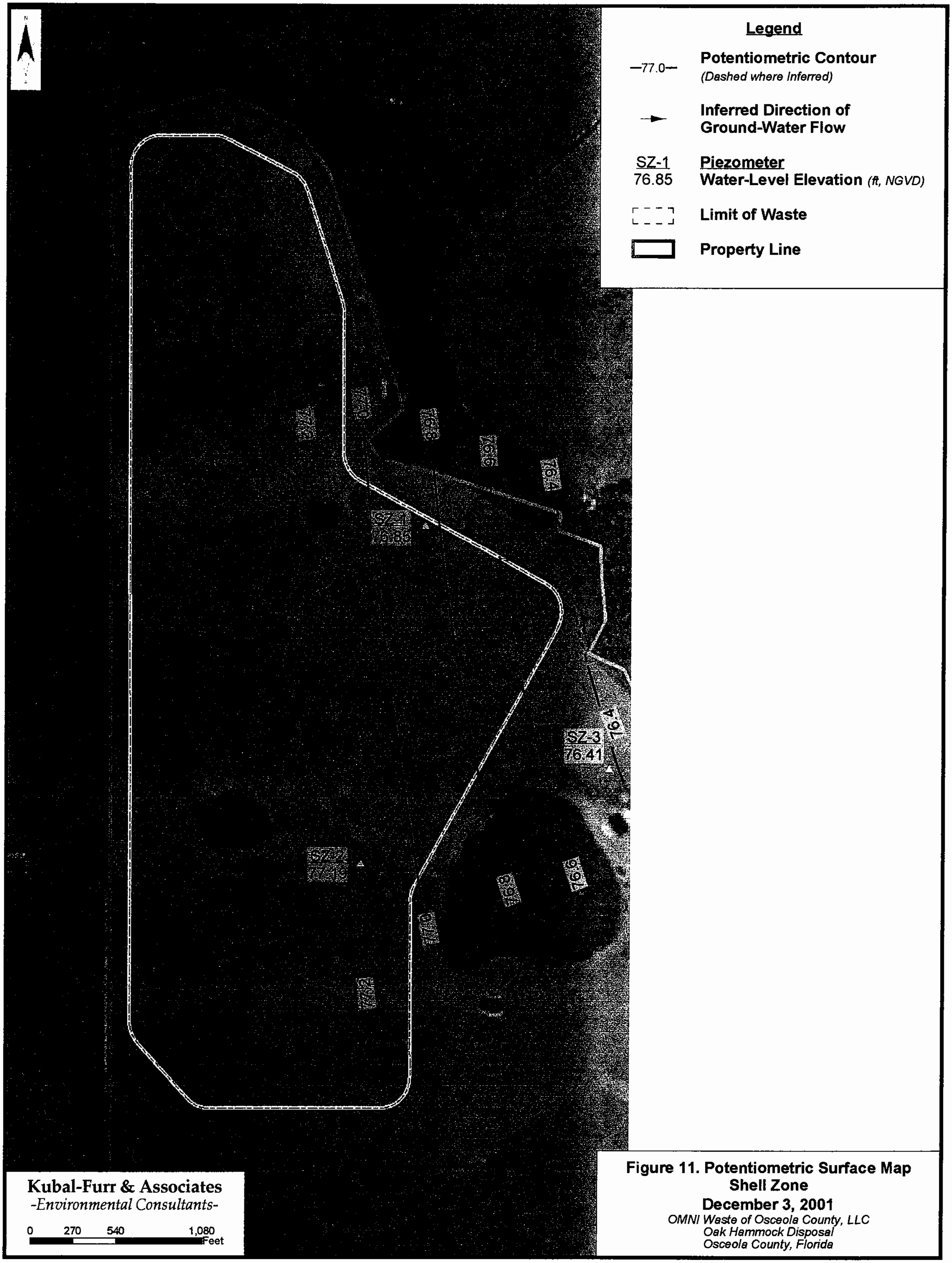


Figure 11. Potentiometric Surface Map
Shell Zone
December 3, 2001
OMNI Waste of Osceola County, LLC
Oak Hammock Disposal
Osceola County, Florida

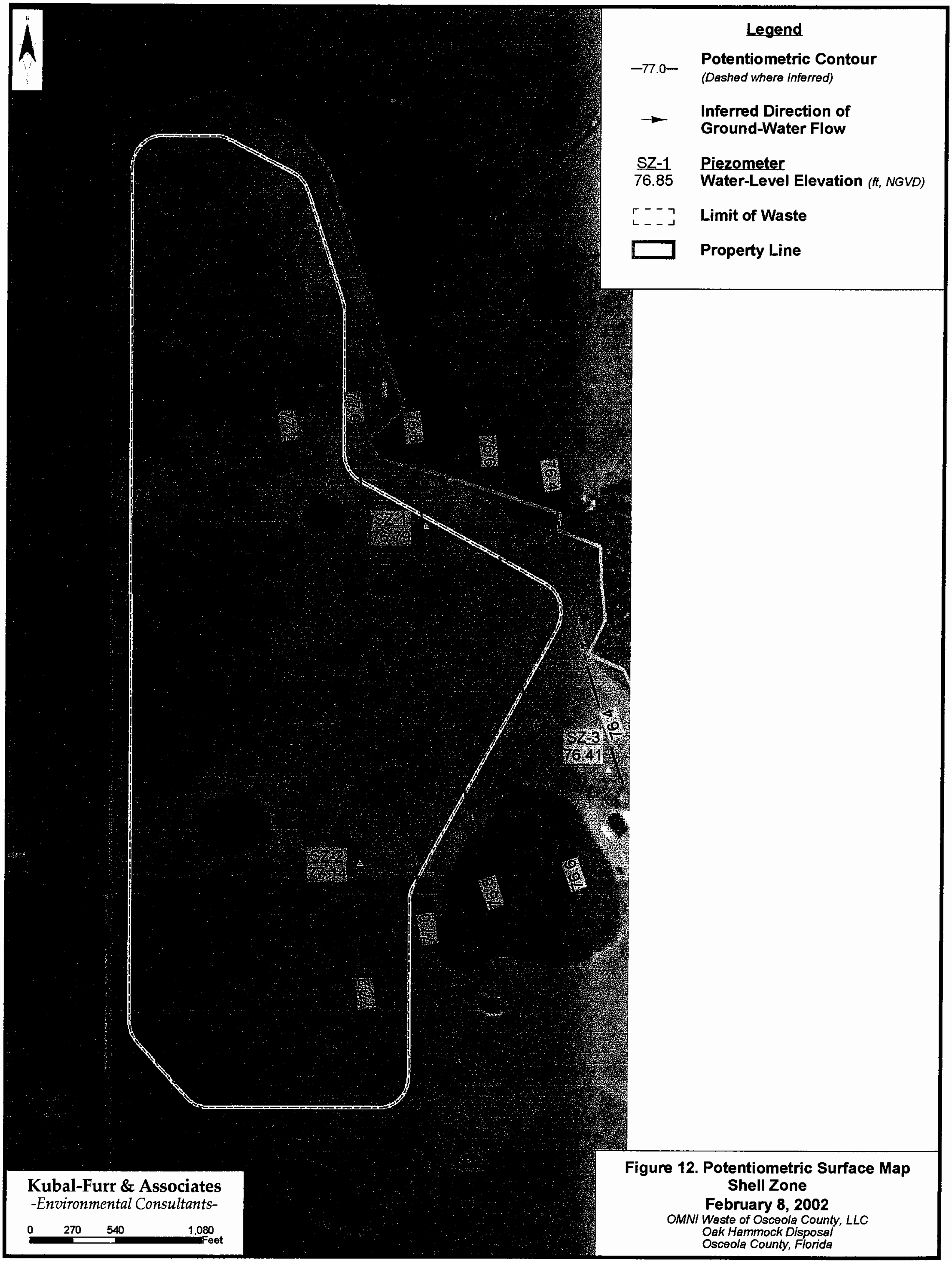
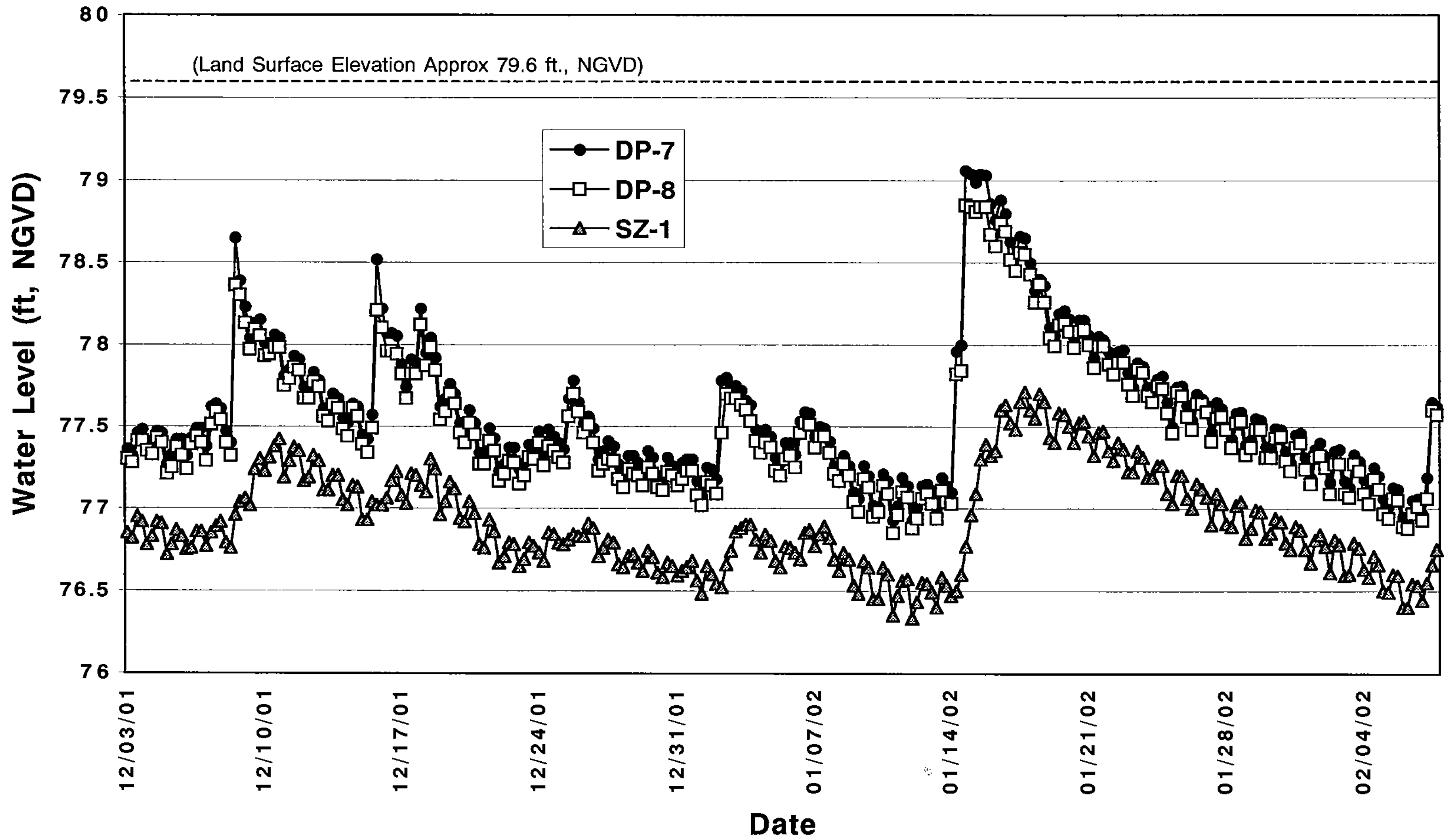


Figure 12. Potentiometric Surface Map
Shell Zone
February 8, 2002
OMNI Waste of Osceola County, LLC
Oak Hammock Disposal
Osceola County, Florida

Figure 13. Oak Hammock Hydrographs (DP-7/DP-8/SZ-1)



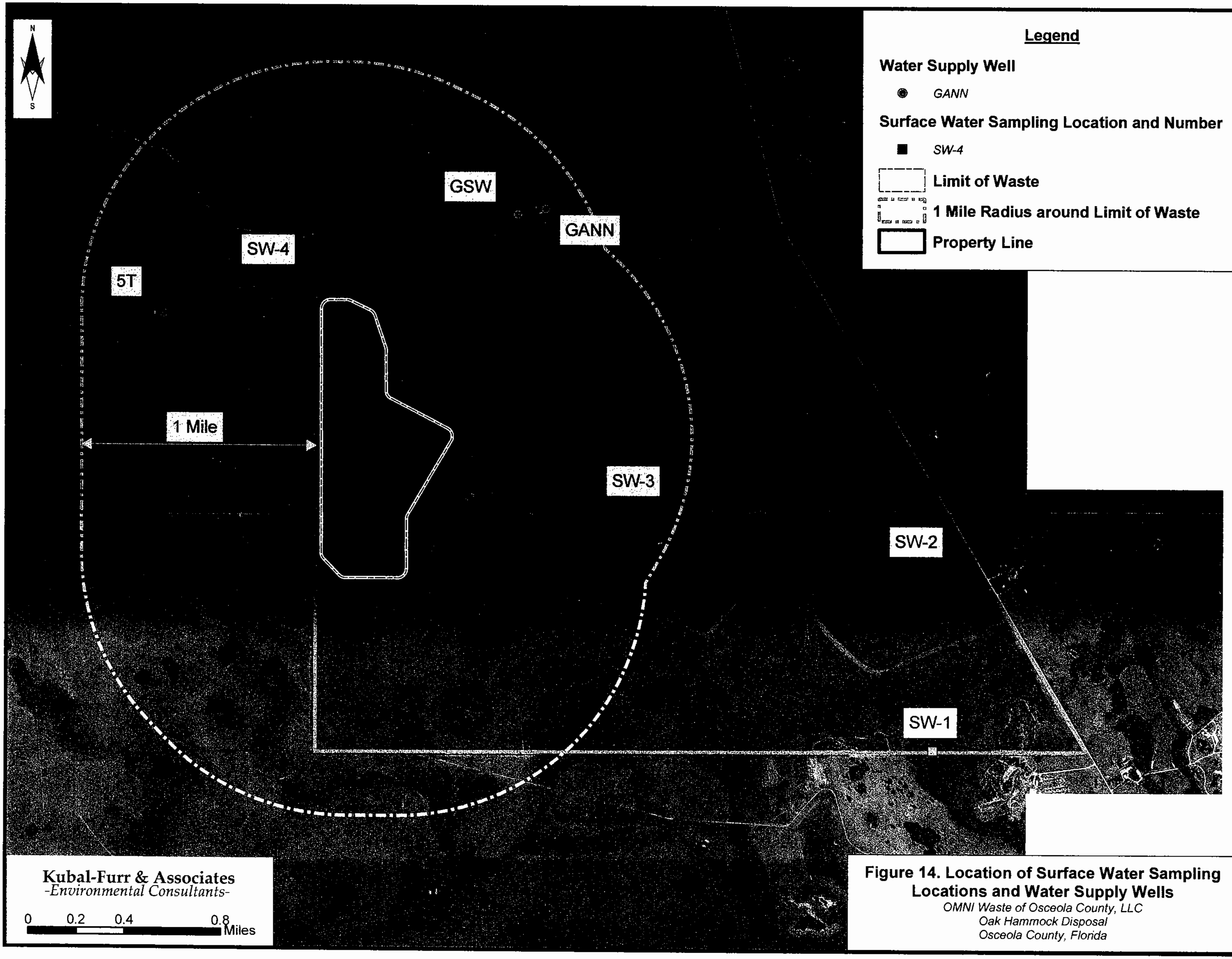
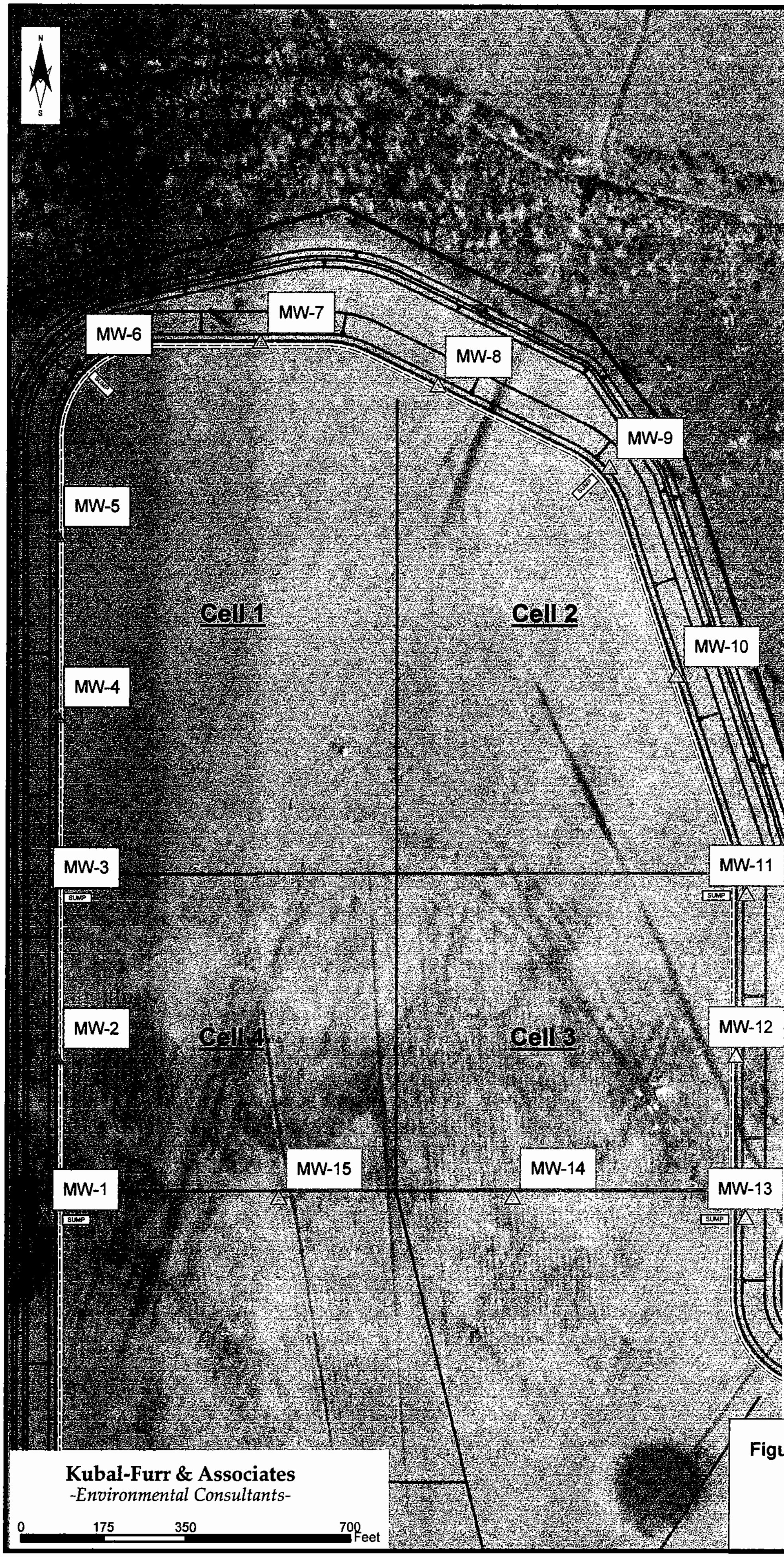


Figure 14. Location of Surface Water Sampling Locations and Water Supply Wells
OMNI Waste of Osceola County, LLC
Oak Hammock Disposal
Osceola County, Florida



Legend

- ▲ Proposed Monitor Well Cluster
- Limit of Waste
- Property Line
- Landfill Construction Detail

Well Spacing

Well Cluster	Approximate Spacing (ft)
MW-1 to MW-2	341
MW-2 to MW-3	341
MW-3 to MW-4	383
MW-4 to MW-5	382
MW-5 to MW-6	367
MW-6 to MW-7	391
MW-7 to MW-8	388
MW-8 to MW-9	404
MW-9 to MW-10	463
MW-10 to MW-11	488
MW-11 to MW-12	342
MW-12 to MW-13	342
MW-13 to MW-14	499
MW-14 to MW-15	497
MW-15 to MW-1	499

Note: Each monitor well cluster consists of an A-well, B-well and C-well. See text (Section 5.0) for descriptions and approximate depths.

Figure 15. Proposed Ground-Water Monitor Well Locations

OMNI Waste of Osceola County, LLC
Oak Hammock Disposal
Osceola County, Florida

Attachment 1

Lithologic Logs and Piezometer Construction Details

Kubal-Furr & Associates
-Environmental Consultants-

LOG OF BORING SB-1

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Date Started	: 11/2/01	Company Rep.	: K. Smith
Date Completed	: 11/3/01	Northing Coord.	: 1356401.00
Hole Diameter	: 4 inches	Easting Coord.	: 624799.00
Drilling Method	: Rotosonic	Survey By	: Johnston's Surveying
Sampling Method	: Rotosonic	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 80.00	GRAPHIC	DESCRIPTION	Samples	Shelby Tube Sample
0	80		SILTY SAND, Olive Black to Brown, well sorted, fine grained	1	
5	75			2	
10	70		SAND, Moderate Yellowish Brown, well sorted, fine grained with minor silt	3	
15	65			4	
20	60			5	
25	55		SILTY SAND, Dark Yellowish Brown to Gray to Dark Gray to Grayish Black, medium-fine grained, sub-angular quartz grains, becoming more Silty 40-47ft	6	
30	50			7	
35	45			8	
40	40			9	
45	35		SILTY SAND, Light Olive Gray to Grayish Olive, with minor dark minerals (5%-10%), well sorted, fine grained, DISTURBED SAMPLE- 55'-65'	10	
50	30			11	
55	25			12	
60	20			13	
65	15		DISTURBED SAMPLE-65'-75' CLAYEY SAND, Grayish Olive with minor shell fragments	14	
70	10		SANDY SHELLY CLAY, Light Olive Gray to Light Olive	15	
75	5			16	
80	0			17	
85	-5		SHELL HASH with minor clay, Yellowish Gray, Some whole shells, fragments from 2mm-50mm	18	
90					

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LOG OF BORING SB-1

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/2/01	Company Rep.	: K. Smith
Date Completed	: 11/3/01	Northing Coord.	: 1356401.00
Hole Diameter	: 4 inches	Easting Coord.	: 624799.00
Drilling Method	: Rotosonic	Survey By	: Johnston's Surveying
Sampling Method	: Rotosonic	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 80.00	GRAPHIC	DESCRIPTION	Samples	Shelby Tube Sample
90	-10		SHELLY SILTY SAND with Partially Cemented Shells, Grayish Olive	19	
95	-15			20	
100	-20		SILTY SAND with minor Shell fragments, Light Olive Gray, fine grained	21	
105	-25		CLAYEY SAND/SANDY CLAY with minor Shell fragments, Light Olive Gray to Grayish Olive, fine grained	22	
110	-30			23	
115	-35			24	
120	-40			25	
125	-45			26	
130	-50			27	
135	-55		SILTY SAND with Shell fragments (2mm-25mm), and minor Dark Minerals, Grayish Olive, well sorted, fine grained	28	
140	-60			29	
145	-65			30	
150	-70			31	
155	-75		CLAYEY SAND with Shell fragments, Grayish Olive, fine grained	32	
160	-80			33	
165	-85		CALCAREOUS SAND with Shell fragments, Grayish Olive, fine grained	34	
170	-90		CLAY, STIFF, PLASTIC, with fine Phosphatic nodules, Olive Gray (Top of Hawthorn Group)	35	
175	-95			36	175-177'
180					

Kubal-Furr & Associates
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LOG OF BORING SB-2

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Date Started	: 10/31/01	Company Rep.	: K. Smith
Date Completed	: 11/01/01	Northing Coord.	: 1353191.00
Hole Diameter	: 4 inches	Easting Coord.	: 624139.00
Drilling Method	: Rotosonic	Survey By	: Johnston's Surveying
Sampling Method	: Rotosonic	Logged By	: G. Kinsman / J. Furr

Depth in Feet | Surf. Elev. 82.00 | GRAPHIC | DESCRIPTION | Samples | Shelby Tube Sample

Depth in Feet	Surf. Elev. 82.00	DESCRIPTION
0	82	SILTY SAND, Gray
2.5		SILT,Dark Black, Organic Rich at top grading less organic to Dark Brown SILT
5	77	
10	72	
12.5		SAND, PaleYellowish Brown, well sorted, sub-angular quartz grains, fine grained with minor silt
15	67	
20	62	SILTY SAND, Dark Brown to Olive Gray to Dusky Yellowish Green, fine grained, less Silty 25-35ft.
25	57	
30	52	
35	47	
40	42	
45	37	
50	32	
55	27	DISTURBED SAMPLE-55-65' CLAY with Shell fragments (1mm-2mm), Grayish Green
60	22	
65	17	SHELL HASH with Shell fragments 2mm-50mm, Fragments included complete Gastopods, Bivalves, Yellowish Gray, Poorly Sorted
70	12	
75		

Samples (depth interval, ft)	
0–5	1
5–10	2
10–15	3
15–20	4
20–25	5
25–30	6
30–35	7
35–40	8
40–45	9
45–50	10
50–55	11
55–60	12
60–65	13
65–70	14
70–75	15

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LOG OF BORING SB-2

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Date Started	: 10/31/01	Company Rep.	: K. Smith
Date Completed	: 11/01/01	Northing Coord.	: 1353191.00
Hole Diameter	: 4 inches	Easting Coord.	: 624139.00
Drilling Method	: Rotosonic	Survey By	: Johnston's Surveying
Sampling Method	: Rotosonic	Logged By	: G. Kinsman / J. Furr

Depth in Feet	Surf. Elev. 82.00	GRAPHIC	DESCRIPTION	Samples	Shelby Tube Sample
75	7				
			CLAYEY SAND to SANDY CLAY, medium to fine grained, Large Oyster Shell fragments (2mm-50mm), and Dark Minerals (10%) 90-115ft., Grayish Green to Dark Grayish Green	16	
80	2			17	
85	-3			18	
90	-8			19	
95	-13			20	
100	-18			21	
105	-23			22	
110	-28			23	
115	-33			24	
120	-38		CALCAREOUS SAND with Shell fragments, Grayish Olive, fine grained	25	
125	-43		CLAYEY SAND with Shell fragments, Olive Gray	26	
			CLAY with Shell fragments, Olive Gray,		
130	-48		SANDY CLAY with SHARKS TOOTH, 2mm-50mm PHOSPHATE NODULES and minor Shell fragments, Gray, (Top of Hawthorn Group)	27	
135	-53		CLAY, STIFF, PLASTIC with fine Phosphatic Nodules, fine sand stringers 143-145ft., Olive Gray	28	
140	-58			29	
145	-63			30	145-147'
150					

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LOG OF BORING SB-3

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/01/01	Company Rep.	: K. Smith
Date Completed	: 11/02/01	Northing Coord.	: 1353810.00
Hole Diameter	: 4 inches	Easting Coord.	: 626532.00
Drilling Method	: Rotosonic	Survey By	: Johnston's Surveying
Sampling Method	: Rotosonic	Logged By	: G. Kinsman / J. Furr

Columns: Depth in Feet | Surf. Elev. 79.20 | GRAPHIC | DESCRIPTION | Samples | Shelby Tube Sample

Depth in Feet	Surf. Elev. 79.20
0	79
5	74
10	69
15	64
20	59
25	54
30	49
35	44
40	39
45	34
50	29
55	24
60	19
65	14
70	9
75	4
80	

DESCRIPTION:

- SILTY SAND, Black, Organic-rich
- SILTY SAND, Pale Yellowish Brown
- SAND, PaleYellowish Brown, fine grained, clean quartz sand
- SILTY SAND, Dark Yellowish Brown to Grayish Brown to Grayish Olive, Medium to fine grained
- SANDY SILTY CLAY with large (1-mm-50mm) fragments, Grayish Olive Green
- SHELLY SAND with large Shell fragments (1-mm-50mm), Yellowish Gray, some whole shells
- SHELL HASH with CLAY, Shell fragments from 5mm-50mm, Yellowish Gray
- SHELLY SAND with fragments from 5mm-25mm, Yellowish Gray to Pale Greenish Yellow

Samples: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

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-Environmental Consultants-

LOG OF BORING SB-3

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Date Started	: 11/01/01	Company Rep.	: K. Smith
Date Completed	: 11/02/01	Northing Coord.	: 1353810.00
Hole Diameter	: 4 inches	Easting Coord.	: 626532.00
Drilling Method	: Rotosonic	Survey By	: Johnston's Surveying
Sampling Method	: Rotosonic	Logged By	: G. Kinsman / J. Furr

Depth in Feet	Surf. Elev. 79.20	GRAPHIC	DESCRIPTION	Samples	Shelby Tube Sample
80	-1			17	
85	-6			18	
90	-11		CLAYEY SAND, Pale Olive to Grayish Olive, well sorted, fine grained, mixed with minor Shell fragments 95-146ft.	19	
95	-16			20	
100	-21			21	
105	-26			22	
110	-31			23	
115	-36			24	
120	-41			25	
125	-46			26	
130	-51			27	
135	-56			28	
140	-61			29	
145	-66		SANDY CLAY with PHOSPHATE NODULES and Shell fragments, Olive Gray, (Top of Hawthorn Group)	30	
150	-71		CLAY, STIFF, PLASTIC, with fine Phosphatic Nodules, Olive Gray, (Hawthorn Group)	31	
155	-76			32	155-157'
160					

Kubal-Furr & Associates

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LOG OF BORING DP-1/2

OMNI Waste
Oak Hammock
Site Investigation

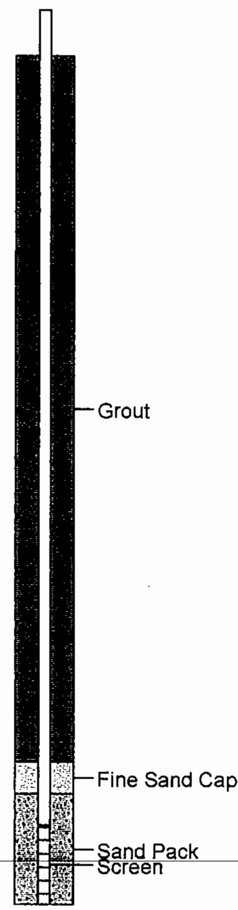
Holopaw, FL

Project # 48OH01

Date Started	: 11/5/01	Company Rep.	: B. Chitten
Date Completed	: 11/6/01	Northing Coord.	: 1356797.91
Hole Diameter	: 1.5 in.	Easting Coord.	: 624537.79
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 81.20	GRAPHIC	DESCRIPTION
0	81		SAND, Dark Gray to Yellowish Gray, well sorted, fine grained
			SILTY SAND, Brownish Black, fine grained
5	76		SAND, Gray grading into Yellowish Gray, fine grained
10	71		SILTY SAND, Brownish Black grading to Moderate Brown to Moderate Yellowish Brown, well sorted, fine grained
15	66		
20	61		SAND, Pale Yellowish Brown
25	56		SILTY SAND, Dusky Yellowish Brown, well sorted, fine grained grading coarser into Moderate Yellowish Brown, medium to fine grained
30	51		
35	46		
40	41		
45	36		SILTY SAND with minor Dark Minerals (5% grading to 10%), Grayish Olive
50	31		
55	26		
60	21		SAND with Dark Minerals (10%) Slightly Silty in top portion but grading out into Sand, Olive Gray to Yellowish Gray, medium to fine grained
65	16		
70	11		SILTY SAND with Dark Minerals, Dark Gray, fine grained
75	6		CLAYEY SAND, Dark Gray, grades more clayey
80			

Piezometer: DP-1
TOC Elev.: 84.12



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/5/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK	: 20/30 Sand
FINE SAND CAP	: 30/45 Sand

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LOG OF BORING DP-1/2

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Date Started	: 11/5/01	Company Rep.	: B. Chitten
Date Completed	: 11/6/01	Northing Coord.	: 1356802.93
Hole Diameter	: 1.5 in.	Easting Coord.	: 624536.96
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 81.20
0	81
5	76
10	71
15	66
20	61
25	56
30	51
35	46
40	41
45	36
50	31
55	26
60	21
65	16
70	11
75	6
80	

GRAPHIC

DESCRIPTION

SAND, Dark Gray to Yellowish Gray, well sorted, fine grained

SILTY SAND, Brownish Black, fine grained

SAND, Gray grading into Yellowish Gray, fine grained

SILTY SAND, Brownish Black grading to Moderate Brown to Moderate Yellowish Brown, well sorted, fine grained

SAND, Pale Yellowish Brown

SILTY SAND, Dusky Yellowish Brown, well sorted, fine grained grading coarser into Moderate Yellowish Brown, medium to fine grained

SILTY SAND with minor Dark Minerals (5% grading to 10%), Grayish Olive

SAND with Dark Minerals (10%) Slightly Silty in top portion but grading out into Sand, Olive Gray to Yellowish Gray, medium to fine grained

SILTY SAND with Dark Minerals, Dark Gray, fine grained

CLAYEY SAND, Dark Gray, grades more clayey

Piezometer: DP-2
TOC Elev.: 84.11

Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/6/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

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LOG OF BORING DP-3/4

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/7/01	Company Rep.	: B. Chitten
Date Completed	: 11/7/01	Northing Coord.	: 1356050.85
Hole Diameter	: 1.5 in.	Easting Coord.	: 625213.95
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 79.30
0	79
5	74
10	69
15	64
20	59
25	54
30	49
35	44
40	39
45	34
50	29
55	24
60	19
65	14
70	9
75	

GRAPHIC

DESCRIPTION

SILTY SAND, Grayish Black grading into Grayish Brown to Grayish Orange well sorted, fine grained

SAND with minor Dark Minerals, White, fine grained

SILTY SAND, Grayish Orange grading more silty into Dark Yellowish Brown to Dark Gray, well sorted, fine grained

SILTY SAND, Dusky Yellowish Brown fine grained grading more coarse into Moderate Yellowish Brown medium to fine grained

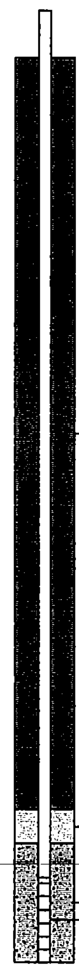
SILTY SAND with Dark Minerals, Grayish Olive, well sorted, fine grained, medium grains of Dark Minerals at 50ft.

SILTY SAND with minor Dark Minerals, Moderate Yellowish Brown to Pale Olive to Grayish Olive, well sorted, fine grained

SILTY CLAYEY SAND with Cemented Clay Nodules, Grayish Olive

SILTY SAND, Grayish Olive

Piezometer: DP-3
TOC Elev.: 82.22



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/7/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

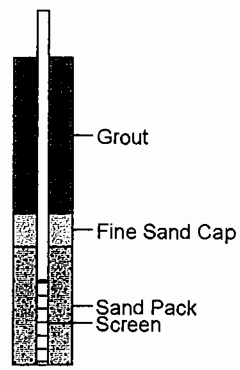
Kubal-Furr & Associates -Environmental Consultants-	LOG OF BORING DP-3/4 (Page 1 of 1)

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/7/01	Company Rep.	: B. Chitten
Date Completed	: 11/7/01	Northing Coord.	: 1356053.84
Hole Diameter	: 1.5 in.	Easting Coord.	: 625219.58
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Piezometer: DP-4
TOC Elev.: 82.24

Depth in Feet	Surf. Elev. 79.30	DESCRIPTION
0	79	SILTY SAND, Grayish Black grading into Grayish Brown to Grayish Orange well sorted, fine grained
5	74	
10	69	SAND with minor Dark Minerals, White, fine grained
		SILTY SAND, Grayish Orange grading more silty into Dark Yellowish Brown to Dark Gray, well sorted, fine grained
15	64	
20	59	
25	54	
30	49	
35	44	
		SILTY SAND, Dusky Yellowish Brown fine grained grading more coarse into Moderate Yellowish Brown medium to fine grained
40	39	
45	34	SILTY SAND with Dark Minerals, Grayish Olive, well sorted, fine grained, medium grains of Dark Minerals at 50ft.
50	29	SILTY SAND with minor Dark Minerals, Moderate Yellowish Brown to Pale Olive to Grayish Olive, well sorted, fine grained
55	24	
60	19	
65	14	SILTY CLAYEY SAND with Cemented Clay Nodules, Grayish Olive
		SILTY SAND, Grayish Olive
70	9	
75		



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/6/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

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LOG OF BORING DP-5/6

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Date Started	: 11/6/01	Company Rep.	: B. Chitten
Date Completed	: 11/6/01	Northing Coord.	: 1355353.25
Hole Diameter	: 1.5 in.	Easting Coord.	: 624128.08
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

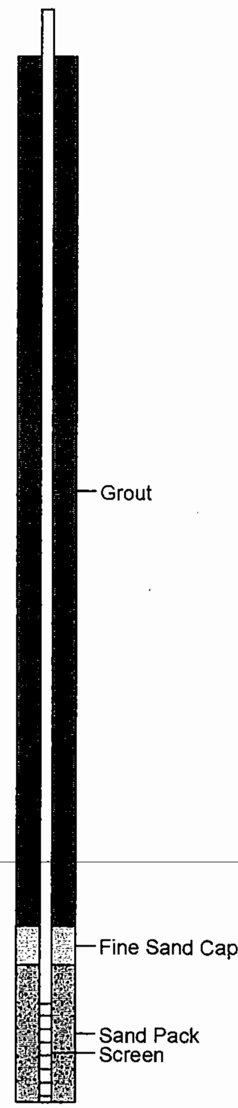
Depth in Feet | Surf. Elev. 81.60 | GRAPHIC | DESCRIPTION

Depth in Feet	Surf. Elev. 81.60
0	81
5	76
10	71
15	66
20	61
25	56
30	51
35	46
40	41
45	36
50	31
55	26
60	21
65	

DESCRIPTION

- SILTY SAND, Black, well sorted, fine grained
- SAND, Very Light Gray, fine grained
- SILTY SAND, Black grading to Dark Yellowish Brown to Black, well sorted, fine grained
- SILTY SAND with minor Dark Minerals, Moderate Brown grading into Moderate Yellowish Brown, well sorted, fine grained
- SILTY SAND, Moderate Yellowish Brown grading into Black to Grayish Brown, fine grained
- SILTY SAND with Dark Minerals (10%), Dark Yellowish Brown, well sorted, fine grained
- SILTY SAND with Dark Minerals, Light Olive Gray grading into Olive Gray, well sorted, fine grained
- SILTY SAND with small (2mm-15mm) Moderate Yellowish Brown Cemented Clay Nodules, Grayish Black
- CLAYEY SILTY SAND, Grayish Black, well sorted, fine grained
- CLAYEY SAND, Grayish Black

Piezometer: DP-5
TOC Elev.: 84.13



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/6/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Kubal-Furr & Associates -Environmental Consultants-	LOG OF BORING DP-5/6 (Page 1 of 1)

OMNI Waste Oak Hammock Site Investigation Holopaw, FL Project # 48OH01				
	Date Started	: 11/6/01	Company Rep.	: B. Chitten
	Date Completed	: 11/6/01	Northing Coord.	: 1355356.37
	Hole Diameter	: 1.5 in.	Easting Coord.	: 624125.45
	Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
	Sampling Method	: Geoprobe	Logged By	: G. Kinsman

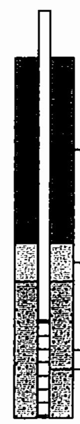
Depth in Feet	Surf. Elev. 81.60
0	81
5	76
10	71
15	66
20	61
25	56
30	51
35	46
40	41
45	36
50	31
55	26
60	21
65	

GRAPHIC

DESCRIPTION

- SILTY SAND, Black, well sorted, fine grained
- SAND, Very Light Gray, fine grained
- SILTY SAND, Black grading to Dark Yellowish Brown to Black, well sorted, fine grained
- SILTY SAND with minor Dark Minerals, Moderate Brown grading into Moderate Yellowish Brown, well sorted, fine grained
- SILTY SAND, Moderate Yellowish Brown grading into Black to Grayish Brown, fine grained
- SILTY SAND with Dark Minerals (10%), Dark Yellowish Brown, well sorted, fine grained
- SILTY SAND with Dark Minerals, Light Olive Gray grading into Olive Gray, well sorted, fine grained
- SILTY SAND with small (2mm-15mm) Moderate Yellowish Brown Cemented Clay Nodules, Grayish Black
- CLAYEY SILTY SAND, Grayish Black, well sorted, fine grained
- CLAYEY SAND, Grayish Black

Piezometer: DP-6
TOC Elev.: 84.23



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/6/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK	: 20/30 Sand
FINE SAND CAP	: 30/45 Sand

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LOG OF BORING DP-7/8

OMNI Waste
Oak Hammock
Site Investigation

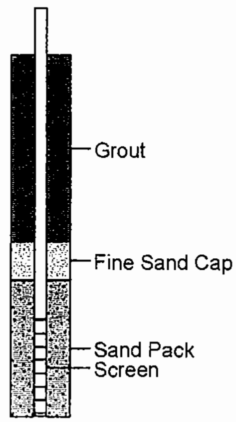
Holopaw, FL

Project # 48OH01

Date Started	: 11/7/01	Company Rep.	: B. Chitten
Date Completed	: 11/8/01	Northing Coord.	: 1355177.88
Hole Diameter	: 1.5 in.	Easting Coord.	: 625941.53
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 79.60	GRAPHIC	DESCRIPTION
0	79		SILTY SAND, Brownish Black grading into Dark Yellowish Brown to Pale Yellowish Brown to Dark Yellowish Brown, well sorted, fine grained
5	74		
10	69		
15	64		
20	59		SILTY SAND with Dark Minerals, Pale Yellowish Brown to Pale Brown to Dark Yellowish Brown, medium to fine grained grading to fine grained
25	54		SILTY SAND, Brownish Gray to Dusky Yellowish Brown to Dark Yellowish Brown, well sorted, fine grained
30	49		
35	44		
40	39		SILTY SAND with Dark Minerals, Dusky Yellowish Brown to Grayish Olive to Light Olive, fine grained
45	34		
50	29		
55	24		
60	19		CLAYEY SAND with Dark Minerals, Grayish Olive, fine grained
65			

Piezometer: DP-7
TOC Elev.: 82.63



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/7/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Kubal-Furr & Associates
-Environmental Consultants-

LOG OF BORING DP-7/8

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Date Started	: 11/7/01	Company Rep.	: B. Chitten
Date Completed	: 11/8/01	Northing Coord.	: 1355182.23
Hole Diameter	: 1.5 in.	Easting Coord.	: 625941.31
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet | Surf. Elev. 79.60 | GRAPHIC | DESCRIPTION

Depth in Feet	Surf. Elev. 79.60
0	79
5	74
10	69
15	64
20	59
25	54
30	49
35	44
40	39
45	34
50	29
55	24
60	19
65	

SILTY SAND, Brownish Black grading into Dark Yellowish Brown to Pale Yellowish Brown to Dark Yellowish Brown, well sorted, fine grained

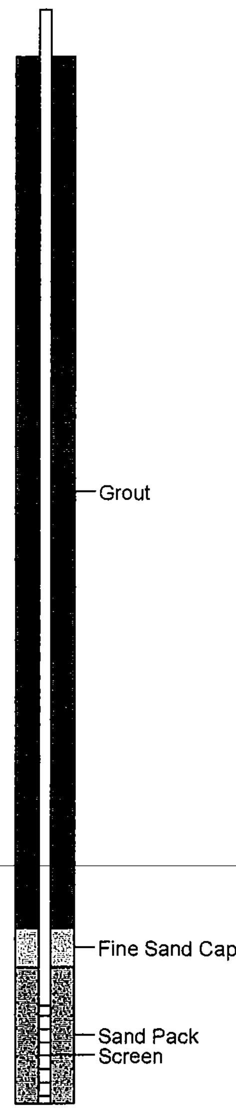
SILTY SAND with Dark Minerals, Pale Yellowish Brown to Pale Brown to Dark Yellowish Brown, medium to fine grained grading to fine grained

SILTY SAND, Brownish Gray to Dusky Yellowish Brown to Dark Yellowish Brown, well sorted, fine grained

SILTY SAND with Dark Minerals, Dusky Yellowish Brown to Grayish Olive to Light Olive, fine grained

CLAYEY SAND with Dark Minerals, Grayish Olive, fine grained

Piezometer: DP-8
TOC Elev.: 82.78



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/7/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK	: 20/30 Sand
FINE SAND CAP	: 30/45 Sand

Kubal-Furr & Associates
-Environmental Consultants-

LOG OF BORING DP-9/10

(Page 1 of 1)

OMNI Waste
Oak Hammock
Site Investigation

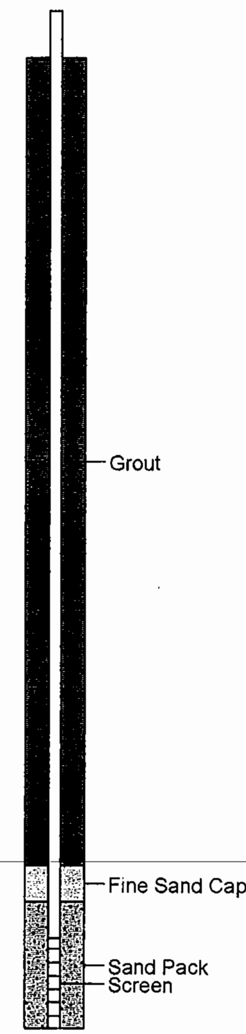
Holopaw, FL

Project # 48OH01

Date Started	: 11/8/01	Company Rep.	: B. Chitten
Date Completed	: 11/9/01	Northing Coord.	: 1354970.41
Hole Diameter	: 1.5 in.	Easting Coord.	: 626691.23
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 78.90	GRAPHIC	DESCRIPTION
0	78		SILTY SAND, Black grading through Moderate Yellowish Brown to Grayish Orange, well sorted, fine grained
5	73		
10	68		SAND, Clean White with minor Dark Minerals, well sorted fine grained
			SILTY SAND with minor Dark Minerals, well sorted, fine grained
15	63		SILTY SAND, Pale Yellowish Brown grading into Dark Yellowish Brown to Medium Gray, medium to fine grained, At 47' dark Yellowish Brown Clay Nodules
20	58		
25	53		
30	48		
35	43		
40	38		
45	33		
50	28		SILTY SAND, Grayish Olive, grades more silty, fine grained
55	23		
60	18		
65	13		SHELLY CLAY, Light Olive Gray
			SANDY CLAY with Shell Fragments, Light Olive Gray
70			

Piezometer: DP-9
TOC Elev.: 81.58



Piezometer Construction Information

PIEZOMETER CONSTRUCTION	
Date Compl.	: 11/8/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie
PIEZOMETER CASING	
Material	: PVC
Diameter	: 2 in.
Joints	: threaded
PIEZOMETER SCREEN	
Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot
SAND PACK	: 20/30 Sand
FINE SAND CAP	: 30/45 Sand

Kubal-Furr & Associates
-Environmental Consultants-

LOG OF BORING DP-9/10

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Date Started	: 11/8/01	Company Rep.	: B. Chitten
Date Completed	: 11/9/01	Northing Coord.	: 1354970.16
Hole Diameter	: 1.5 in.	Easting Coord.	: 626687.84
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Piezometer: DP-10
TOC Elev.: 81.59

Depth in Feet	Surf. Elev. 78.90	DESCRIPTION
0	78	SILTY SAND, Black grading through Moderate Yellowish Brown to Grayish Orange, well sorted, fine grained
5	73	
10	68	SAND, Clean White with minor Dark Minerals, well sorted fine grained
		SILTY SAND with minor Dark Minerals, well sorted, fine grained
15	63	SILTY SAND, Pale Yellowish Brown grading into Dark Yellowish Brown to Medium Gray, medium to fine grained, At 47' dark Yellowish Brown Clay Nodules
20	58	
25	53	
30	48	
35	43	
40	38	
45	33	
50	28	SILTY SAND, Grayish Olive, grades more silty, fine grained
55	23	
60	18	
65	13	SHELLY CLAY, Light Olive Gray
		SANDY CLAY with Shell Fragments, Light Olive Gray
70		

Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/8/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Kubal-Furr & Associates
-Environmental Consultants-

LOG OF BORING DP-11/12

OMNI Waste
Oak Hammock
Site Investigation

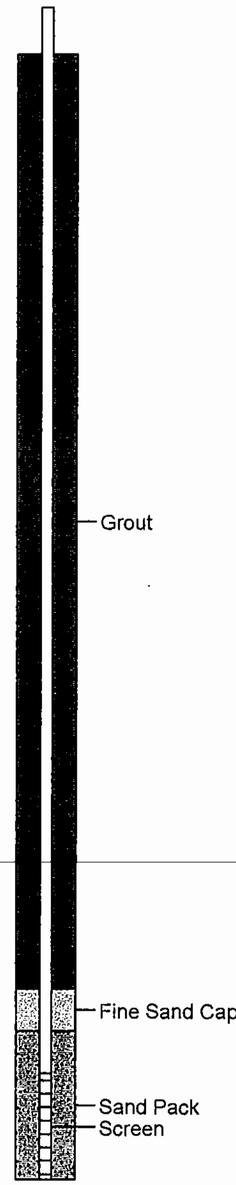
Holopaw, FL

Project # 48OH01

Date Started	: 11/27/01	Company Rep.	: B. Chitten
Date Completed	: 11/27/01	Northing Coord.	: 1354609.00
Hole Diameter	: 1.5 in.	Easting Coord.	: 625190.27
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 81.20	GRAPHIC	DESCRIPTION
0	81		SILTY SAND, Gray grading into Dusky Yellowish Brown to Grayish Orange, fine grained
5	76		
10	71		
15	66		
20	61		
			SILTY SAND, Moderate Yellowish Brown grading into Dusky Yellowish Brown, medium to fine grained
25	56		
30	51		
35	46		
40	41		SILTY SAND, Grayish Olive grading into Light Olive Gray to Grayish Olive, medium to fine grained, medium grained Black Pebbles at 56ft.
45	36		
50	31		
55	26		
60			Slightly SANDY CLAY, Grayish Olive

Piezometer: DP-11
TOC Elev.: 84..06



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/16/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Kubal-Furr & Associates -Environmental Consultants-	LOG OF BORING DP-11/12

OMNI Waste Oak Hammock Site Investigation Holopaw, FL Project # 48OH01				
	Date Started	: 11/27/01	Company Rep.	: B. Chitten
	Date Completed	: 11/27/01	Northing Coord.	: 1354604.52
	Hole Diameter	: 1.5 in.	Easting Coord.	: 625187.66
	Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
	Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Piezometer: DP-12
TOC Elev.: 84.18

Depth in Feet	Surf. Elev. 81.20	DESCRIPTION
0	81	SILTY SAND, Gray grading into Dusky Yellowish Brown to Grayish Orange, fine grained
5	76	
10	71	
15	66	
20	61	
		SILTY SAND, Moderate Yellowish Brown grading into Dusky Yellowish Brown, medium to fine grained
25	56	
30	51	
35	46	
40	41	
		SILTY SAND, Grayish Olive grading into Light Olive Gray to Grayish Olive, medium to fine grained, medium grained Black Pebbles at 56ft.
45	36	
50	31	
55	26	
		Slightly SANDY CLAY, Grayish Olive
60		

Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/12/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK	: 20/30 Sand
FINE SAND CAP	: 30/45 Sand

Kubal-Furr & Associates
-Environmental Consultants-

PIEZOMETER DP-13

OMNI Waste
Oak Hammock
Site Investigation

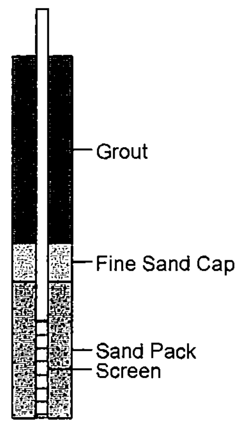
Holopaw, FL

Project # 48OH01

Date Started	: 11/12/01	Company Rep.	: B. Chitten
Date Completed	: 11/23/01	Northing Coord.	: 1354519.86
Hole Diameter	: 1.5 in.	Easting Coord.	: 626168.29
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 80.00	GRAPHIC	DESCRIPTION
0	80		SILTY SAND, Gray grading into Dark Yellowish Brown to Grayish Orange to Dark Yellowish Brown, fine grained
5	75		
10	70		
15	65		
20	60		
25	55		
30	50		
35	45		SILTY SAND with minor Dark Minerals, Grayish Orange grading more silty into Dark Gray, medium to fine grained
40	40		
45	35		
50	30		
55	25		CLAYEY SILTY SAND with minor Black Pebbles, Grayish Olive, fine grained
			CLAYEY SAND, Grayish Olive
60	20		
65			

Piezometer: DP-13
TOC Elev.: 83.09



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/12/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK	: 20/30 Sand
FINE SAND CAP	: 30/45 Sand

No Geoprobe boring performed at DP-13. Lithology taken from closest boring, DP-16/17.

Kubal-Furr & Associates

-Environmental Consultants-

LOG OF BORING DP-14/15

OMNI Waste
Oak Hammock
Site Investigation

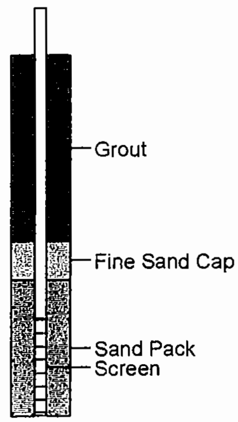
Holopaw, FL

Project # 48OH01

Date Started	: 11/12/01	Company Rep.	: B. Chitten
Date Completed	: 11/12/01	Northing Coord.	: 1354321.35
Hole Diameter	: 1.5 in.	Easting Coord.	: 626873.19
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 78.90	GRAPHIC	DESCRIPTION
0	78		SILTY SAND, Black grading into Dark Gray to Pale Yellowish Brown, fine grained, Dark Yellow Nodules at 3.5
5	73		SILTY SAND, Grayish Orange with Wood Fragments
			SILTY SAND, Pale Yellowish Brown grading into Dark Yellowish Brown to Grayish Brown, fine grained
10	68		
15	63		
20	58		SILTY SAND, Dark Yellowish Brown grading into Dusky Yellowish Brown to Grayish Black, medium to fine grained
25	53		
30	48		
35	43		
40	38		
45	33		SILTY SAND, Olive Gray to Light Olive Gray, fine grained
50	28		
55	23		
60	18		CLAYEY SILTY SAND, Olive Gray, fine grained
			CLAYEY SHELLY SAND with Black Nodules (1mm-5mm), Olive Gray
65			

Piezometer: DP-14
TOC Elev.: 81.97



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/8/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

LOG OF BORING DP-14/15

Kubal-Furr & Associates
-Environmental Consultants-

OMNI Waste
Oak Hammock
Site Investigation

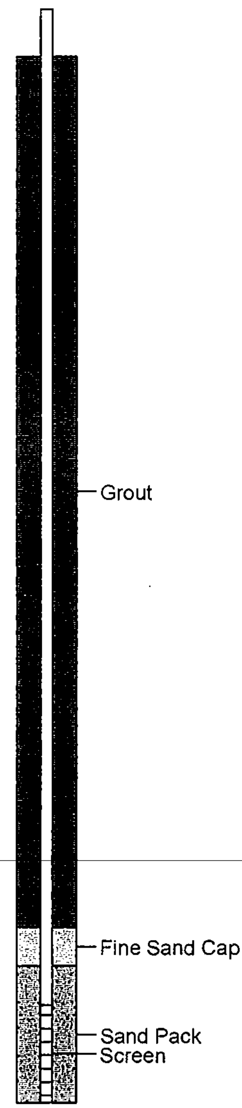
Holopaw, FL

Project # 48OH01

Date Started	: 11/12/01	Company Rep.	: B. Chitten
Date Completed	: 11/12/01	Northing Coord.	: 1354318.16
Hole Diameter	: 1.5 in.	Easting Coord.	: 626873.34
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 78.90	DESCRIPTION
0	78	SILTY SAND, Black grading into Dark Gray to Pale Yellowish Brown, fine grained, Dark Yellow Nodules at 3.5
5	73	SILTY SAND, Grayish Orange with Wood Fragments
		SILTY SAND, Pale Yellowish Brown grading into Dark Yellowish Brown to Grayish Brown, fine grained
10	68	
15	63	
20	58	SILTY SAND, Dark Yellowish Brown grading into Dusky Yellowish Brown to Grayish Black, medium to fine grained
25	53	
30	48	
35	43	
40	38	
45	33	SILTY SAND, Olive Gray to Light Olive Gray, fine grained
50	28	
55	23	
60	18	CLAYEY SILTY SAND, Olive Gray, fine grained
		CLAYEY SHELLY SAND with Black Nodules (1mm-5mm), Olive Gray
65		

Piezometer: DP-15
TOC Elev.: 81.98



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/8/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

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Kubal-Furr & Associates
-Environmental Consultants-

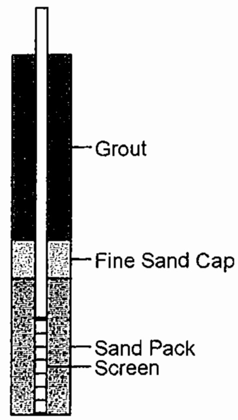
LOG OF BORING DP-16/17

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/12/01	Company Rep.	: B. Chitten
Date Completed	: 11/23/01	Northing Coord.	: 1354048.17
Hole Diameter	: 1.5 in.	Easting Coord.	: 626132.23
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 79.50	GRAPHIC	DESCRIPTION
0	79		SILTY SAND, Gray grading into Dark Yellowish Brown to Grayish Orange to Dark Yellowish Brown, fine grained
5	74		
10	69		
15	64		
20	59		
25	54		
30	49		
35	44		SILTY SAND with minor Dark Minerals, Grayish Orange grading more silty into Dark Gray, medium to fine grained
40	39		
45	34		
50	29		
55	24		CLAYEY SILTY SAND with minor Black Pebbles, Grayish Olive, fine grained
			CLAYEY SAND, Grayish Olive
60	19		
65			

Piezometer: DP-16
TOC Elev.: 82.57



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/9/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Kubal-Furr & Associates
-Environmental Consultants-

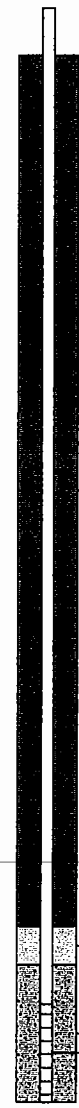
LOG OF BORING DP-16/17

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/12/01	Company Rep.	: B. Chitten
Date Completed	: 11/23/01	Northing Coord.	: 1354047.58
Hole Diameter	: 1.5 in.	Easting Coord.	: 626135.33
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 79.50	GRAPHIC	DESCRIPTION
0	79		SILTY SAND, Gray grading into Dark Yellowish Brown to Grayish Orange to Dark Yellowish Brown, fine grained
5	74		
10	69		
15	64		
20	59		
25	54		
30	49		
35	44		SILTY SAND with minor Dark Minerals, Grayish Orange grading more silty into Dark Gray, medium to fine grained
40	39		
45	34		
50	29		
55	24		CLAYEY SILTY SAND with minor Black Pebbles, Grayish Olive, fine grained
			CLAYEY SAND, Grayish Olive
60	19		
65			

Piezometer: DP-17
TOC Elev.: 82.58



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/9/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Kubal-Furr & Associates
-Environmental Consultants-

LOG OF BORING DP-18/19

(Page 1 of 1)

OMNI Waste
Oak Hammock
Site Investigation

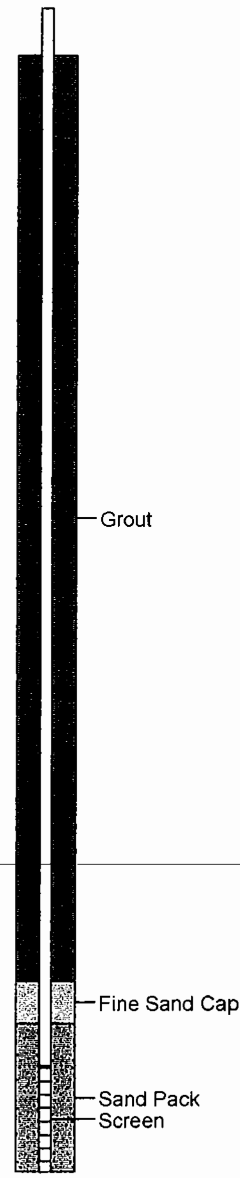
Holopaw, FL

Project # 48OH01

Date Started	: 11/27/01	Company Rep.	: B. Chitten
Date Completed	: 11/27/01	Northing Coord.	: 135592.44
Hole Diameter	: 1.5 in.	Easting Coord.	: 624195.90
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 81.20	GRAPHIC	DESCRIPTION
0	81		SILTY SAND, Gray grading into Grayish Brown to Moderate Yellowish Brown fine grained
5	76		
10	71		
15	66		SAND, Dark Yellowish Orange grading into Grayish Orange
20	61		
			SILTY SAND, Moderate Yellowish Brown grading into Light Olive Gray to Dark Gray, medium to fine grained
25	56		
30	51		
35	46		
40	41		
45	36		
50	31		
			CLAYEY SILTY SAND with Clay Nodules, Dark Gray
55	26		CLAYEY SAND, Dark Gray, fine grained
60			

Piezometer: DP-18
TOC Elev.: 84.38



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/19/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

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Kubal-Furr & Associates

-Environmental Consultants-

LOG OF BORING DP-18/19

OMNI Waste
Oak Hammock
Site Investigation

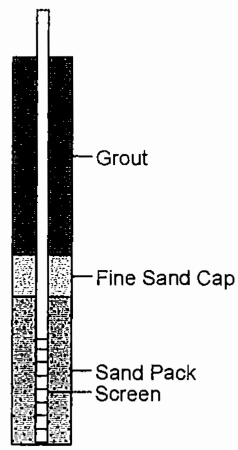
Holopaw, FL

Project # 48OH01

Date Started	: 11/27/01	Company Rep.	: B. Chitten
Date Completed	: 11/27/01	Northing Coord.	: 1353596.07
Hole Diameter	: 1.5 in.	Easting Coord.	: 624200.39
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 81.20	GRAPHIC	DESCRIPTION
0	81		SILTY SAND, Gray grading into Grayish Brown to Moderate Yellowish Brown fine grained
5	76		
10	71		
15	66		SAND, Dark Yellowish Orange grading into Grayish Orange
20	61		SILTY SAND, Moderate Yellowish Brown grading into Light Olive Gray to Dark Gray, medium to fine grained
25	56		
30	51		
35	46		
40	41		
45	36		
50	31		CLAYEY SILTY SAND with Clay Nodules, Dark Gray
55	26		CLAYEY SAND, Dark Gray, fine grained
60			

Piezometer: DP-19
TOC Elev.: 84.34



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/15/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Kubal-Furr & Associates
-Environmental Consultants-

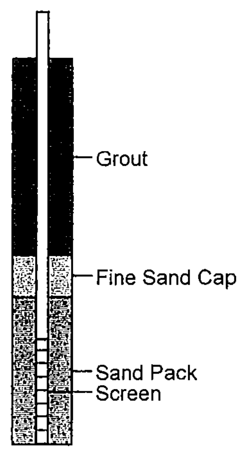
LOG OF BORING DP-20/21

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/9/01	Company Rep.	: B. Chitten
Date Completed	: 11/9/01	Northing Coord.	: 1353034.67
Hole Diameter	: 1.5 in.	Easting Coord.	: 625503.33
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 79.80	GRAPHIC	DESCRIPTION
0	79		SILTY SAND, Dark Gray grading into Grayish Brown to Grayish Orange to Dusky Yellowish Brown, fine grained
5	74		
10	69		
15	64		
20	59		
25	54		
30	49		SILTY SAND, Black grading into Moderate Yellowish Brown with minor Dark Minerals
35	44		
40	39		SILTY SAND, Dark Yellowish Brown grading more silty into Grayish Olive to Grayish Black, fine grained
45	34		
50	29		
55	24		CLAYEY SILTY SAND, Grayish Black, fine grained
60			

Piezometer: DP-20
TOC Elev.: 83.07



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/12/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Kubal-Furr & Associates

-Environmental Consultants-

LOG OF BORING DP-20/21

OMNI Waste
Oak Hammock
Site Investigation

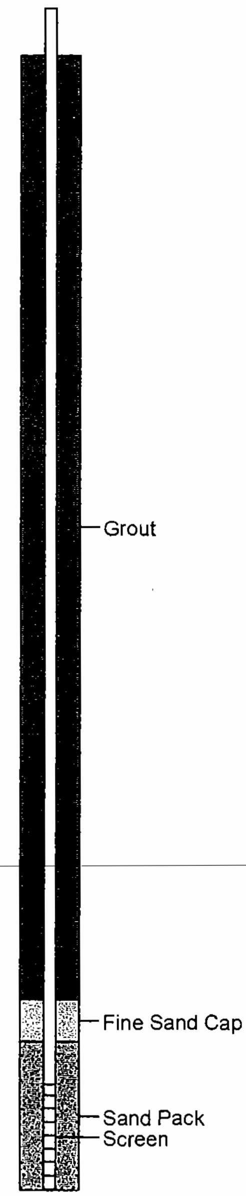
Holopaw, FL

Project # 48OH01

Date Started	: 11/9/01	Company Rep.	: B. Chitten
Date Completed	: 11/9/01	Northing Coord.	: 1353030.01
Hole Diameter	: 1.5 in.	Easting Coord.	: 625502.82
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 79.80	GRAPHIC	DESCRIPTION
0	79		SILTY SAND, Dark Gray grading into Grayish Brown to Grayish Orange to Dusky Yellowish Brown, fine grained
5	74		
10	69		
15	64		
20	59		
25	54		
30	49		SILTY SAND, Black grading into Moderate Yellowish Brown with minor Dark Minerals
35	44		
40	39		SILTY SAND, Dark Yellowish Brown grading more silty into Grayish Olive to Grayish Black, fine grained
45	34		
50	29		
55	24		CLAYEY SILTY SAND, Grayish Black, fine grained
60			

Piezometer: DP-21
TOC Elev.: 83.00



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/12/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK	: 20/30 Sand
Fine Sand Cap	: 30/45 Sand

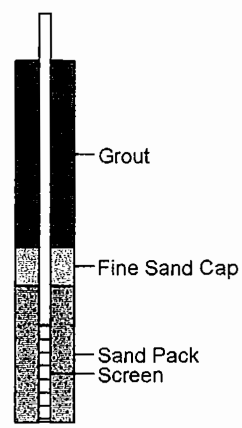
Kubal-Furr & Associates
-Environmental Consultants-

LOG OF BORING DP-22/23

OMNI Waste Oak Hammock Site Investigation	Date Started	: 11/9/01	Company Rep.	: B. Chitten
	Date Completed	: 11/12/01	Northing Coord.	: 1353637.77
	Hole Diameter	: 1.5 in.	Easting Coord.	: 627171.49
Holopaw, FL	Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Project # 48OH01	Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 78.30	GRAPHIC	DESCRIPTION
0	78		SILTY SAND, Black grading into Pale Yellowish Brown to Grayish Black, fine grained
5	73		
10	68		
15	63		
20	58		
25	53		
30	48		
35	43		
40	38		SILTY SAND with minor Dark Minerals, Olive Gray to Light Olive to Grayish Olive, medium to fine grained
45	33		
50	28		
55	23		
60	18		SANDY CLAY with minor Shell Fragments, Grayish Olive
			SHELLY SANDY CLAY, Pale Olive
65			

Piezometer: DP-22
TOC Elev.: 81.00



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/9/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Kubal-Furr & Associates

-Environmental Consultants-

LOG OF BORING DP-22/23

OMNI Waste
Oak Hammock
Site Investigation

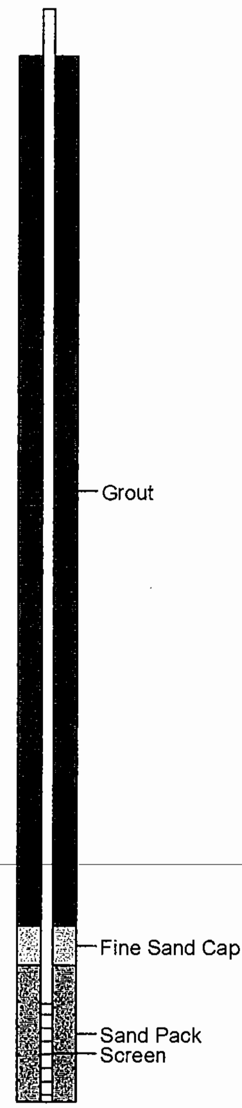
Holopaw, FL

Project # 48OH01

Date Started	: 11/9/01	Company Rep.	: B. Chitten
Date Completed	: 11/12/01	Northing Coord.	: 1353641.31
Hole Diameter	: 1.5 in.	Easting Coord.	: 627170.88
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 78.30	GRAPHIC	DESCRIPTION
0	78		SILTY SAND, Black grading into Pale Yellowish Brown to Grayish Black, fine grained
5	73		
10	68		
15	63		
20	58		
25	53		
30	48		
35	43		
40	38		SILTY SAND with minor Dark Minerals, Olive Gray to Light Olive to Grayish Olive, medium to fine grained
45	33		
50	28		
55	23		
60	18		SANDY CLAY with minor Shell Fragments, Grayish Olive
			SHELLY SANDY CLAY, Pale Olive
65			

Piezometer: DP-23
TOC Elev.: 81.27



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/9/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK	: 20/30 Sand
FINE SAND CAP	: 30/45 Sand

Kubal-Furr & Associates
-Environmental Consultants-

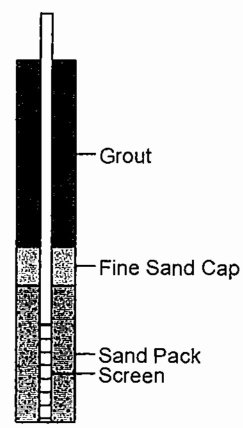
PIEZOMETER DP-24

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/12/01	Company Rep.	: B. Chitten
Date Completed	: 11/23/01	Northing Coord.	: 1353736.22
Hole Diameter	: 1.5 in.	Easting Coord.	: 626342.40
Drilling Method	: Geoprobe	Survey By	: Johnston's Surveying
Sampling Method	: Geoprobe	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 79.20	DESCRIPTION
0	79	SILTY SAND, Gray grading into Dark Yellowish Brown to Grayish Orange to Dark Yellowish Brown, fine grained
5	74	
10	69	
15	64	
20	59	
25	54	
30	49	
35	44	
		SILTY SAND with minor Dark Minerals, Grayish Orange grading more silty into Dark Gray, medium to fine grained
40	39	
45	34	
50	29	
55	24	
		CLAYEY SILTY SAND with minor Black Pebbles, Grayish Olive, fine grained
		CLAYEY SAND, Grayish Olive
60	19	
65		

Piezometer: DP-24
TOC Elev.: 82.22



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/12/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: R. Wilkie

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

No Geoprobe boring performed at DP-24. Lithology taken from closest boring, DPT 16/17.

Kubal-Furr & Associates
-Environmental Consultants-

PIEZOMETER SZ-1

OMNI Waste
Oak Hammock
Site Investigation

Holopaw, FL

Project # 48OH01

Date Started	: 11/28/01	Company Rep.	: H. Hammal
Date Completed	: 11/28/01	Northing Coord.	: 1355170.25
Hole Diameter	: 5 5/8 in.	Easting Coord.	: 625942.43
Drilling Method	: HSA	Survey By	: Johnston's Surveying
		Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 79.60	DESCRIPTION
0	79	SILTY SAND, Brownish Black grading into Dark Yellowish Brown to Pale Yellowish Brown to Dark Yellowish Brown, well sorted, fine grained
5	74	
10	69	
15	64	
20	59	SILTY SAND with Dark Minerals, Pale Yellowish Brown to Pale Brown to Dark Yellowish Brown, medium to fine grained grading to fine grained
25	54	SILTY SAND, Brownish Gray to Dusky Yellowish Brown to Dark Yellowish Brown, well sorted, fine grained
30	49	
35	44	
40	39	SILTY SAND with Dark Minerals, Dusky Yellowish Brown to Grayish Olive to Light Olive, fine grained
45	34	
50	29	
55	24	
60	19	CLAYEY SAND with Dark Minerals, Grayish Olive, fine grained
65	14	SHELLY SAND with large Shell fragments (1-mm-50mm), Yellowish Gray, some whole shells
70	9	SHELL HASH with CLAY, Shell fragments from 5mm-50mm, Yellowish Gray
75	4	SHELLY SAND with fragments from 5mm-25mm, Yellowish Gray to Pale Greenish Yellow
80	-1	
85	-6	
90		

Piezometer: SZ-1
TOC Elev.: 82.43

Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/28/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: H. Hammal

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Lithology taken from the closest borings, DP-7/8 and Sonic Boring SB-3.

Pushed Shelby Tube 66-68ft.

Kubal-Furr & Associates
-Environmental Consultants-

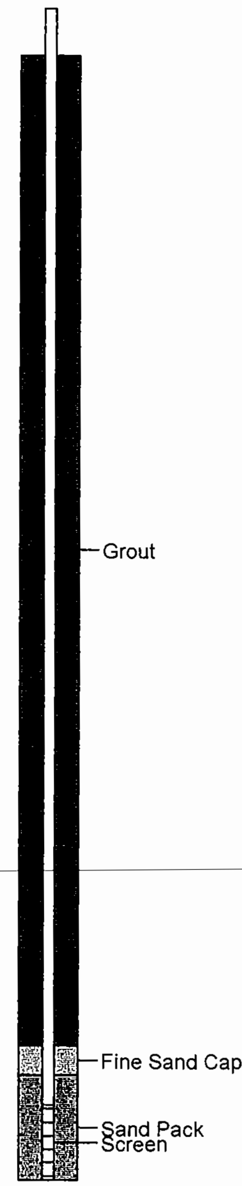
PIEZOMETER SZ-2

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/27/01	Company Rep.	: H. Hammal
Date Completed	: 11/27/01	Northing Coord.	: 1353030.47
Hole Diameter	: 5 5/8 in.	Easting Coord.	: 625511.10
Drilling Method	: HSA	Survey By	: Johnston's Surveying
		Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 79.80	GRAPHIC	DESCRIPTION
0	79		SILTY SAND, Dark Gray grading into Grayish Brown to Grayish Orange to Dusky Yellowish Brown, fine grained
5	74		
10	69		
15	64		
20	59		
25	54		
30	49		SILTY SAND, Black grading into Moderate Yellowish Brown with minor Dark Minerals
35	44		
40	39		SILTY SAND, Dark Yellowish Brown grading more silty into Grayish Olive to Grayish Black, fine grained
45	34		
50	29		
55	24		CLAYEY SILTY SAND, Grayish Black, fine grained
			DISTURBED SAMPLE-55-65' CLAY with Shell Fragments (1mm-2mm), Grayish Green
60	19		
65	14		SHELL HASH with Shell fragments 2mm-50mm, Clasts included complete Gastopods, Bivalves, Yellowish Gray, Poorly Sorted
70	9		
75	4		CLAYEY SAND to SANDY CLAY, medium to fine grained, Large Oyster Shell fragments (2mm-50mm), and Dark Minerals (10%) 90-115ft., Grayish Green to Dark Grayish Green
80	-1		
85			

Piezometer: SZ-2
TOC Elev.: 83.16



Piezometer Construction Information

PIEZOMETER CONSTRUCTION

Date Compl.	: 11/27/01
Hole Diameter	: 5 5/8 in.
Drill. Method	: HSA
Company Rep.	: H. Hammal

PIEZOMETER CASING

Material	: PVC
Diameter	: 2 in.
Joints	: threaded

PIEZOMETER SCREEN

Material	: PVC
Diameter	: 2 in.
Length	: 5 ft.
Joints	: threaded
Opening	: .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Lithology taken from the closest borings, DP-20/21 and Sonic Boring SB-2.

Pushed Shelby Tube 60-62ft.

02-...02 C:\Program Files\mtech2002\OMNI Logs\SZ-2.bor

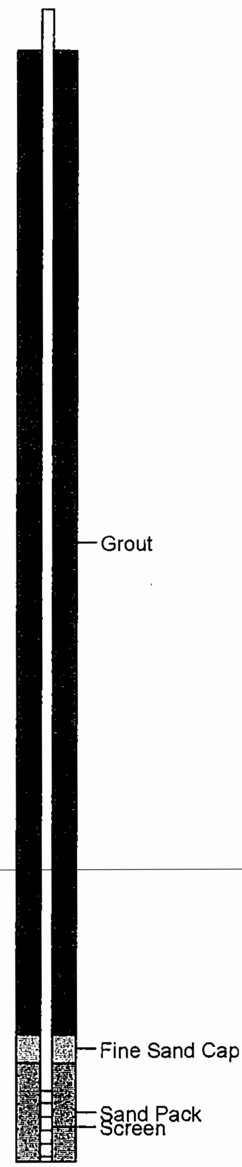
Kubal-Furr & Associates
-Environmental Consultants-

PIEZOMETER SZ-3

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/27/01	Company Rep.	: H. Hammal
Date Completed	: 11/28/01	Northing Coord.	: 1353629.43
Hole Diameter	: 5 5/8 in.	Easting Coord.	: 627175.45
Drilling Method	: HSA	Survey By	: Johnston's Surveying
		Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 78.30	DESCRIPTION
0	78	SILTY SAND, Black grading into Pale Yellowish Brown to Grayish Black, fine grained
5	73	
10	68	
15	63	
20	58	
25	53	
30	48	
35	43	
40	38	SILTY SAND with minor Dark Minerals, Olive Gray to Light Olive to Grayish Olive, medium to fine grained
45	33	
50	28	
55	23	
60	18	SANDY CLAY with minor Shell fragments, Grayish Olive
65	13	SHELLY SANDY CLAY, Pale Olive to Grayish Olive Green
70	8	SHELLY SAND with large Shell fragments (1-mm-50mm), Yellowish Gray, some whole shells
75	3	SHELL HASH with CLAY, Shell fragments from 5mm-50mm, Yellowish Gray
80	-2	SHELLY SAND with fragments from 5mm-25mm, Yellowish Gray to Pale Greenish Yellow
85	-7	
90		



Piezometer Construction Information

PIEZOMETER CONSTRUCTION
Date Compl. : 11/28/01
Hole Diameter : 5 5/8 in.
Drill. Method : HSA
Company Rep. : H. Hammal

PIEZOMETER CASING
Material : PVC
Diameter : 2 in.
Joints : threaded

PIEZOMETER SCREEN
Material : PVC
Diameter : 2 in.
Length : 5 ft.
Joints : threaded
Opening : .010 slot

SAND PACK : 20/30 Sand

FINE SAND CAP : 30/45 Sand

Lithology taken from the closest borings, DP-22/23 and Sonic Boring SB-3.

Pushed Shelby Tube 64'-66'

Attachment 2

PSI Laboratories
Permeability, Grain Size and Porosity Determinations

psi Environmental Geotechnical Construction
Consulting • Engineering • Testing

RECEIVED
DEC 27 2001

December 18, 2001

Kubal-Furr & Associates
P.O. Box 273210
Tampa, Florida 33688-3210

ATTN: Mr. Jerry Kubal

RE: **Omni Oak Hammock Landfill**
Laboratory Testing
PSI Project No. 779-10225-1

Dear Mr. Kubal:

As requested, **Professional Service Industries, Inc. (PSI)** performed Permeability testing on five samples from the above referenced project. The samples were collected by the client and delivered to our office.

The results of the Permeability testing are in the following table.

PERMEABILITY TESTING		
Boring No.	**Depth**	**Permeability, k (cm/sec)**
SB-3	155' – 157'	3.65×10^{-7}
SB-2	145' – 147'	4.49×10^{-6}
SZ-3	64' – 66'	6.27×10^{-7}
SZ-2	60' – 62'	3.03×10^{-4}
SZ-1	66' – 68'	5.61×10^{-6}

Should you have any questions, please do not hesitate to contact our office.

Respectfully Submitted,
Professional Service Industries, Inc.

Tanya K. Schnier, E.I.
Project Manager
Construction Services

Martin E. Millburg, P.E. 12/19/01
Geotechnical Department Manager
FL Registration No. 36584

TKS/MEM/abm:cs\projects\2001\10225\001-ltr.doc

psi *Information To Build On*
Engineering • Consulting • Testing

RECEIVED DEC 27 2001

December 18, 2001

Kubal-Furr & Associates
P.O. Box 273210
Tampa, Florida 33688-3210

ATTN: Mr. Jerry Kubal

RE: **Omni Oak Hammock Landfill**
Laboratory Testing
PSI Project No. 779-10225-2

Dear Mr. Kubal:

As requested, **Professional Service Industries, Inc. (PSI)** performed Grain Size Analysis and Porosity testing on ten samples from the above referenced project. The samples were collected by the client and delivered to our office.

The results of the Grain Size Analysis and Porosity testing are on the attached sheets. Porosity testing was performed on remolded soils in our laboratory. The soils were tested in a very loose state, and the resulting porosity calculations will therefore be relatively high. In-situ soils will be more dense and could exhibit porosity values on the order of 0.3 to 0.35.

Should you have any questions, please do not hesitate to contact our office.

Respectfully Submitted,
Professional Service Industries, Inc.

Tanya K. Schnier, E.I.
Project Manager
Construction Services

Martin E. Millburg, P.E. 12/19/01
Geotechnical Department Manager
FL Registration No. 36584

TKS/MEM/abm:cs\projects\2001\10225\002-ltr.doc

GRAIN SIZE DISTRIBUTION TEST REPORT

PROFESSIONAL SERVICE INDUSTRIES, INC.

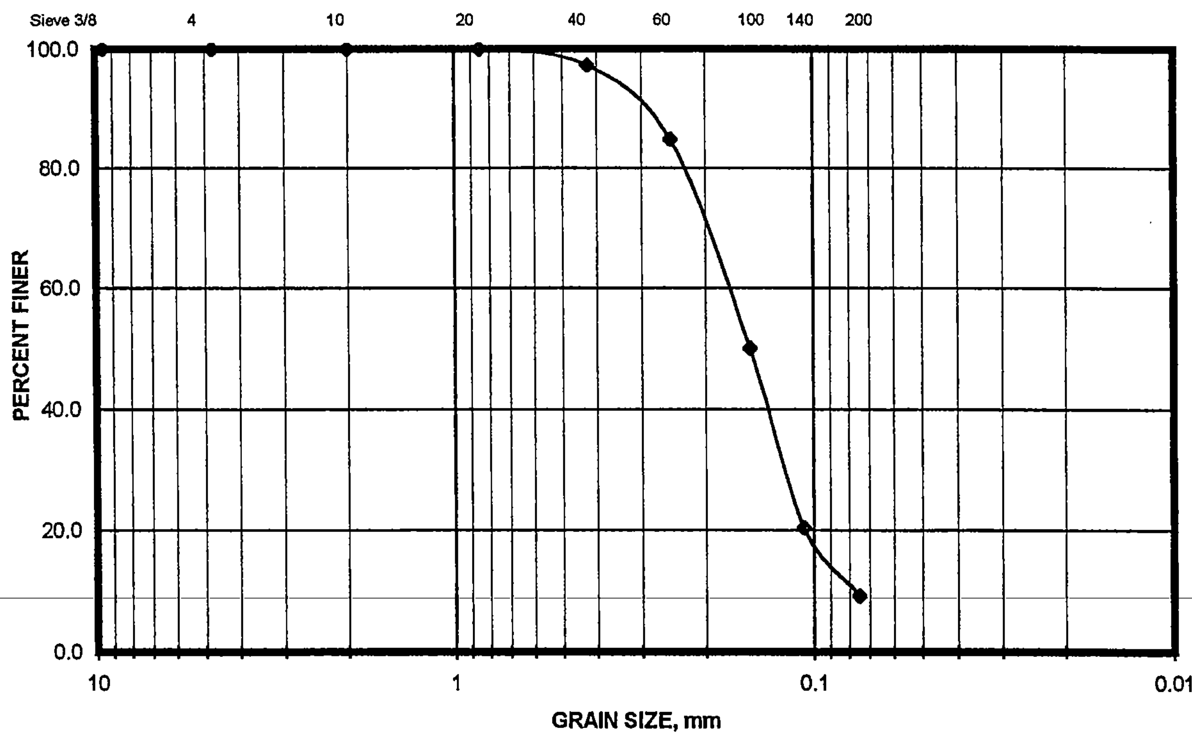
Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 5/6@14'-16'

Porosity: 43.4%

GRAIN SIZE DISTRIBUTION



% Gravel	% Sand	%-200
0.0	90.7	9.3

psi

GRAIN SIZE DISTRIBUTION TEST REPORT

PROFESSIONAL SERVICE INDUSTRIES, INC.

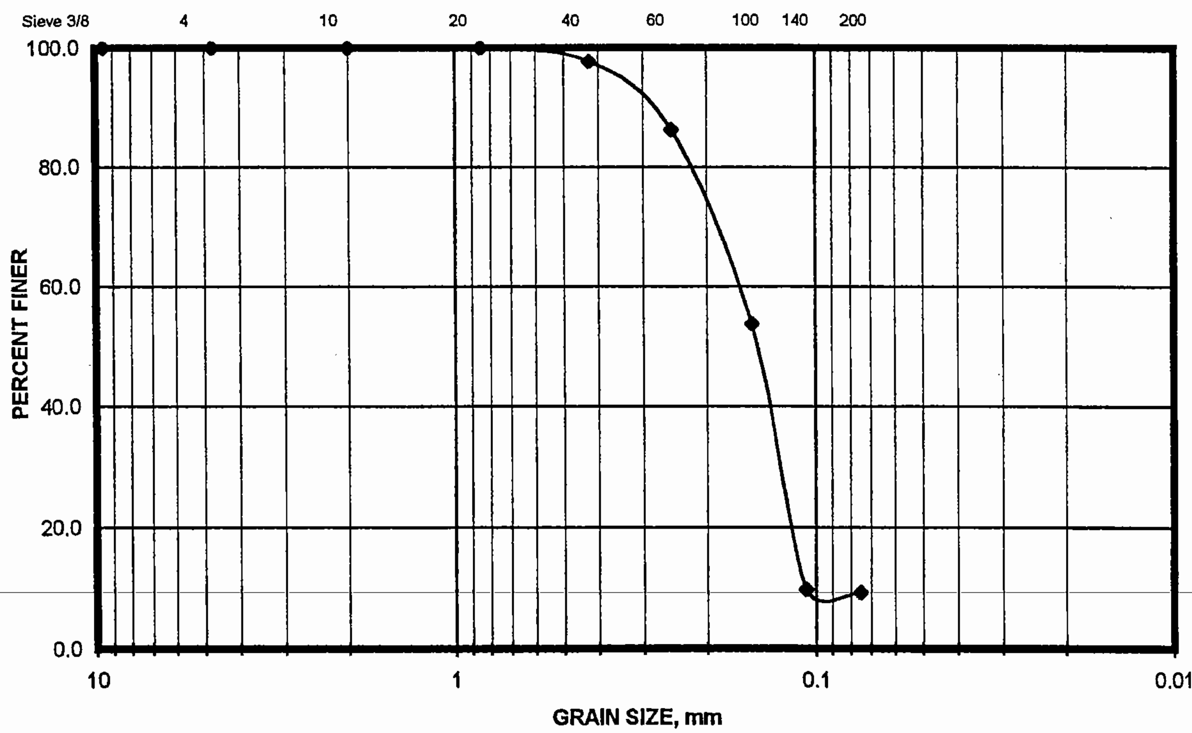
Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 20/21@14'-16'

Porosity: 42.6%

GRAIN SIZE DISTRIBUTION



% Gravel	% Sand	%-200
0.0	90.7	9.3

psi

GRAIN SIZE DISTRIBUTION TEST REPORT

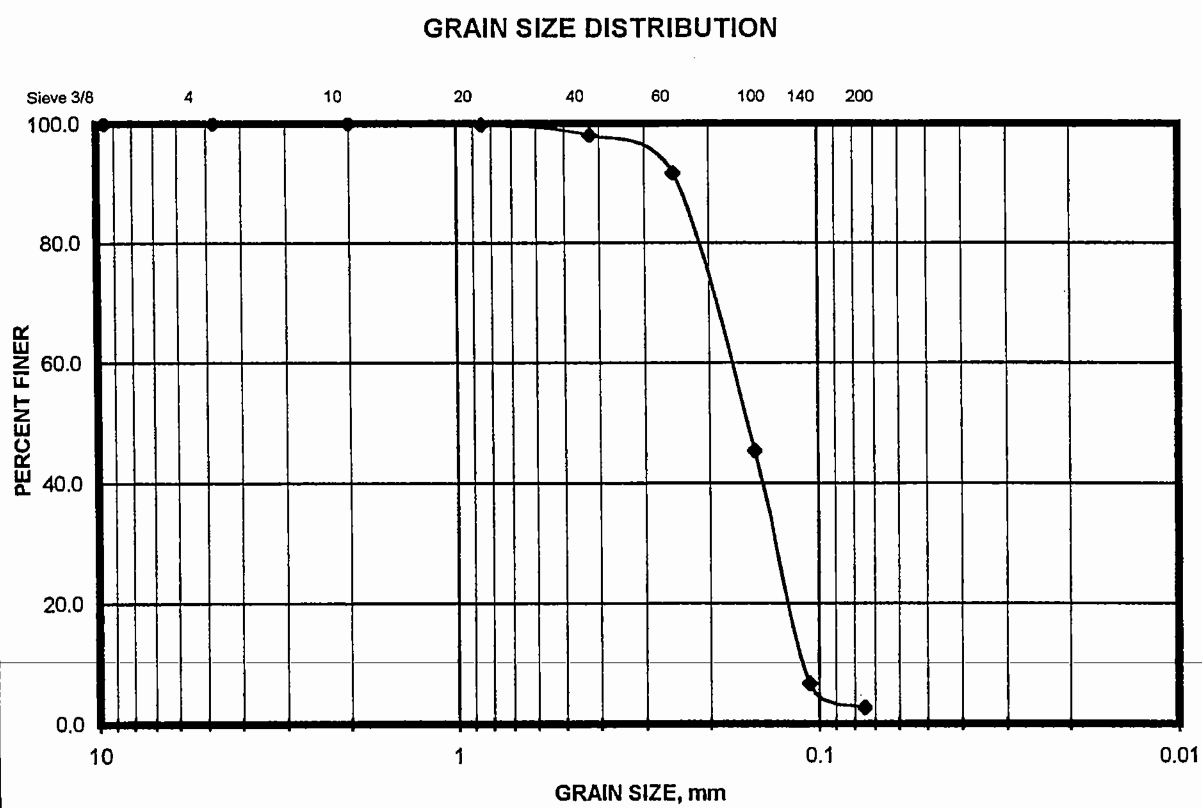
PROFESSIONAL SERVICE INDUSTRIES, INC.

Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 5/6@46'-48'

Porosity: 47.8%



% Gravel	% Sand	%-200
0.0	97.4	2.6

psi

GRAIN SIZE DISTRIBUTION TEST REPORT

PROFESSIONAL SERVICE INDUSTRIES, INC.

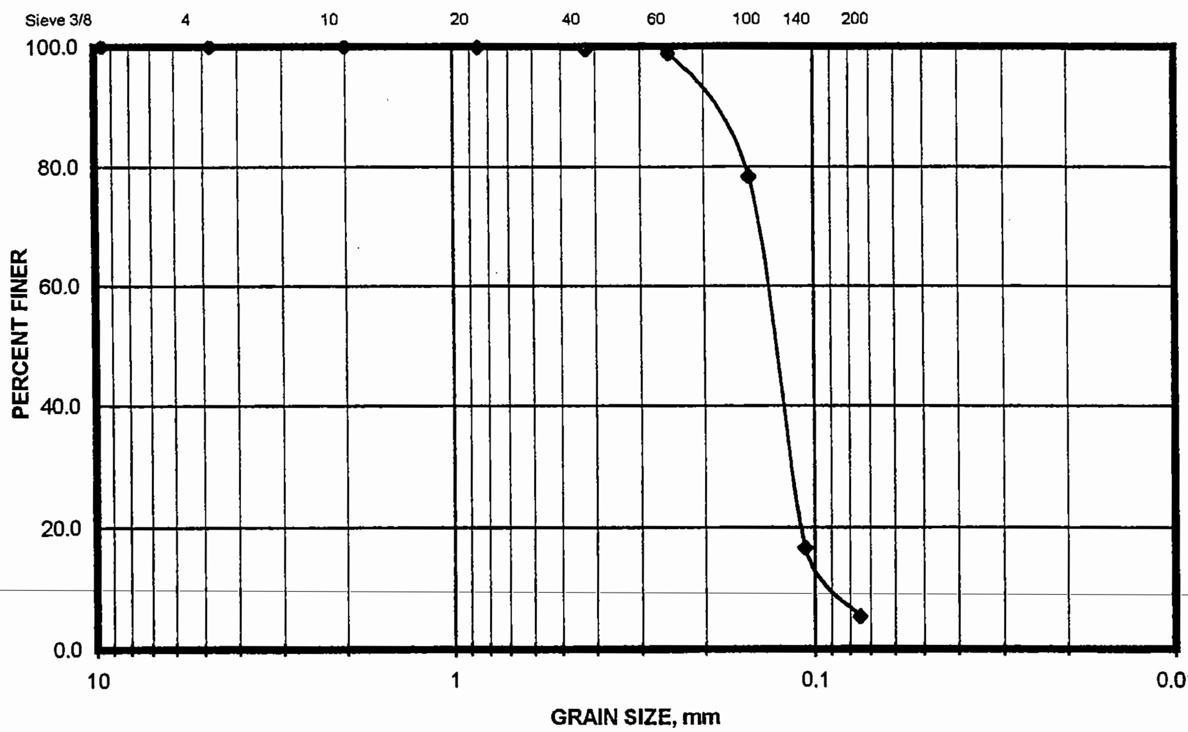
Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 20/21@46'-48'

Porosity: 50.5%

GRAIN SIZE DISTRIBUTION



% Gravel	% Sand	%-200
0.0	94.7	5.3

psi

GRAIN SIZE DISTRIBUTION TEST REPORT

PROFESSIONAL SERVICE INDUSTRIES, INC.

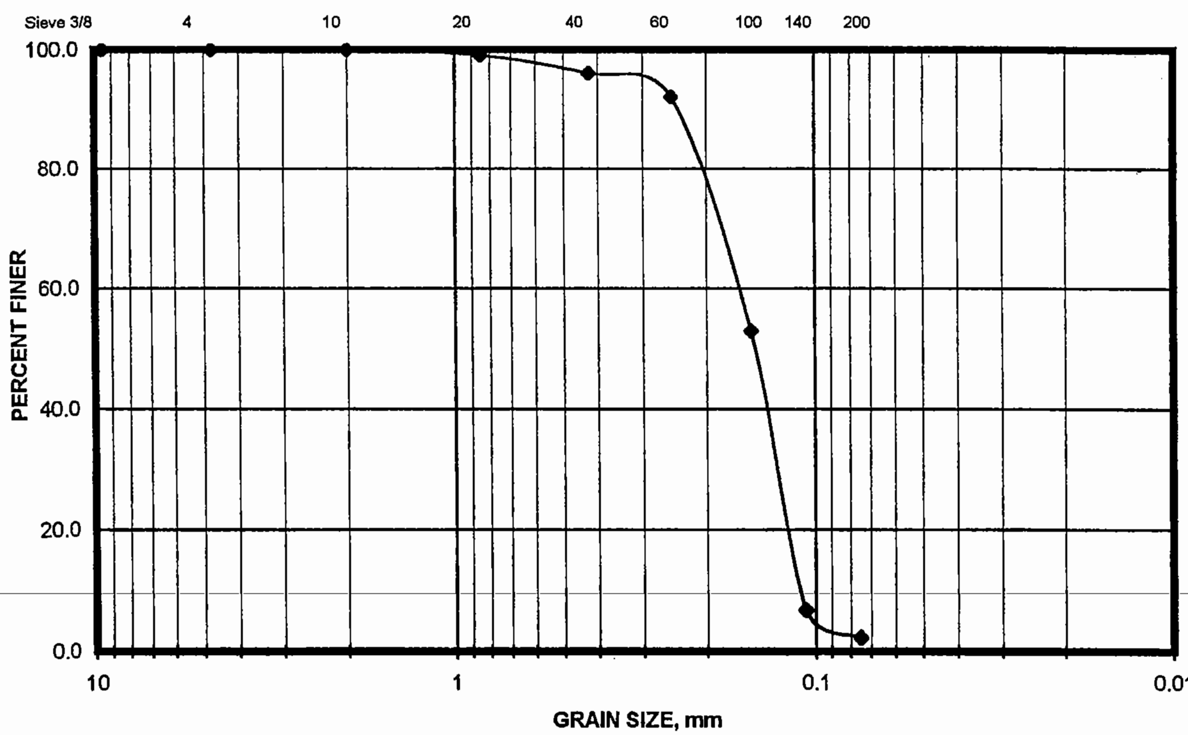
Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 22/23@46'-48'

Porosity: 49.8%

GRAIN SIZE DISTRIBUTION



% Gravel	% Sand	%-200
0.0	97.7	2.3

psi

GRAIN SIZE DISTRIBUTION TEST REPORT

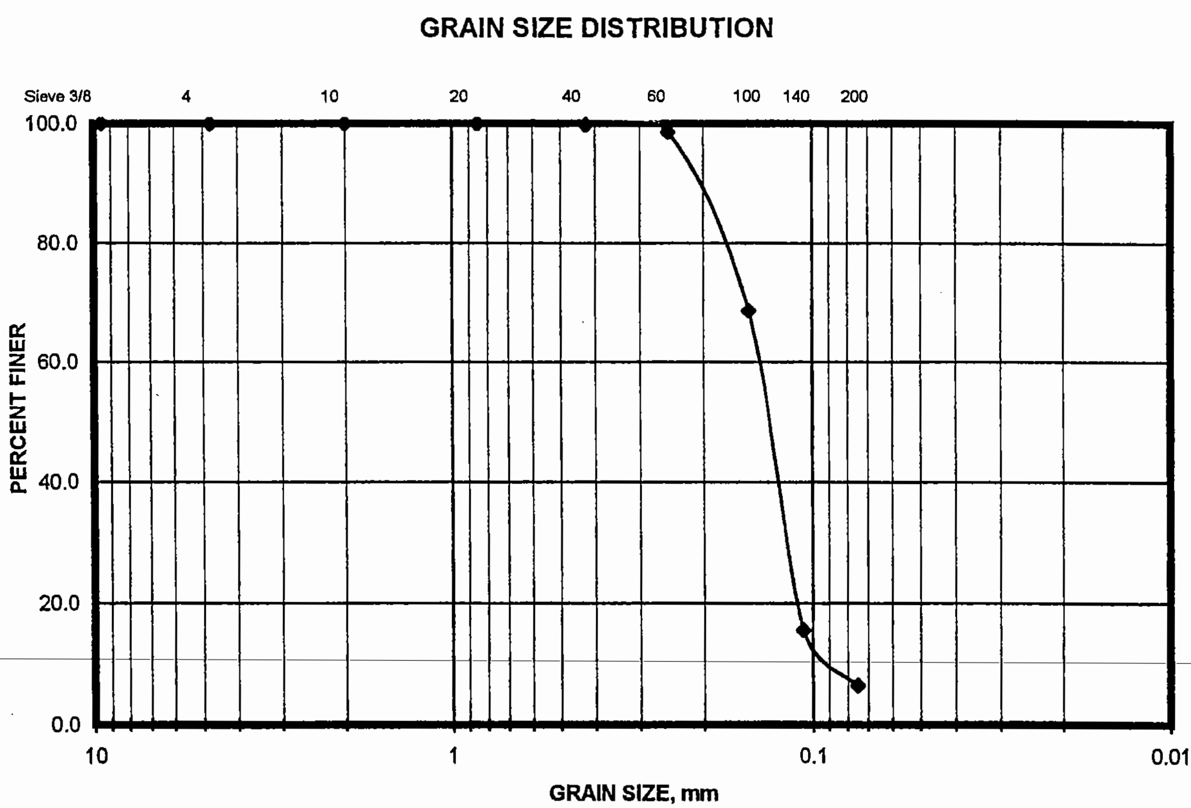
PROFESSIONAL SERVICE INDUSTRIES, INC.

Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 1/2@14'-16'

Porosity: 47.6%



% Gravel	% Sand	%-200
0.0	93.6	6.4

GRAIN SIZE DISTRIBUTION TEST REPORT

PROFESSIONAL SERVICE INDUSTRIES, INC.

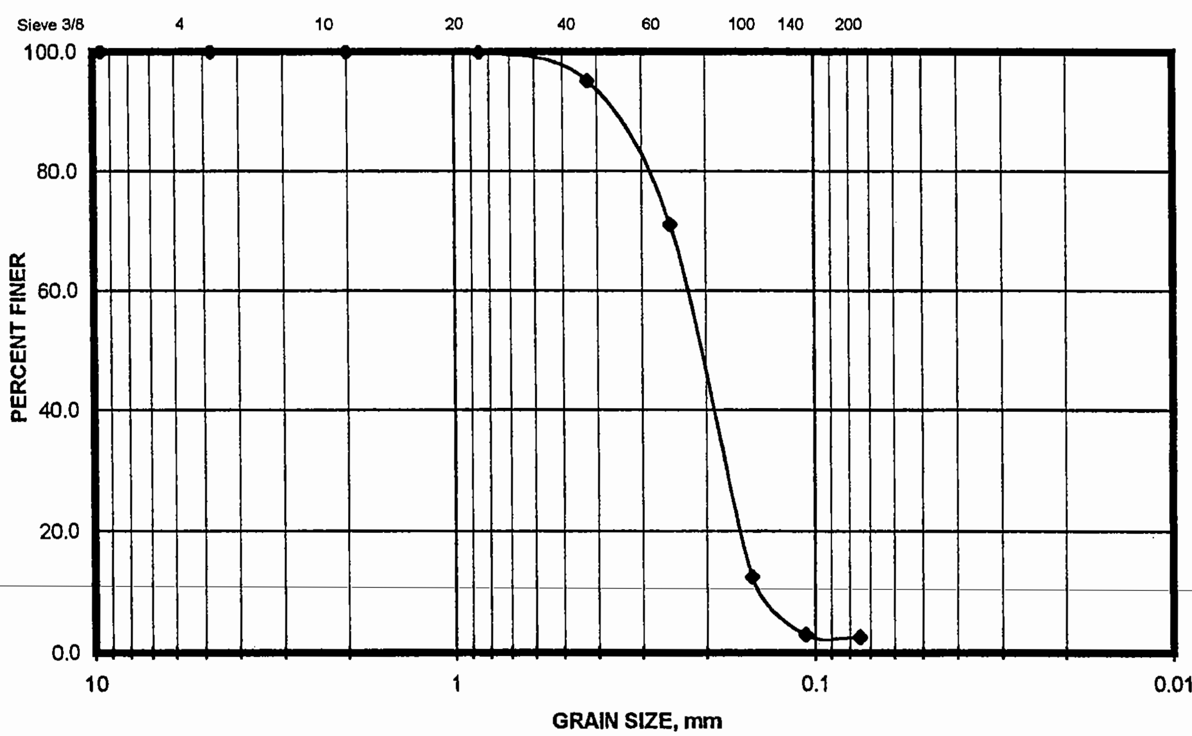
Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 7/8@14'-16'

Porosity: 46.5%

GRAIN SIZE DISTRIBUTION



% Gravel	% Sand	%-200
0.0	97.4	2.6

psi

GRAIN SIZE DISTRIBUTION TEST REPORT

PROFESSIONAL SERVICE INDUSTRIES, INC.

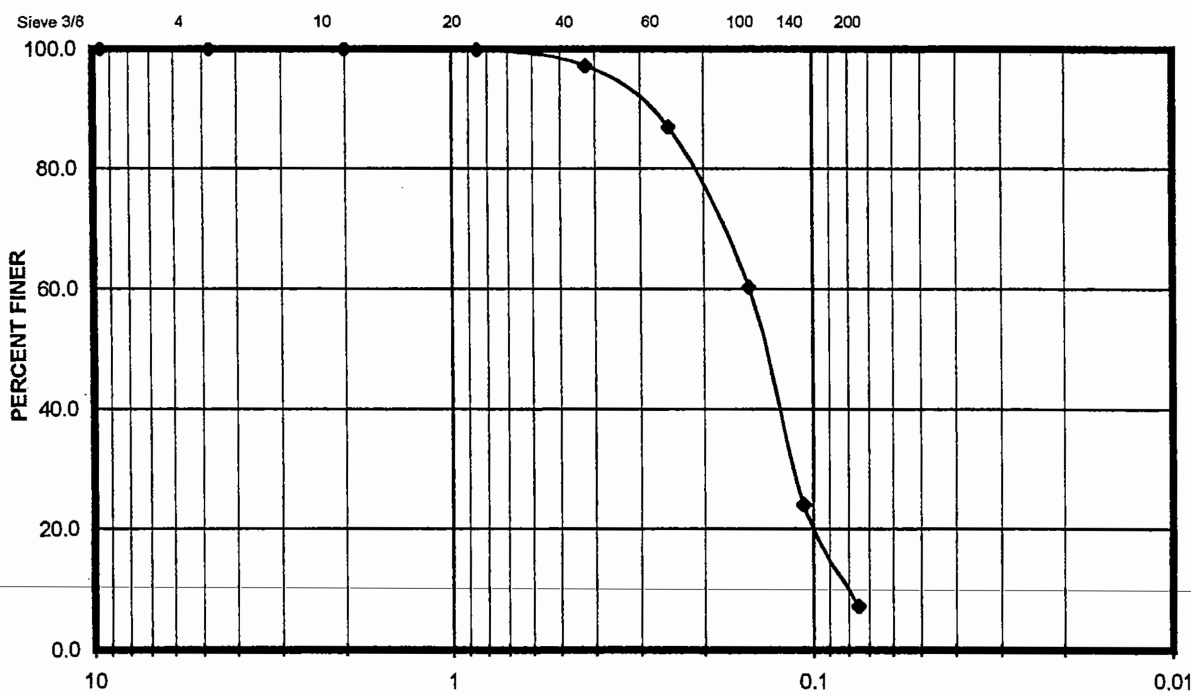
Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 22/23@14'-16'

Porosity: 47.6%

GRAIN SIZE DISTRIBUTION



% Gravel	% Sand	%-200
0.0	92.8	7.2

psi

GRAIN SIZE DISTRIBUTION TEST REPORT

PROFESSIONAL SERVICE INDUSTRIES, INC.

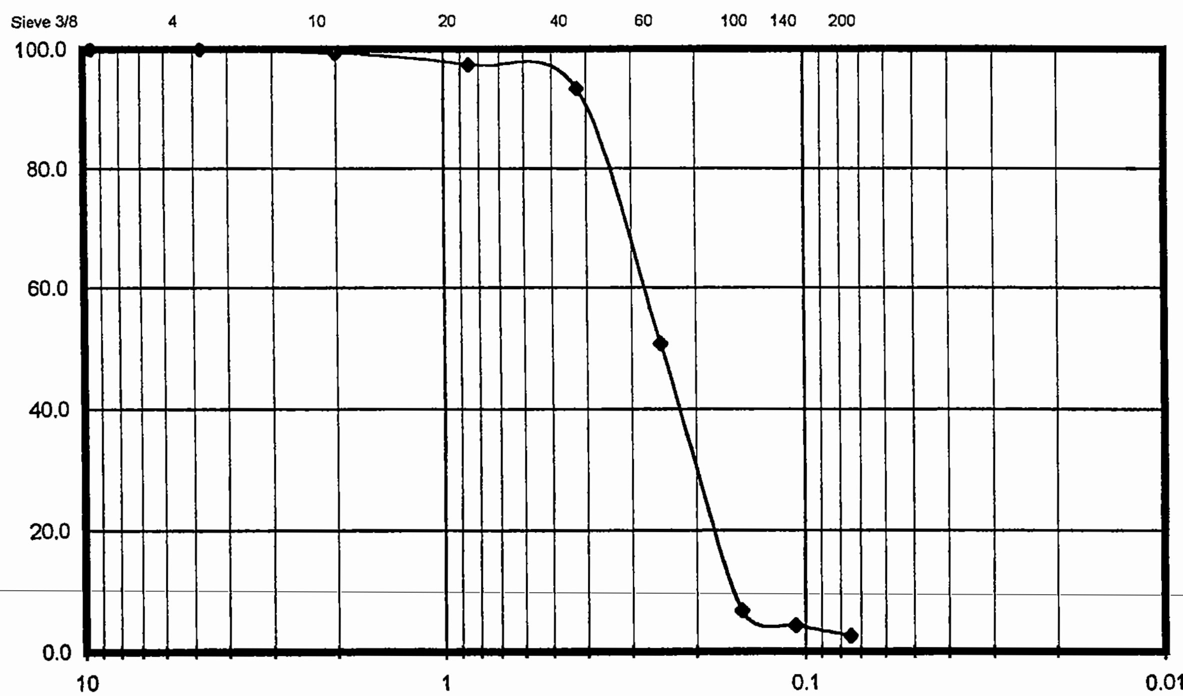
Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 1/2@46'-48'

Porosity: 49.6%

GRAIN SIZE DISTRIBUTION



% Gravel	% Sand	%-200
0.0	97.4	2.6

psi

GRAIN SIZE DISTRIBUTION TEST REPORT

PROFESSIONAL SERVICE INDUSTRIES, INC.

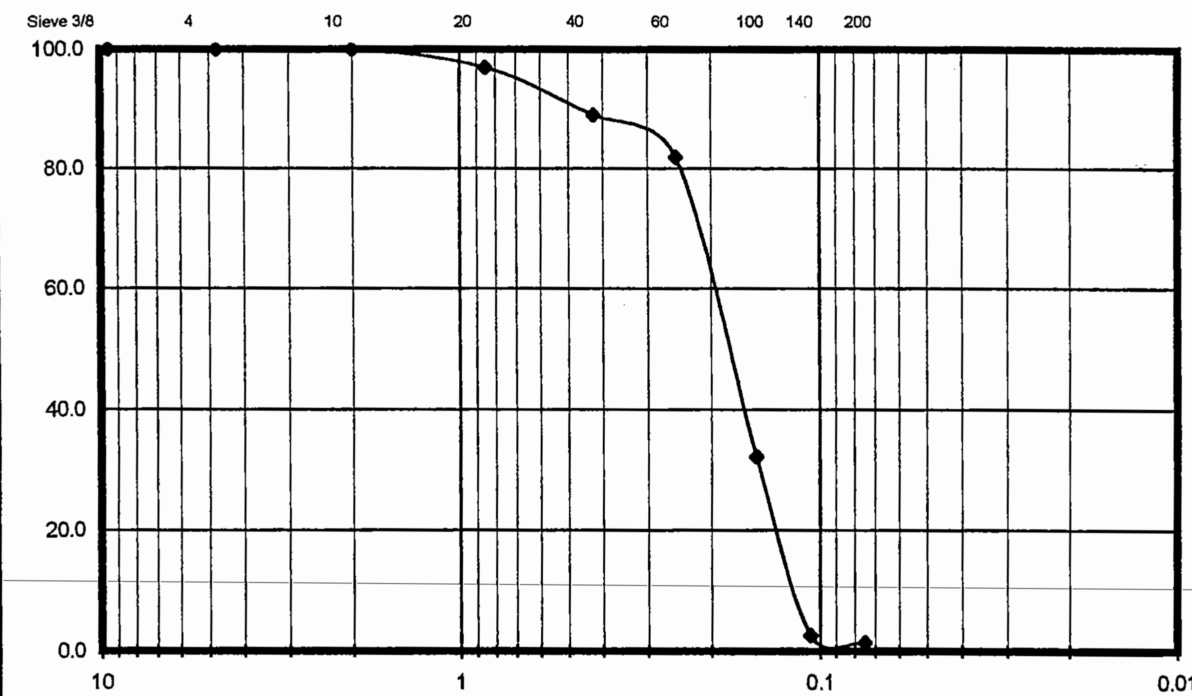
Project No. 779-10225 Date: 12/3/01

Project: Omni Oak Hammock Landfill

Sample Location: DP 7/8@46'-48'

Porosity: 44.7%

GRAIN SIZE DISTRIBUTION



% Gravel	% Sand	%-200
0.0	98.6	1.4

psi

Attachment 3.

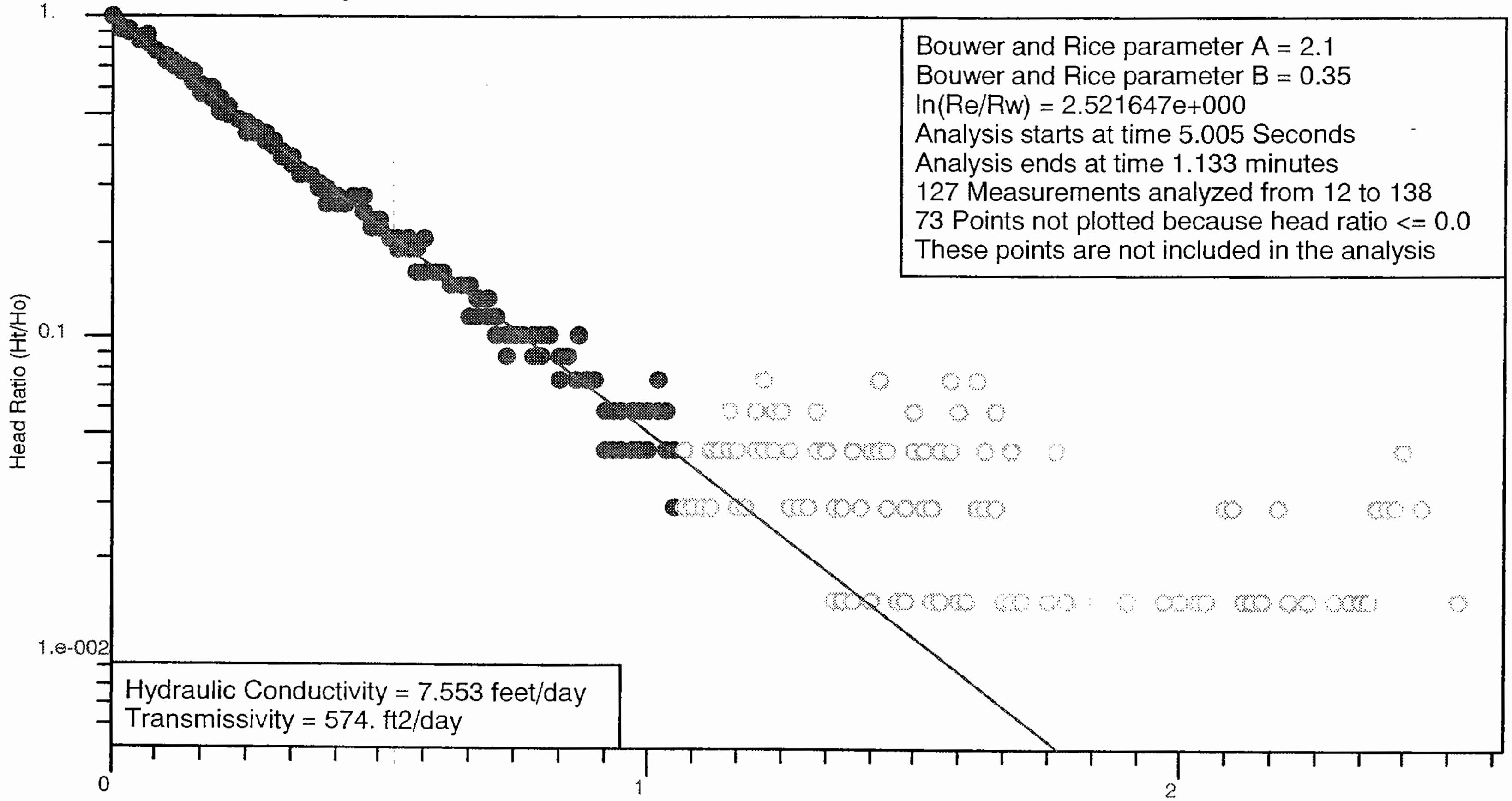
Graphical Plots of Slug Test Data
(Bouwer and Rice)

Slugtest - Slugin - DP-1 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-1



Ho is 0.68 feet at 5.005 Seconds

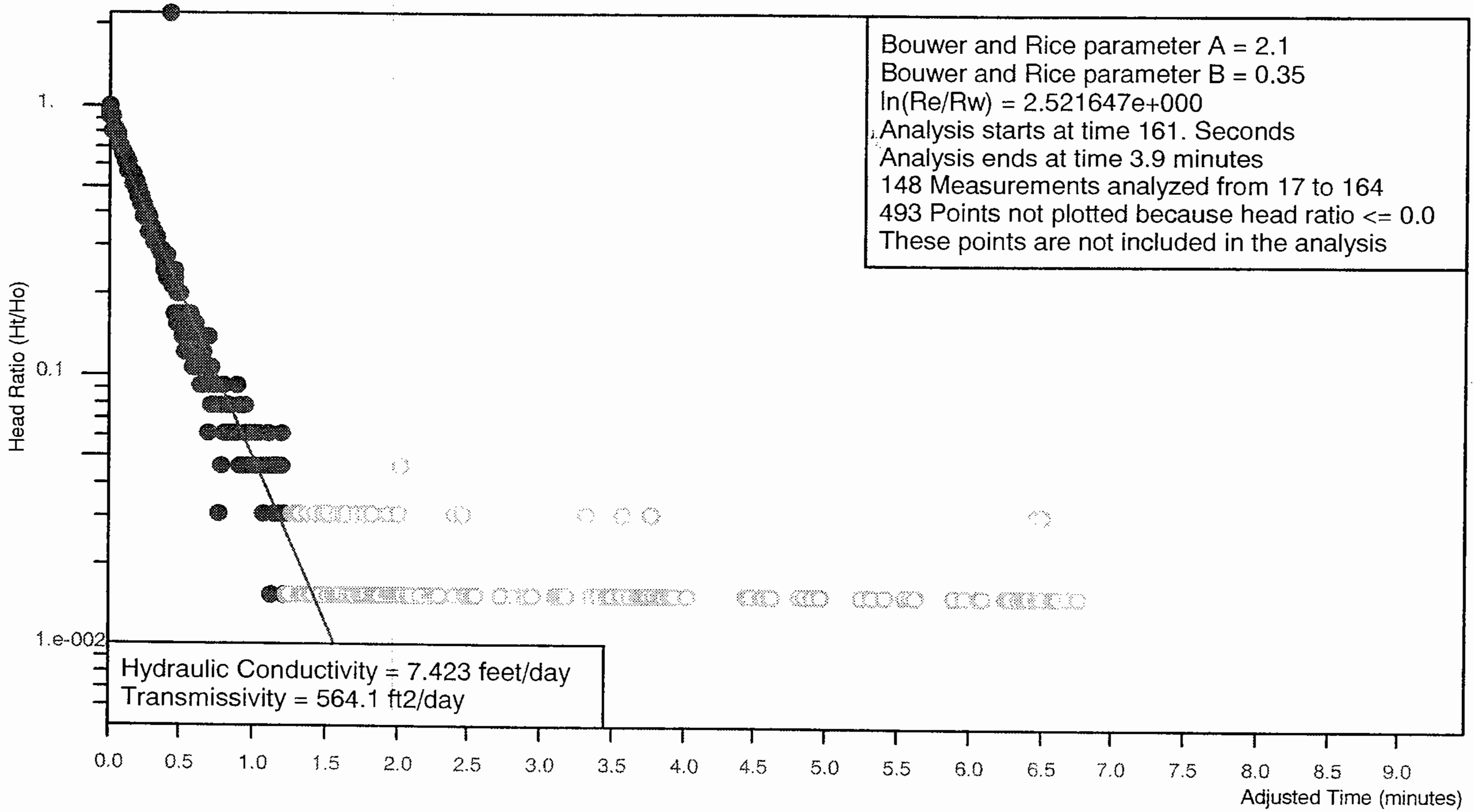
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - DP-1 12/1/01

Bouwer and Rice Graph

Oak Hammock Holopaw, Florida

DP-1



Ho is 0.65 feet at 161. Seconds

Project Number: 48OH01 for OMNI Waste

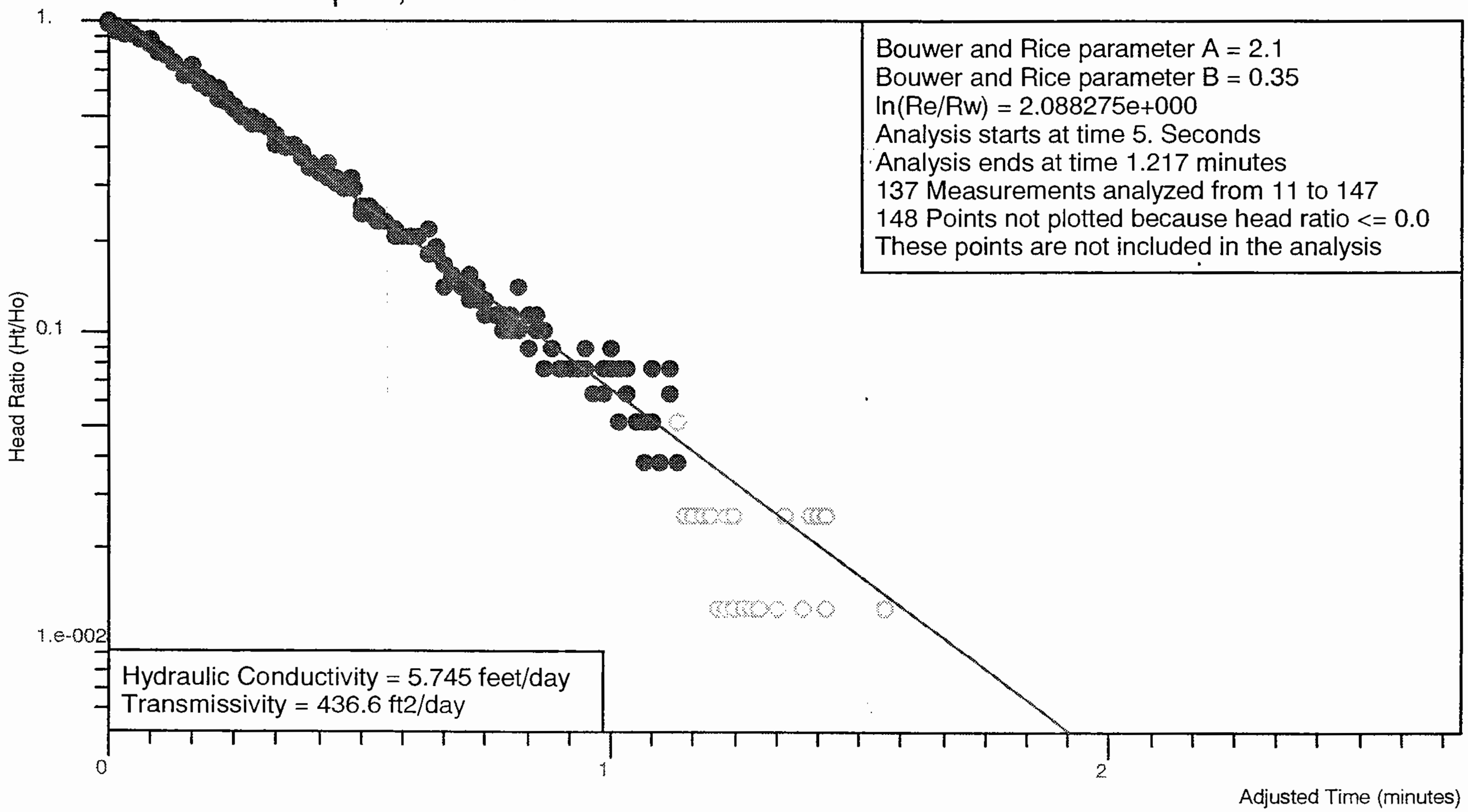
Analysis by Starpoint Software

Slugtest - Slugin - DP-2 12/1/01

Bouwer and Rice Graph

Oak Hammock Holopaw, Florida

DP-2



Ho is 0.78 feet at 5. Seconds

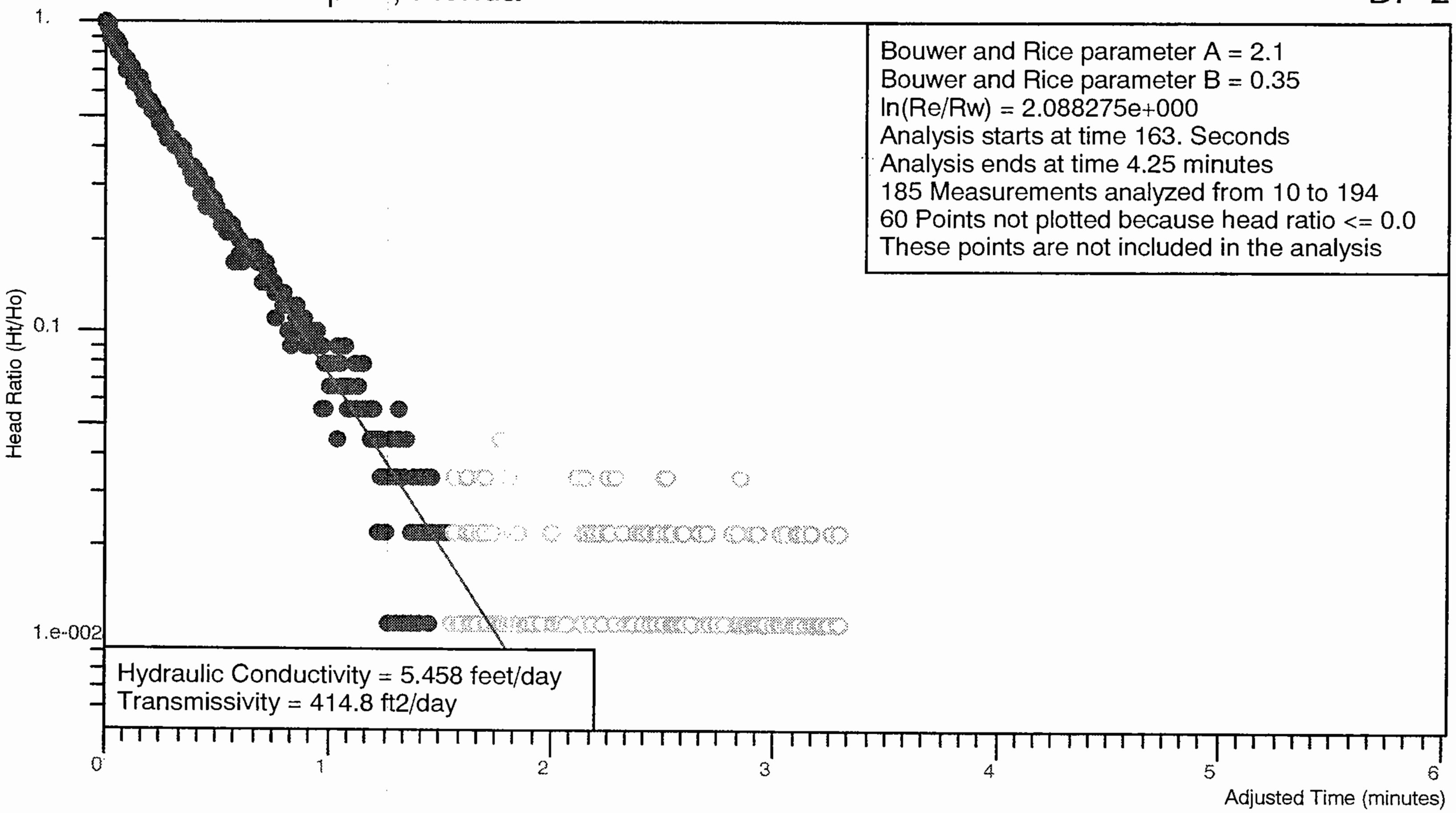
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - DP-2 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-2



Ho is 0.9 feet at 163. Seconds

Project Number: 48OH01 for OMNI Waste

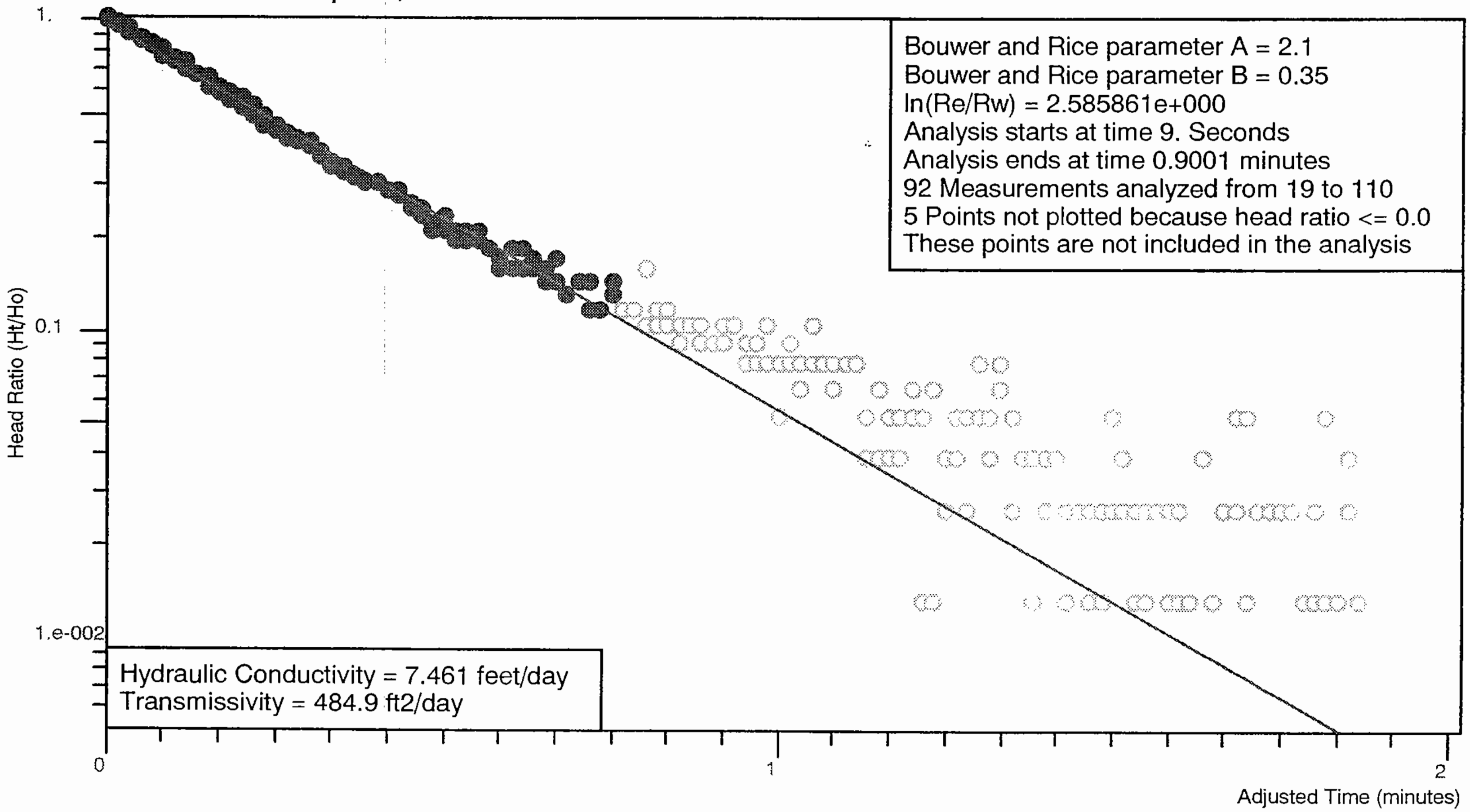
Analysis by Starpoint Software

Slugtest - Slugin - DP-9 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-9



Ho is 0.76 feet at 9. Seconds

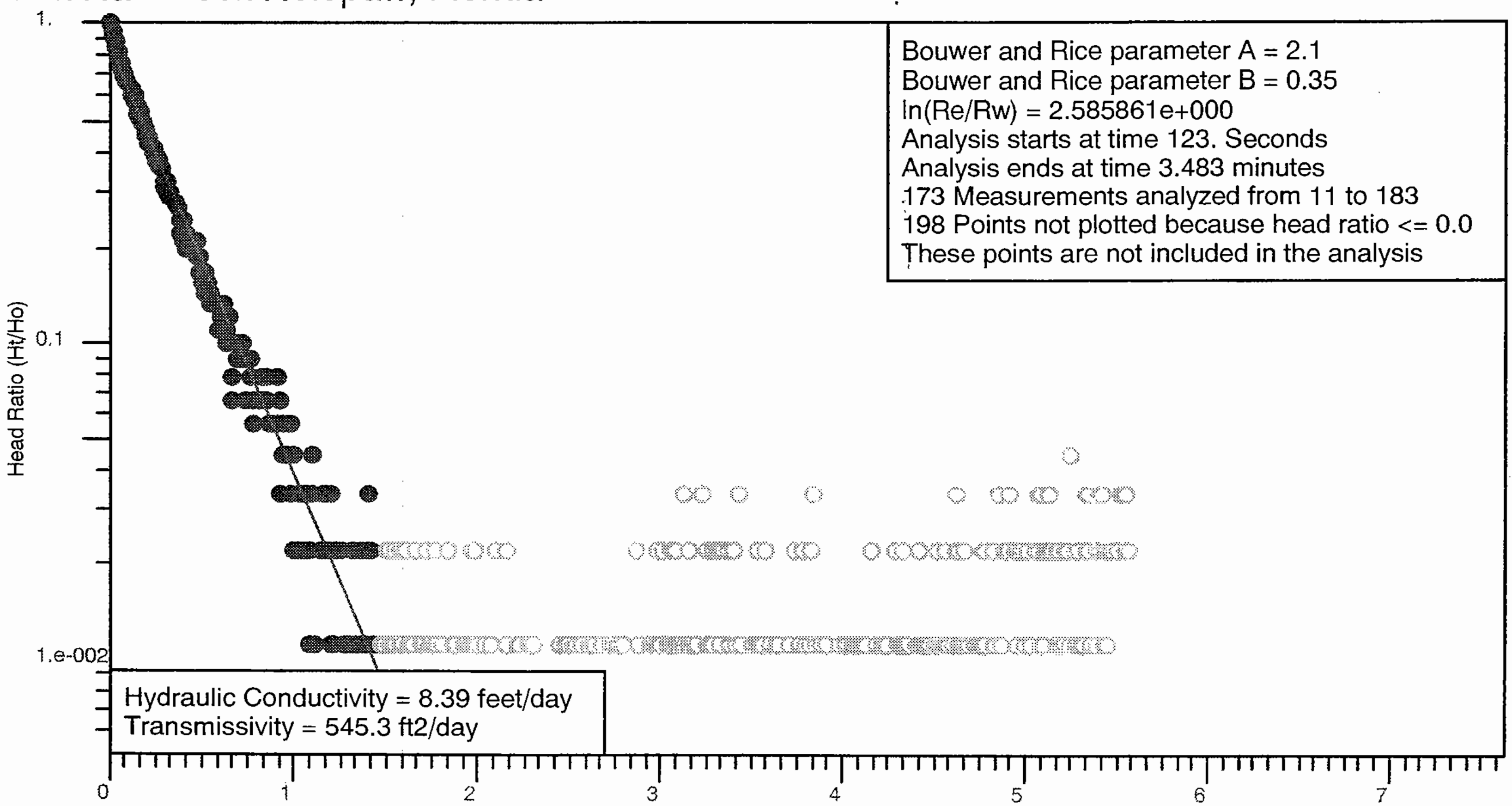
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - DP-9 12/1/01

Bouwer and Rice Graph

Oak Hammock Holopaw, Florida

DP-9



Ho is 0.9 feet at 123. Seconds

Project Number: 48OH01 for OMNI Waste

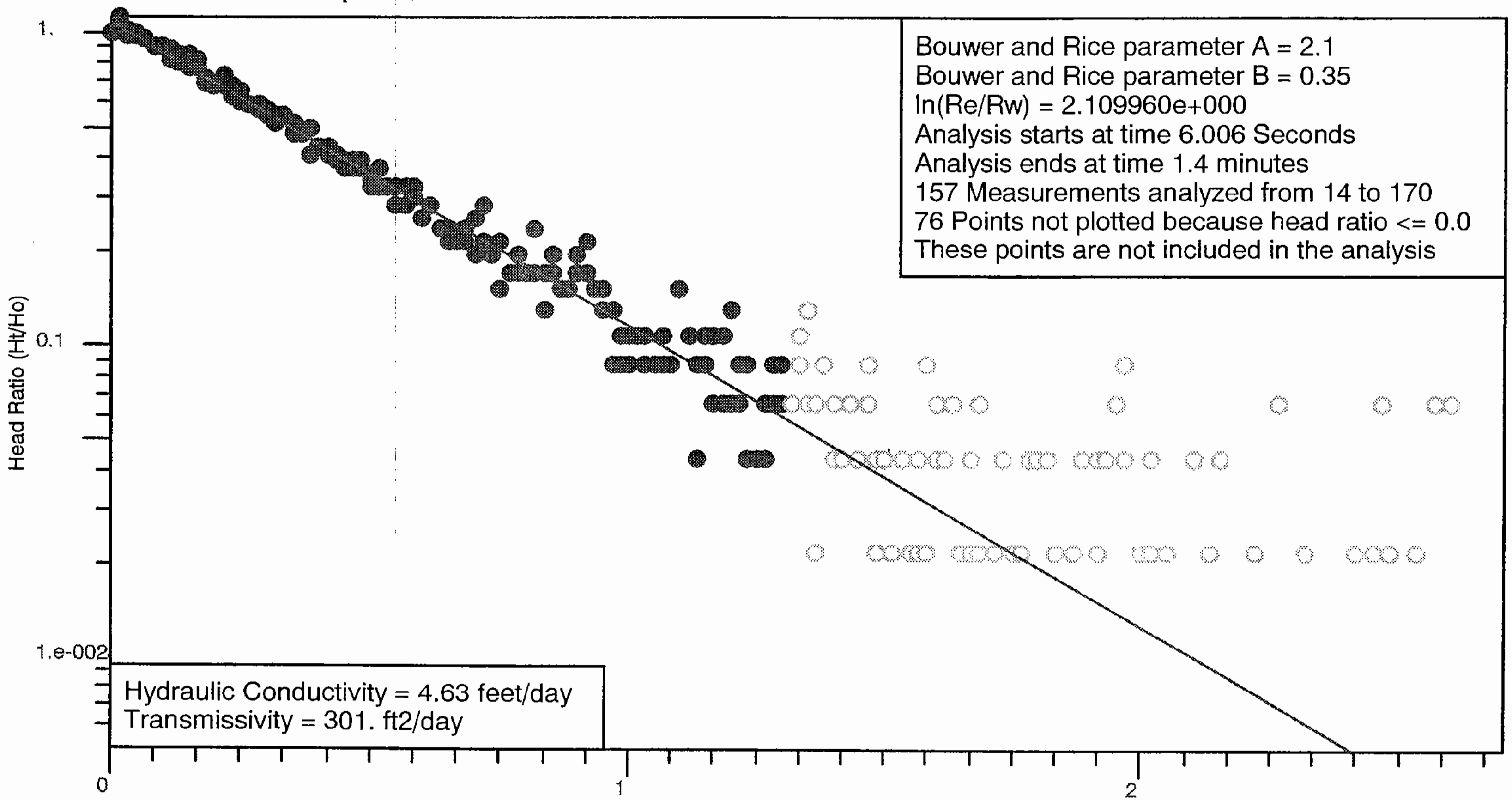
Analysis by Starpoint Software

Slugtest - Slugin - DP-10 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-10



Ho is 0.46 feet at 6.006 Seconds

Project Number: 48OH01 for OMNI Waste

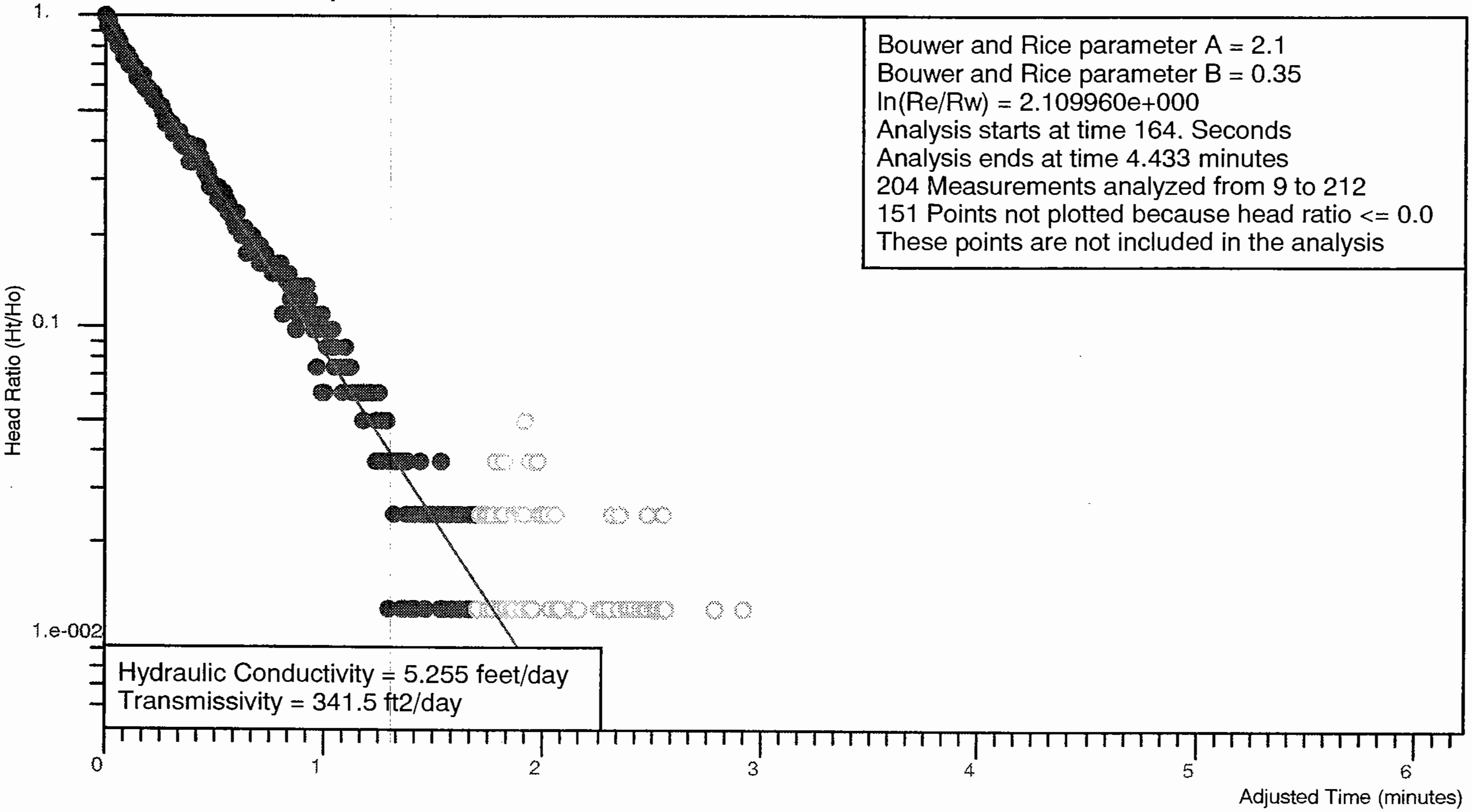
Analysis by Starpoint Software

Slugtest - Slugout - DP-10 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-10



Ho is 0.81 feet at 164. Seconds

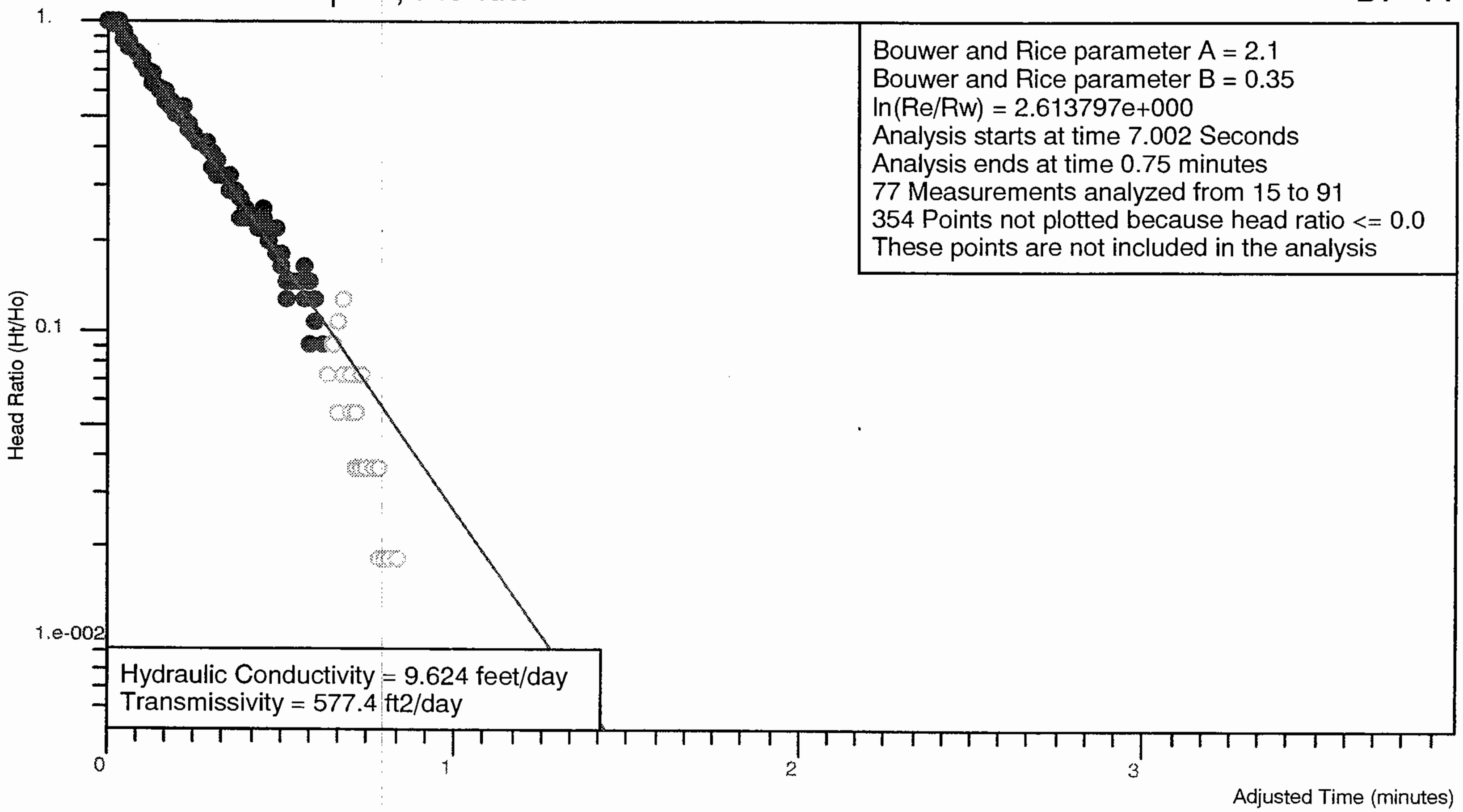
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugin - DP-11 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-11



Ho is 0.55 feet at 7.002 Seconds

Project Number: 48OH01 for OMNI Waste

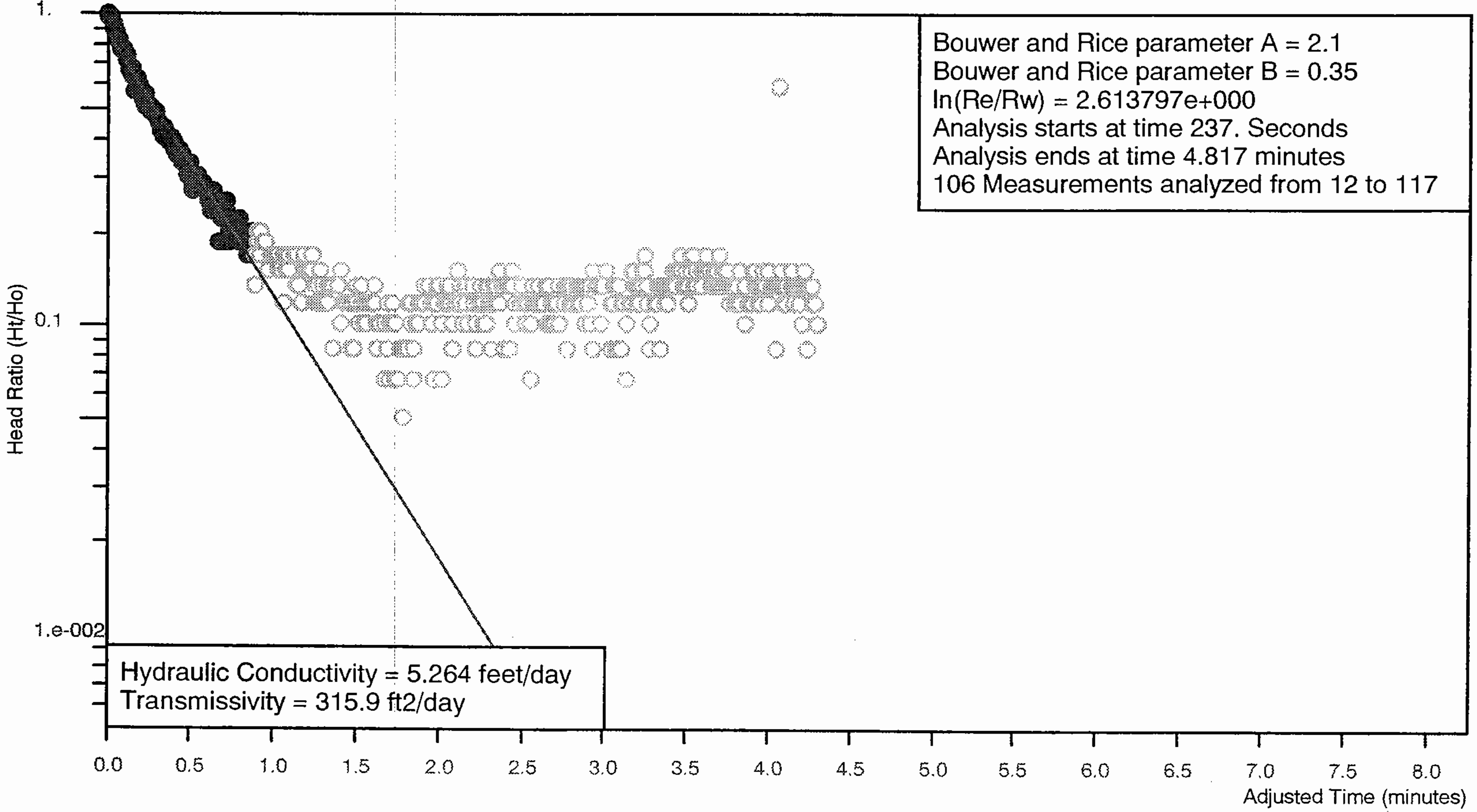
Analysis by Starpoint Software

Slugtest - Slugout - DP-11 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-11



Ho is 0.59 feet at 237. Seconds

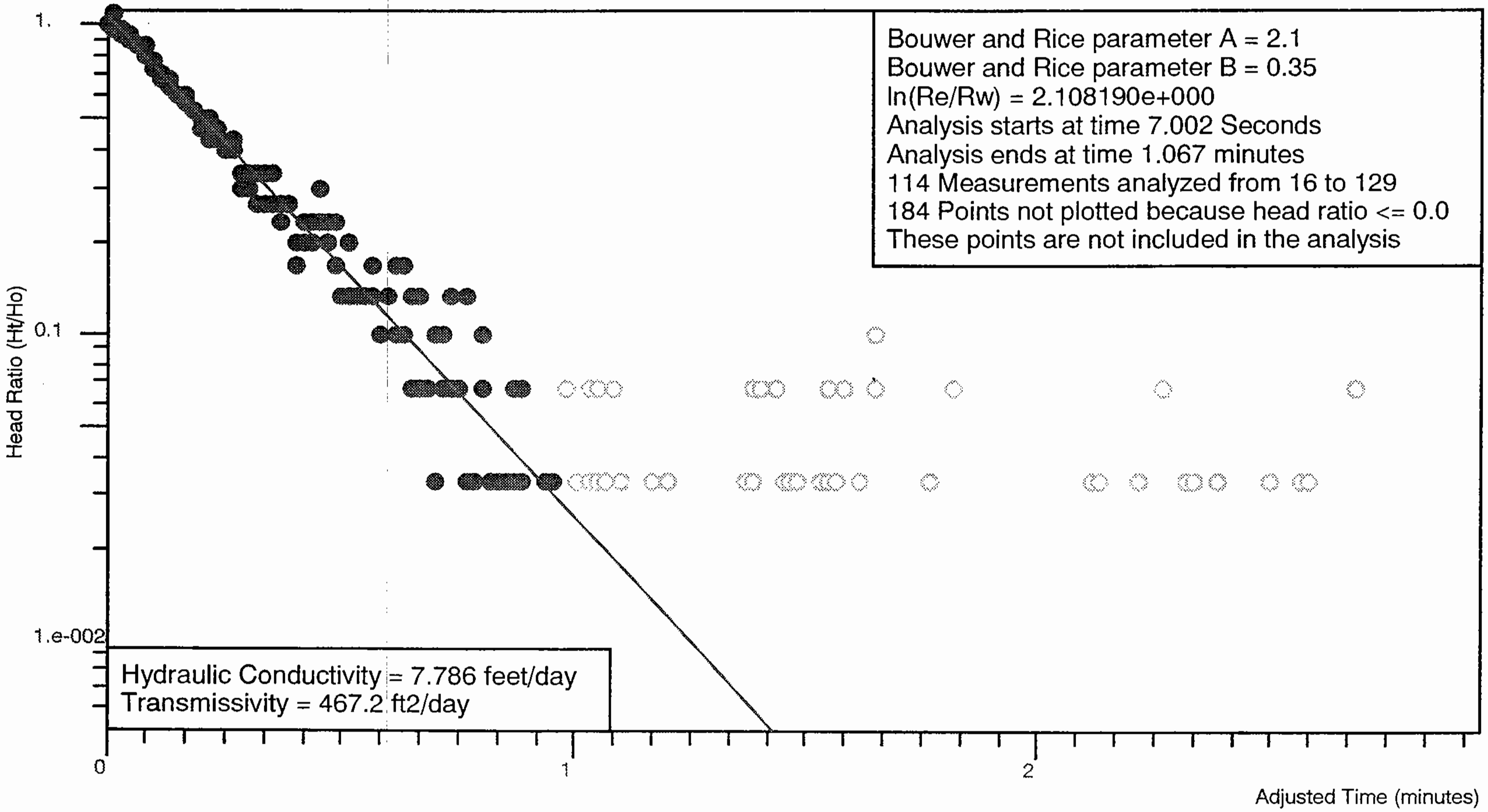
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugin - DP-12 12/1/01

Bouwer and Rice Graph

Oak Hammock Holopaw, Florida

DP-12



Ho is 0.3 feet at 7.002 Seconds

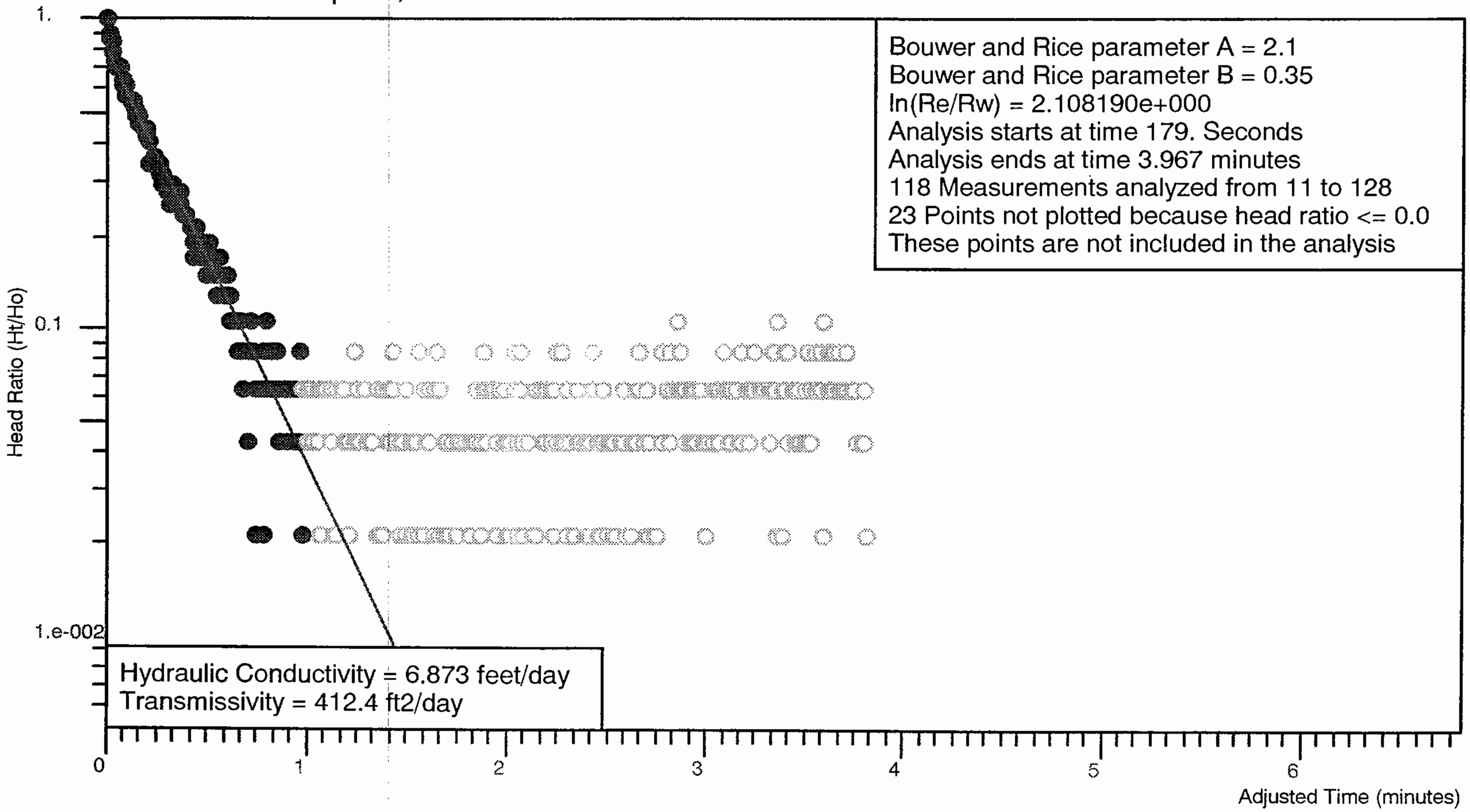
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - DP-12 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-12



Ho is 0.47 feet at 179. Seconds

Project Number: 48OH01 for OMNI Waste

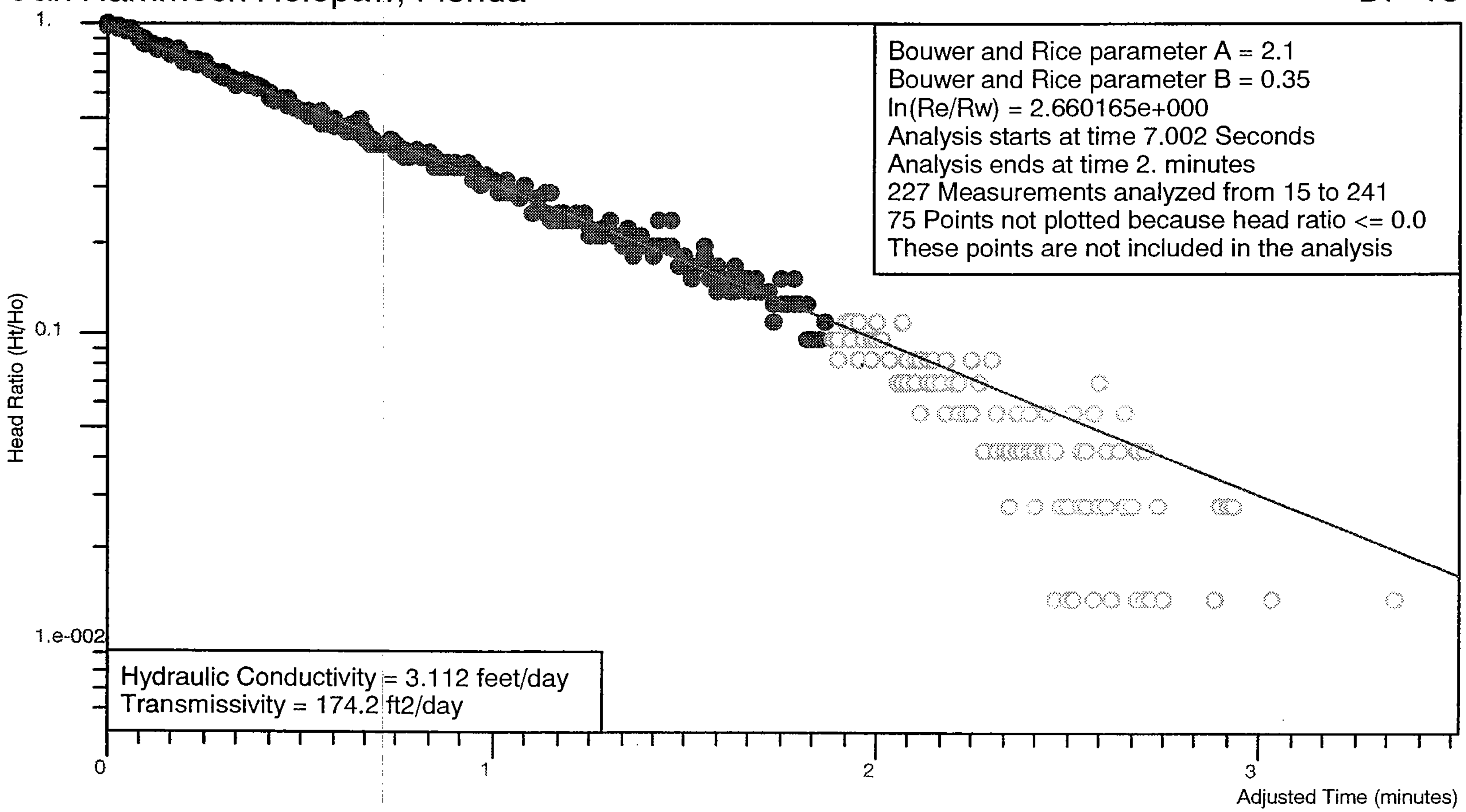
Analysis by Starpoint Software

Slugtest - Slugin - DP-18 12/1/01

Bouwer and Rice Graph

Oak Hammock Holopaw, Florida

DP-18



Ho is 0.72 feet at 7.002 Seconds

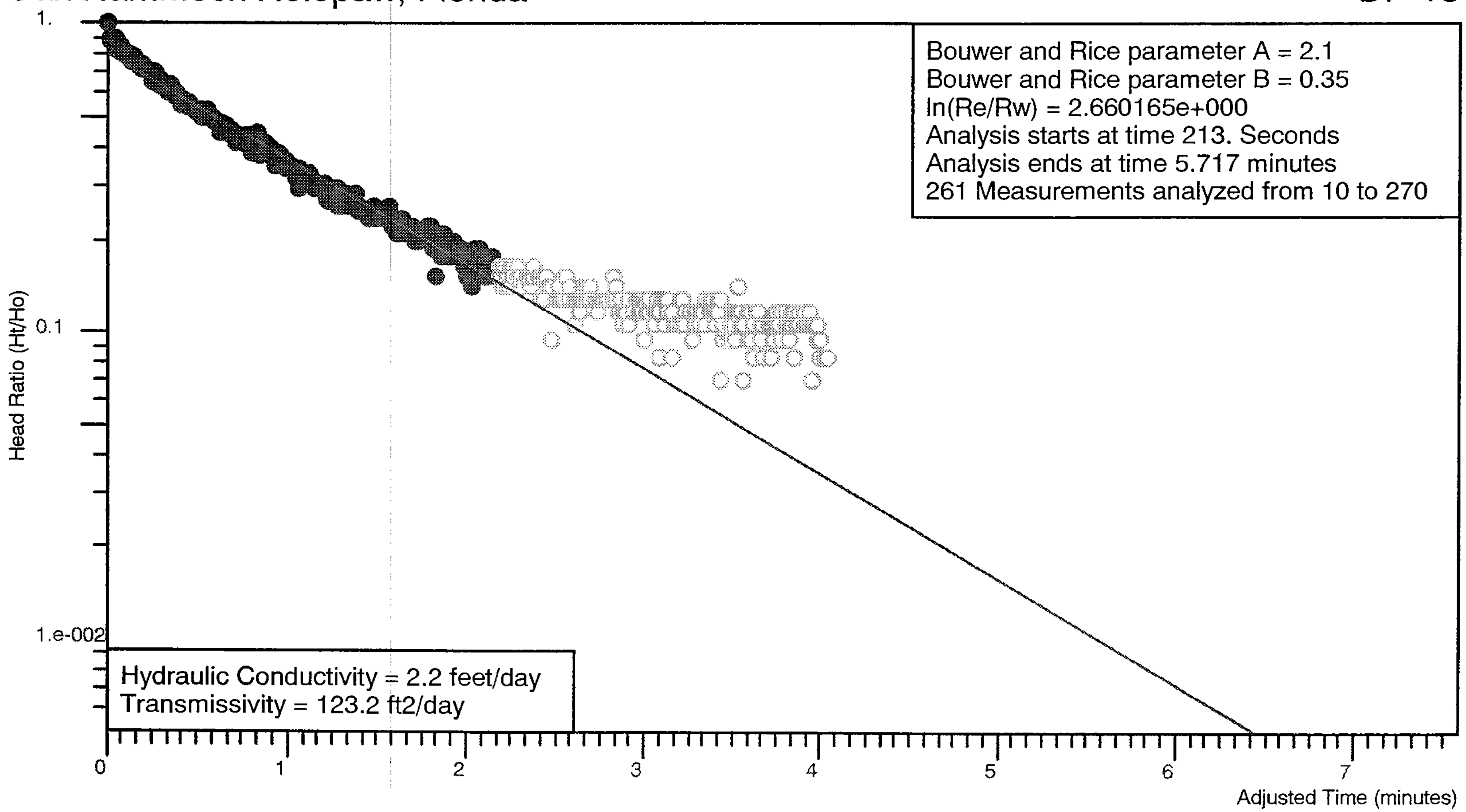
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - DP-18 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-18



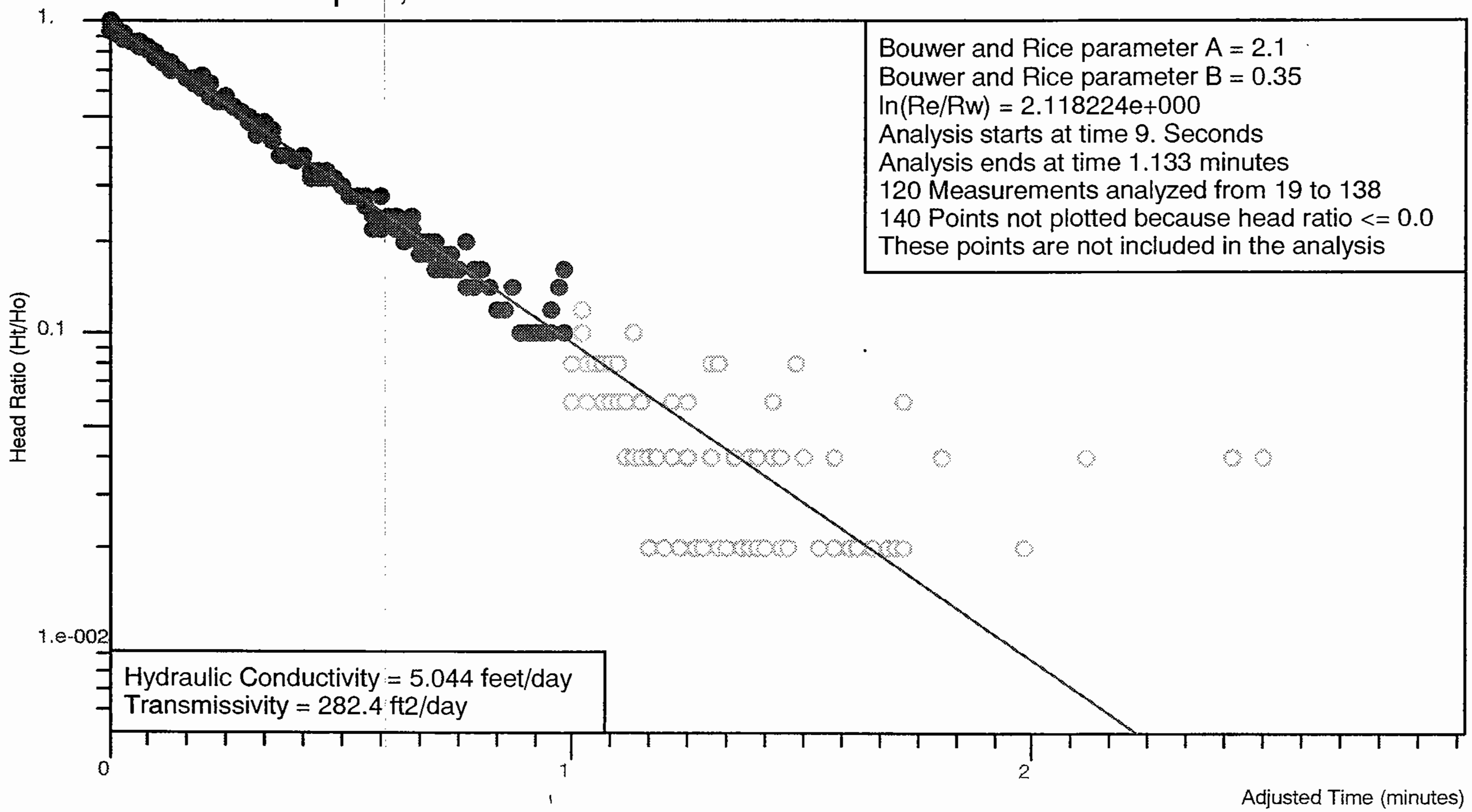
Ho is 0.85 feet at 213. Seconds

Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugin - DP-19 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph
DP-19



Ho is 0.5 feet at 9. Seconds

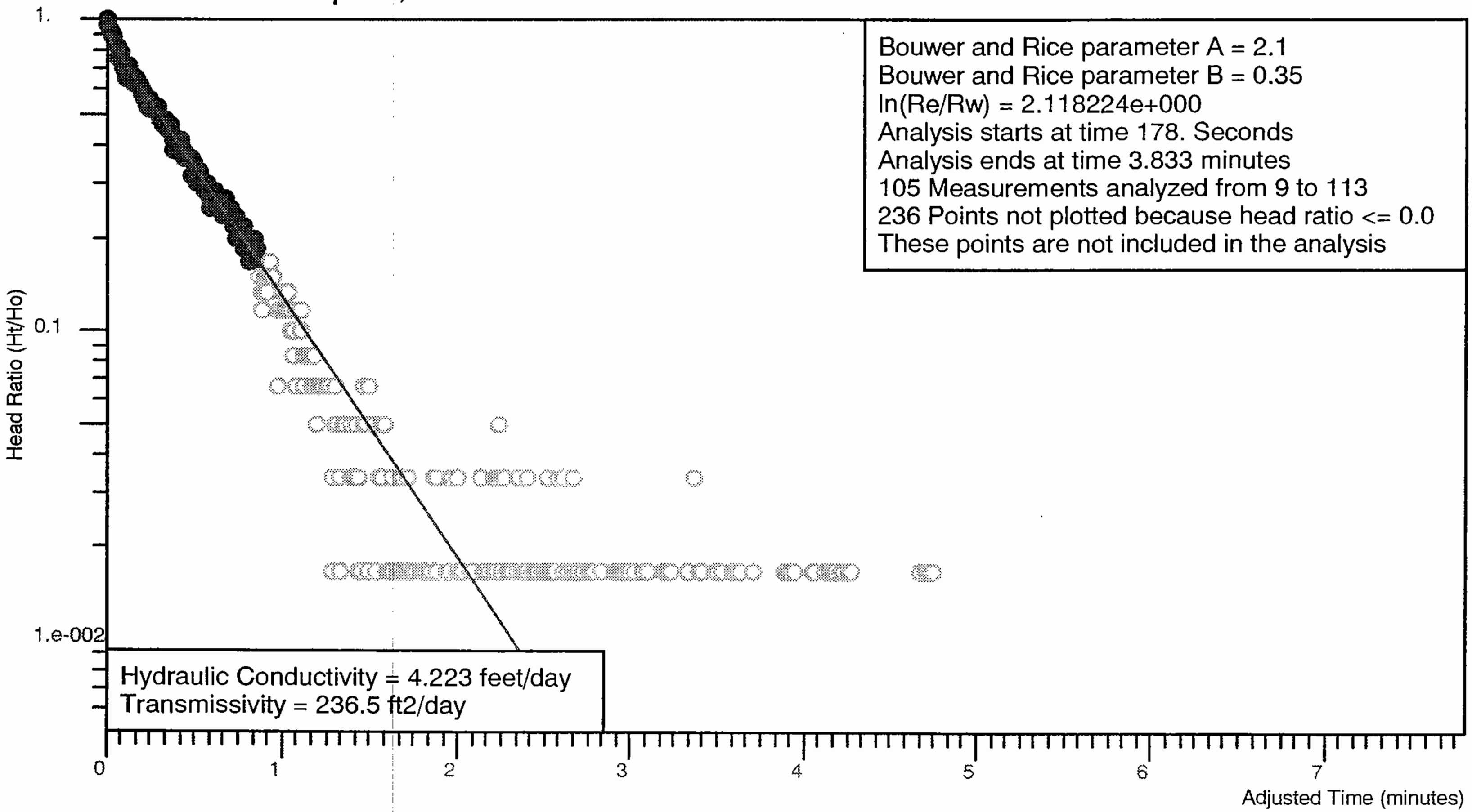
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - DP-19 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-19



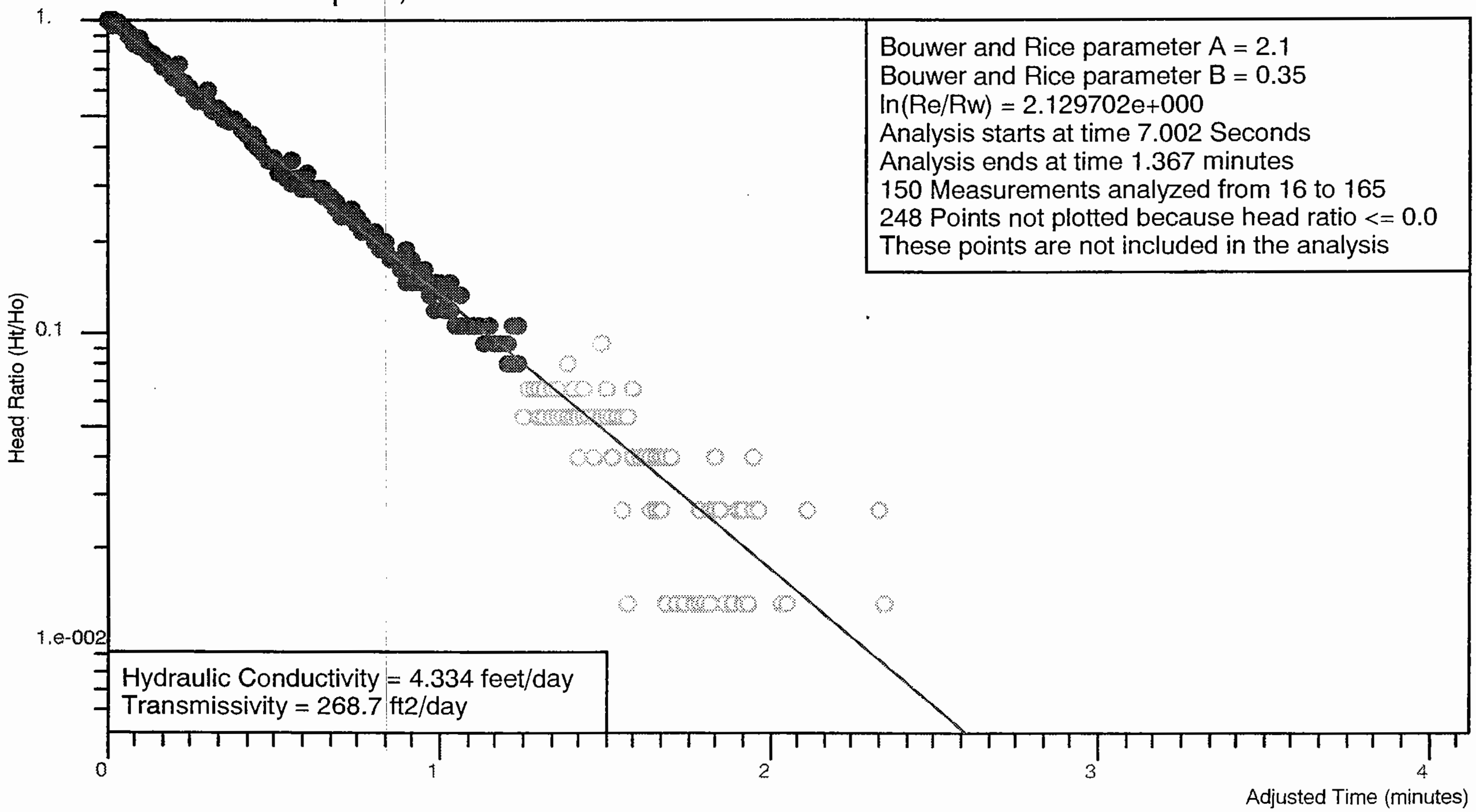
Ho is 0.6 feet at 178. Seconds

Project Number: 48OH01 for OMNI Waste

Analysis by Starpoint Software

Slugtest - Slugin - DP-22 12/1/01
Oak Hammock Holopaw, Florida

Bouwer and Rice Graph
DP-22



Bouwer and Rice parameter A = 2.1
Bouwer and Rice parameter B = 0.35
ln(Re/Rw) = 2.129702e+000
Analysis starts at time 7.002 Seconds
Analysis ends at time 1.367 minutes
150 Measurements analyzed from 16 to 165
248 Points not plotted because head ratio <= 0.0
These points are not included in the analysis

Hydraulic Conductivity = 4.334 feet/day
Transmissivity = 268.7 ft2/day

Ho is 0.75 feet at 7.002 Seconds

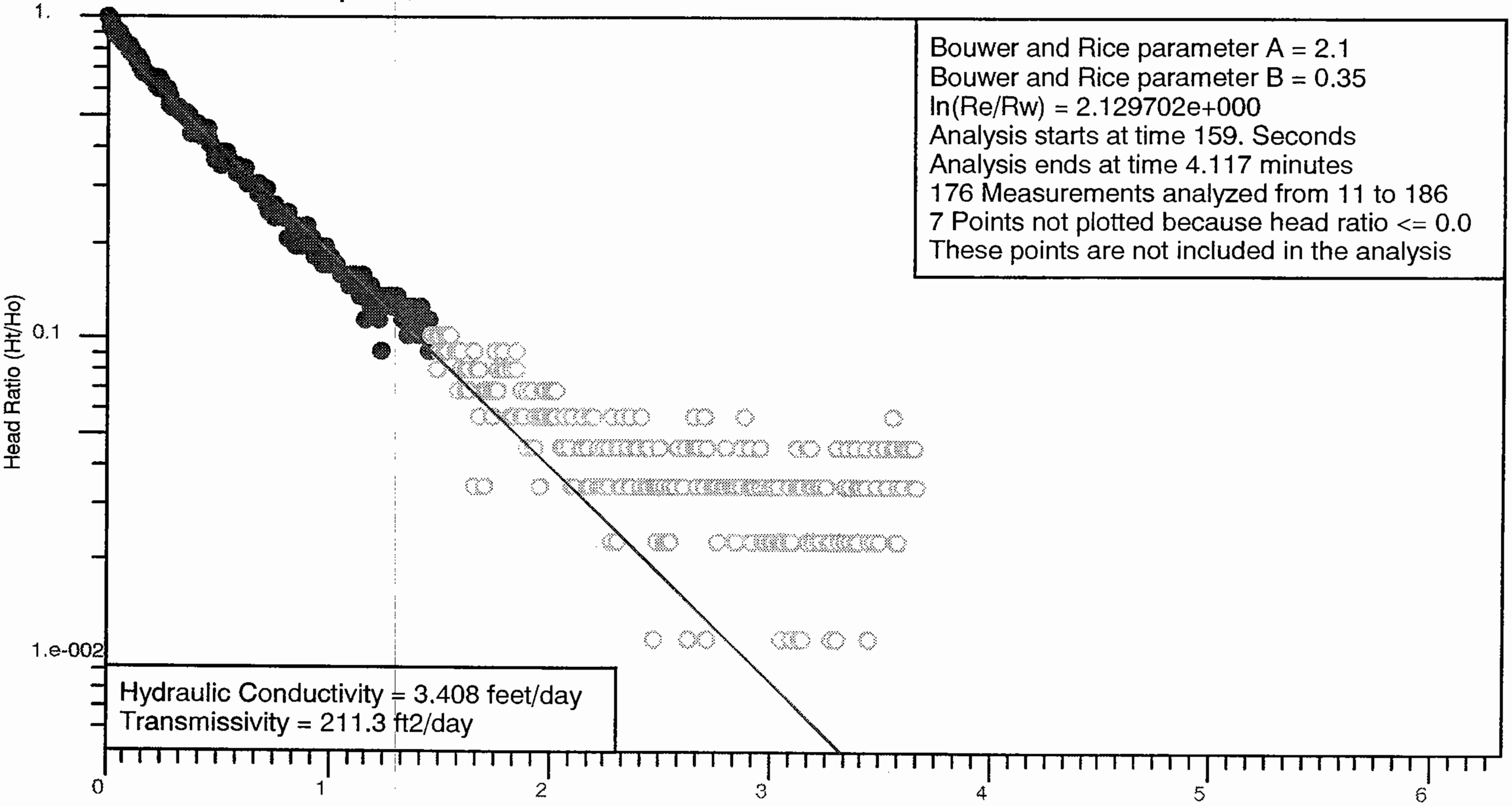
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - DP-22 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-22



Bouwer and Rice parameter A = 2.1
Bouwer and Rice parameter B = 0.35
ln(Re/Rw) = 2.129702e+000
Analysis starts at time 159. Seconds
Analysis ends at time 4.117 minutes
176 Measurements analyzed from 11 to 186
7 Points not plotted because head ratio <= 0.0
These points are not included in the analysis

Hydraulic Conductivity = 3.408 feet/day
Transmissivity = 211.3 ft2/day

Ho is 0.88 feet at 159. Seconds

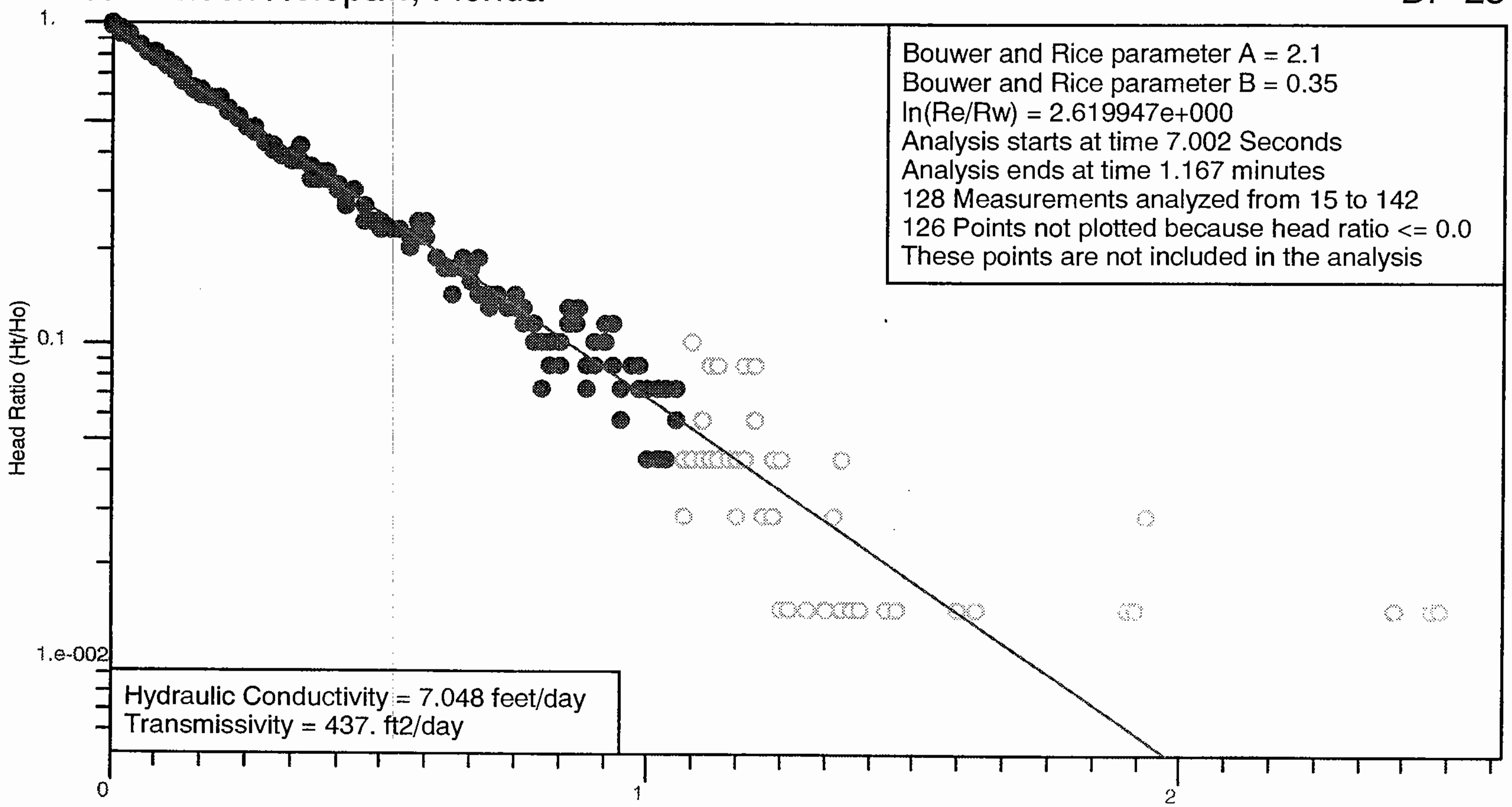
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugin - DP-23 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-23



Bouwer and Rice parameter A = 2.1
Bouwer and Rice parameter B = 0.35
ln(Re/Rw) = 2.619947e+000
Analysis starts at time 7.002 Seconds
Analysis ends at time 1.167 minutes
128 Measurements analyzed from 15 to 142
126 Points not plotted because head ratio <= 0.0
These points are not included in the analysis

Hydraulic Conductivity = 7.048 feet/day
Transmissivity = 437. ft2/day

Ho is 0.69 feet at 7.002 Seconds

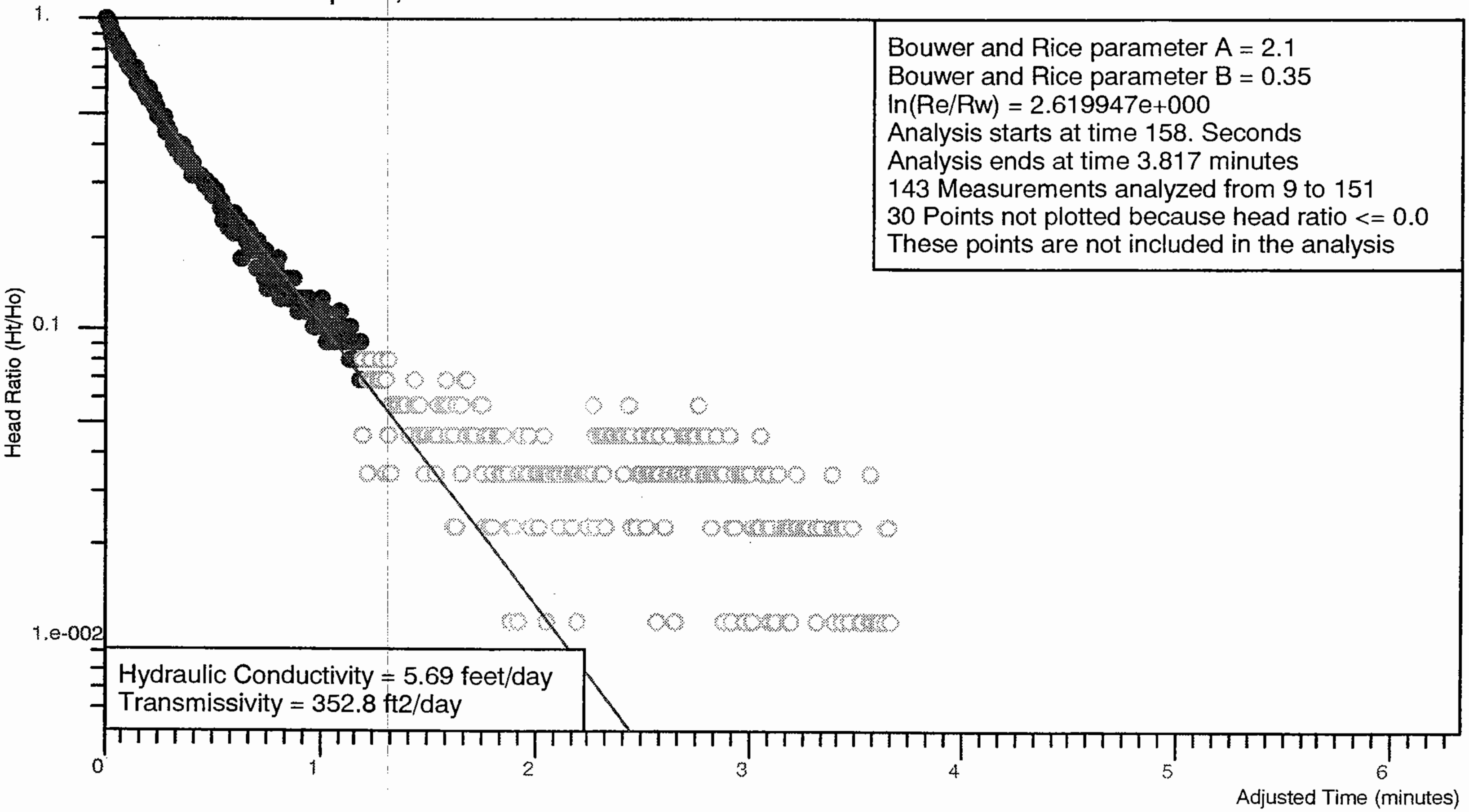
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - DP-23 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

DP-23



Ho is 0.88 feet at 158. Seconds

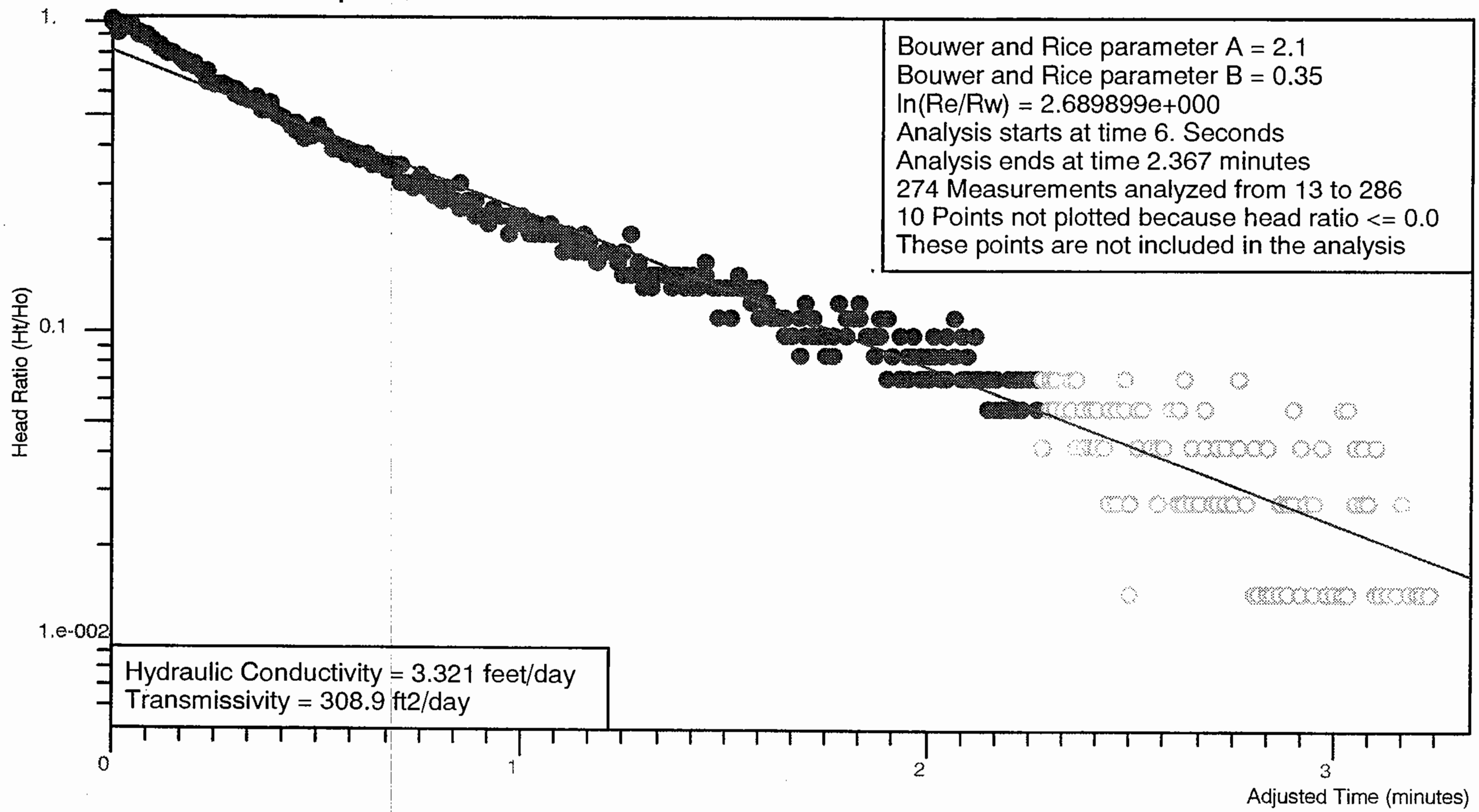
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugin - SZ-1 12/1/01

Bouwer and Rice Graph

Oak Hammock Holopaw, Florida

SZ-1



Bouwer and Rice parameter A = 2.1
Bouwer and Rice parameter B = 0.35
ln(Re/Rw) = 2.689899e+000
Analysis starts at time 6. Seconds
Analysis ends at time 2.367 minutes
274 Measurements analyzed from 13 to 286
10 Points not plotted because head ratio <= 0.0
These points are not included in the analysis

Hydraulic Conductivity = 3.321 feet/day
Transmissivity = 308.9 ft2/day

Ho is 0.71 feet at 6. Seconds

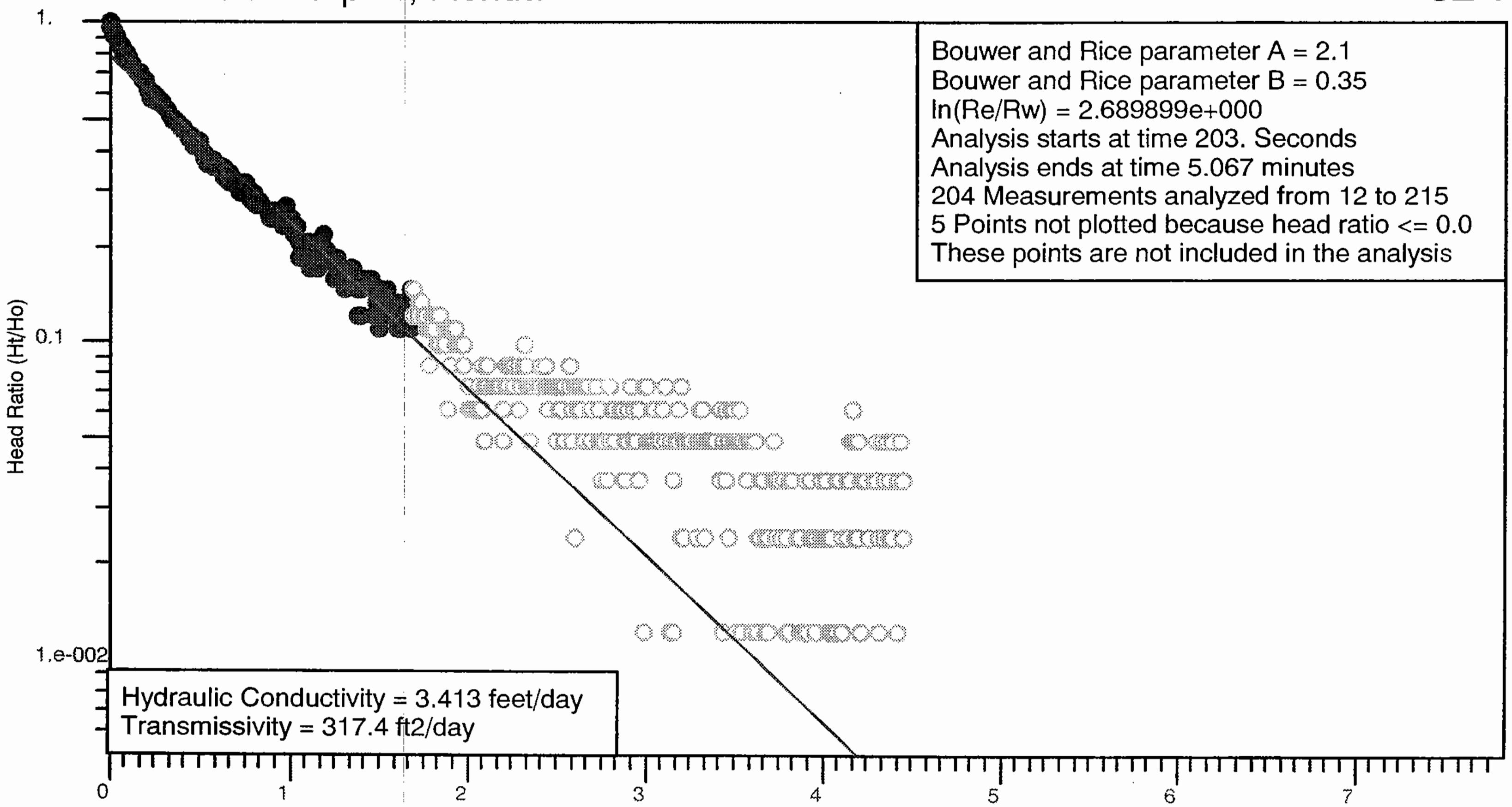
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - SZ-1 12/1/01

Bouwer and Rice Graph

Oak Hammock Holopaw, Florida

SZ-1



Bouwer and Rice parameter A = 2.1
Bouwer and Rice parameter B = 0.35
ln(Re/Rw) = 2.689899e+000
Analysis starts at time 203. Seconds
Analysis ends at time 5.067 minutes
204 Measurements analyzed from 12 to 215
5 Points not plotted because head ratio <= 0.0
These points are not included in the analysis

Hydraulic Conductivity = 3.413 feet/day
Transmissivity = 317.4 ft2/day

Ho is 0.82 feet at 203. Seconds

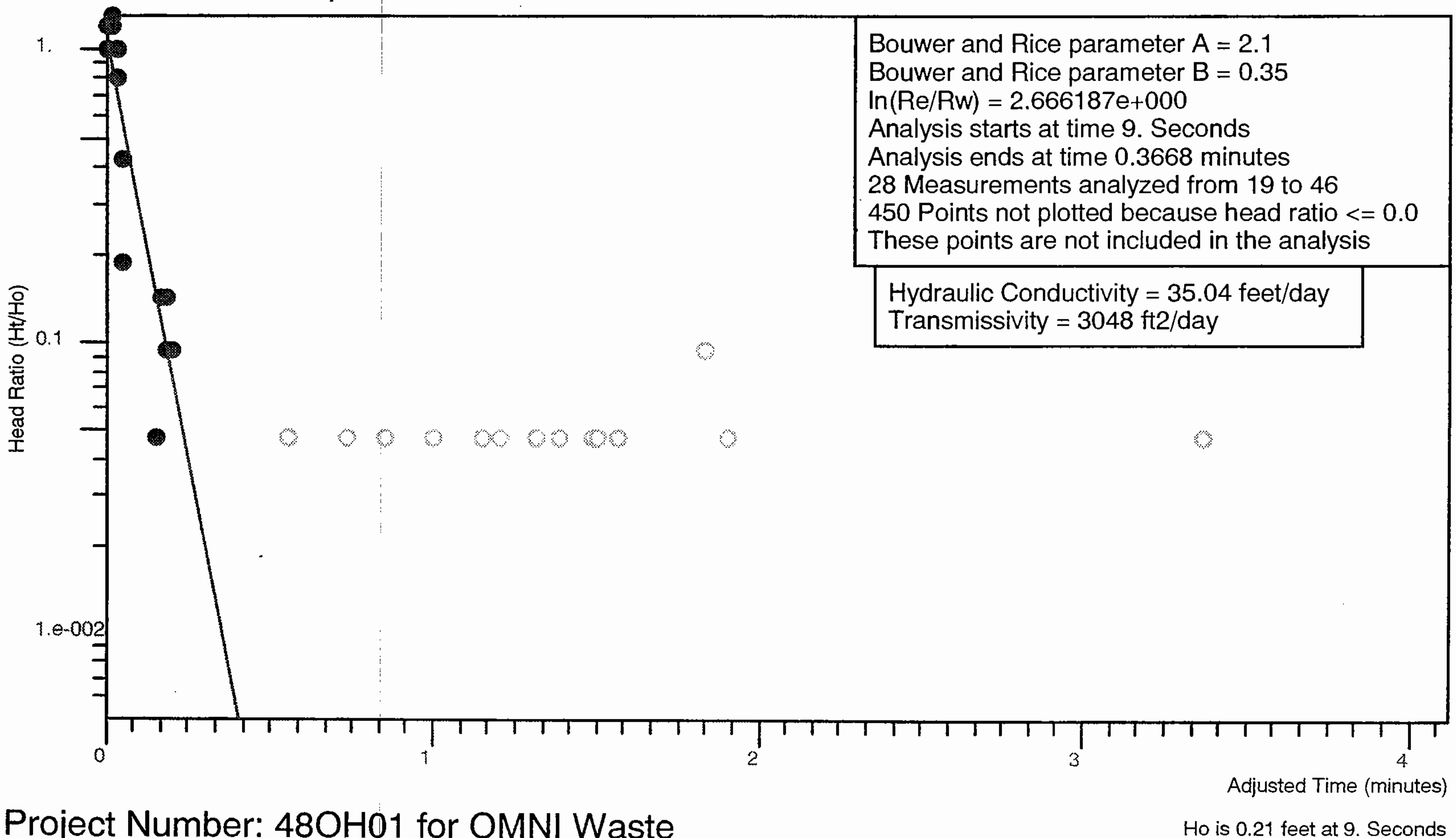
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugin - SZ-2 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

SZ-2



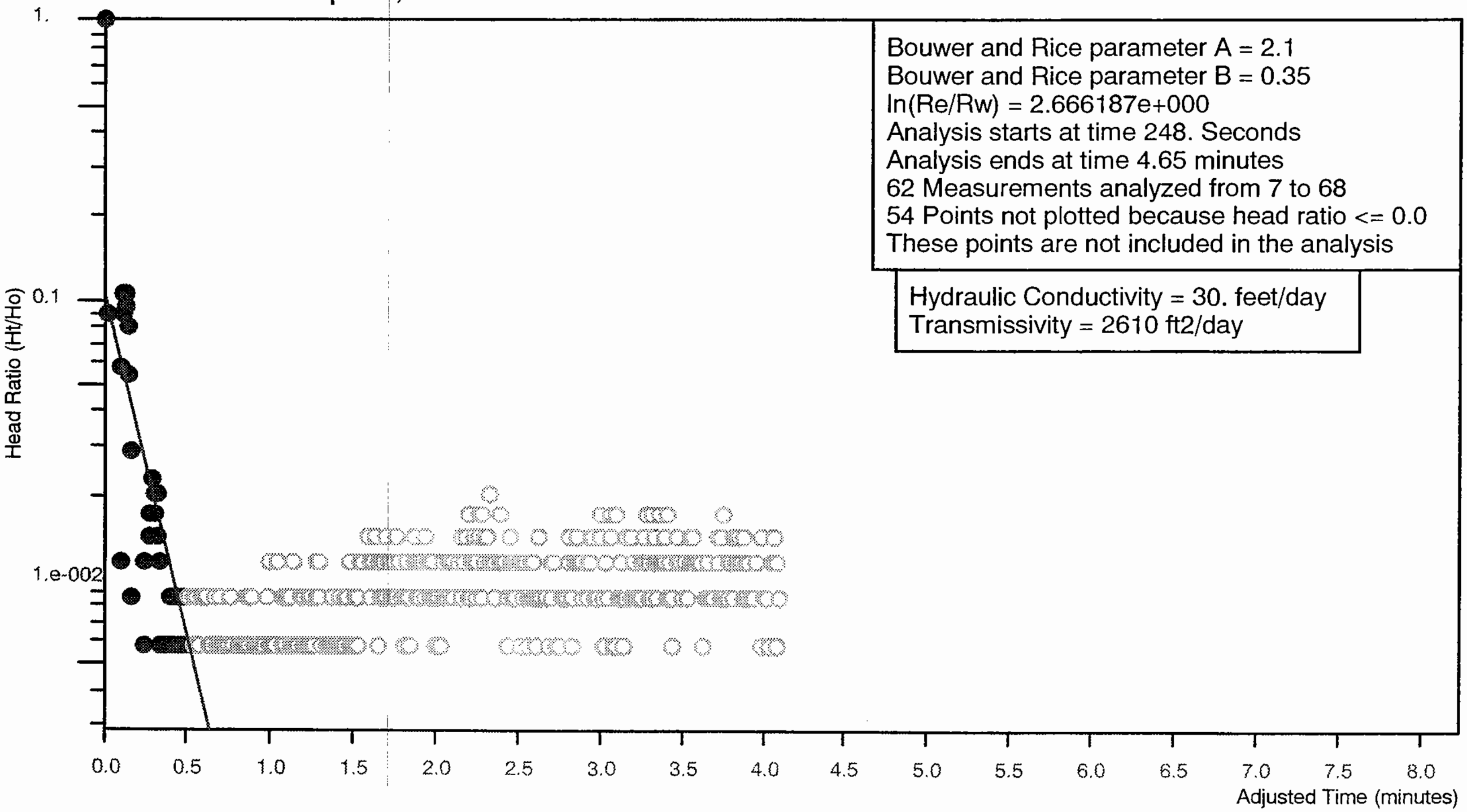
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - SZ-2 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

SZ-2



Bouwer and Rice parameter A = 2.1
Bouwer and Rice parameter B = 0.35
ln(Re/Rw) = 2.666187e+000
Analysis starts at time 248. Seconds
Analysis ends at time 4.65 minutes
62 Measurements analyzed from 7 to 68
54 Points not plotted because head ratio <= 0.0
These points are not included in the analysis

Hydraulic Conductivity = 30. feet/day
Transmissivity = 2610 ft2/day

Ho is 3.49 feet at 248. Seconds

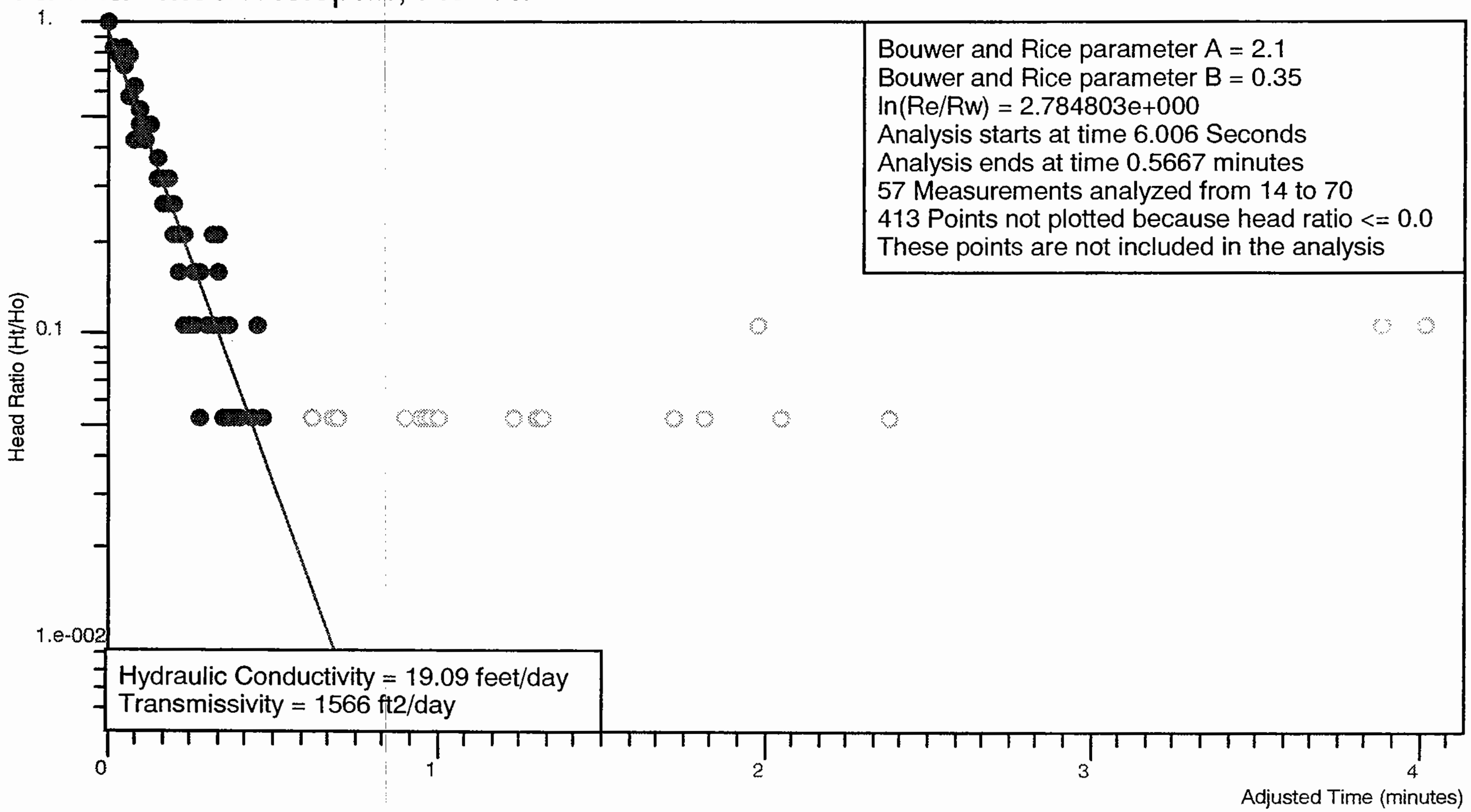
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugin - SZ-3 12/1/01

Bouwer and Rice Graph

Oak Hammock Holopaw, Florida

SZ-3



Ho is 0.19 feet at 6.006 Seconds

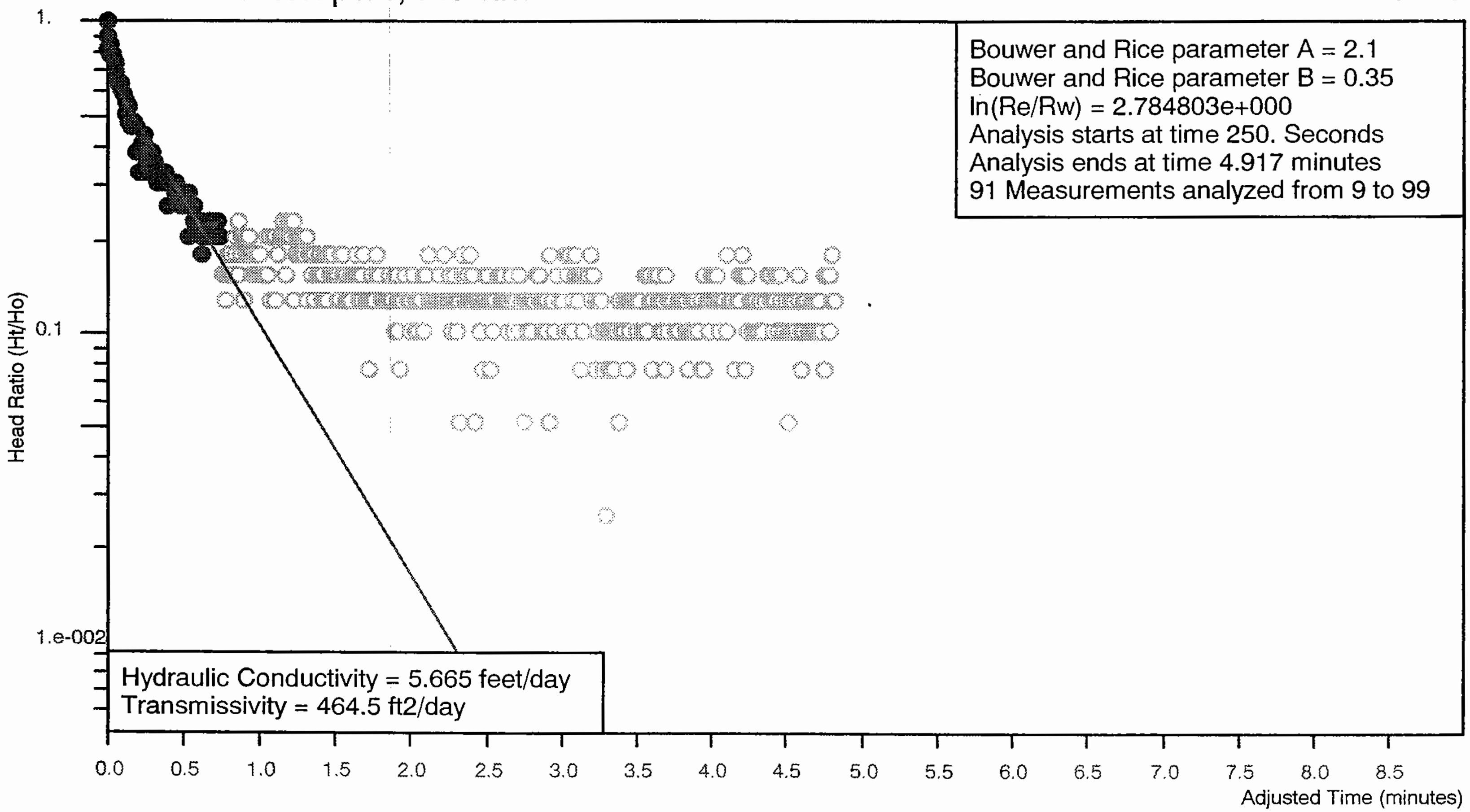
Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Slugtest - Slugout - SZ-3 12/1/01

Oak Hammock Holopaw, Florida

Bouwer and Rice Graph

SZ-3



Ho is 0.39 feet at 250. Seconds

Project Number: 48OH01 for OMNI Waste
Analysis by Starpoint Software

Attachment 4.

Accutest Laboratories
Analytical Testing Results
Drilling Water, Ground Water, Surface Water

DATA ASSESSMENT SUMMARY CHECKLIST AND REPORT – LEVEL III

Client ID: Omni – Oak Hammock
Project Number: TFO48OH01
Project Description: Drilling Water

Prepared By: Diane M. Rosseter
Date: 12/6/01

Sample Delivery Group (SDG) Description:

The municipal water used for well installation at the Omni – Oak Hammock landfill site in Holopaw, FL, was sampled by Kubal-Furr and Associates for volatile and semivolatile organic compounds. The samples were analyzed by AccuTest Laboratories Southeast of Orlando, FL in accordance with FLADEP approved methodology.

CONTENTS	LEVEL III	COMMENTS
Sample Results	√	All data **Class A** except as noted in the discussion section.
Chain(s) of Custody (COCs)	√	O.K.
Master Tracking List	√	O.K.
Case Narrative	√	O.K.
Sample Prep	√	O.K.
Standards Prep		
Instrument Quality Control Data	√	O.K.
Batch Quality Control Report	√	O.K.
Surrogate Recovery Report	√	O.K.
Trip/Field/Equipment Blank Report	√	O.K.
Field Notes/Logbook		
CLP Forms		
All Raw Data		
Electronic Deliverables	√	O.K.

Discussion:

Volatiles

1) The continuing calibration verification (CCV) associated with sample BOART-1 exceeded the acceptance criteria for percent drift (±25%D) from the initial calibration established by the *National Functional Guidelines for Organic Data Review* (USEPA 1999) for bromoform. Results for bromoform in BOART-1 were reported as non-detected and were, therefore, flagged with "UJ".

Semivolatiles

1) The initial calibration associated with sample BOART-1 was outside the *NFG*-established acceptance criteria of ±30% relative standard deviation for calibration response factors for 2,4-dinitrophenol. In addition, the continuing calibration verification associated with this sample exceeded the criteria for ±25% drift from the initial calibration for 2,4-dinitrophenol and benzaldehyde. These compounds were reported as non-detected in BOART-1 and were, therefore, flagged with "UJ".

2) The initial calibration associated with sample PRECISION MOBIL COMBO RIG and GANNARELLI RANCH WELL was outside the *NFG*-established acceptance criteria for benzaldehyde. This compound was reported as non-detected in PRECISION MOBIL COMBO RIG and GANNARELLI RANCH WELL and was, therefore, flagged with "UJ".

3) The continuing calibration verification associated with the original analysis of sample MC2 was outside the *NFG*-established criteria for percent drift from the initial calibration for benzaldehyde. Results for this compound were reported as non-detected in MC2 and were, therefore, flagged with "UJ".

4) The matrix spike and/or matrix spike duplicate (MS/MSD) performed on GANNARELLI RANCH WELL recovered above the laboratory-established upper control limit for 2,4-dinitrophenol, pentachlorophenol, and di-n-octyl phthalate. In addition, 2,4-dinitrophenol recovered above the upper control limit in the associated laboratory control sample. Results for these compounds in GANNARELLI RANCH WELL were reported as non-detected, therefore, no qualifiers were assigned.

5) Bis(2-ethylhexyl)phthalate (BEHP) was found at levels between the method detection limit (MDL) and laboratory-reporting limit (RL) in samples BOART-1 and PRECISION MOBIL COMBO RIG. While not found in the associated method blanks, it should be noted that BEHP is considered a common lab and field contaminant and is often found in environmental samples as a result. Because the drill water used for this project was stored in polyethylene tanks, this may have contributed to the presence of BEHP in these drilling water samples.

6) It should be noted that surrogate recovery in the method blank associated with the original extraction and analysis of MC2 was well below the lower acceptance limits for all compounds, possibly due to laboratory error or equipment failure. All samples associated with this blank were reextracted and reanalyzed out of holding time to confirm results obtained from the original analysis. Because surrogate recoveries were acceptable in both the original analysis and reanalysis of MC2, and results were found to be non-detected in both runs, the results from original analysis were accepted by the reviewer.

UJ = not detected above the associated quantitation limit, however results should be as estimated

Class A = quantitative   Class B = qualitative   Class C = unusable

Southeast
ACCUTEST

12/06/01

Technical Report for

Kubal-Furr & Associates

Omni-Oak Hammock

48OH01 Holopaw,FL

Accutest Job Number: F11379

Report to:

Kubal-Furr & Associates
Drosseter@ix.netcom.com
ATTN: Diane Rosseter

Total number of pages in report: 6

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Sample Summary

Kubal-Furr & Associates

Job No: F11379

Omni-Oak Hammock
Project No: 48OH01 Holopaw,FL

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
F11379-1	10/31/01	10:30	GK	11/01/01	AQ	Ground Water	BOART-1

Report of Analysis

Client Sample ID:	BOART-1			
Lab Sample ID:	F11379-1		Date Sampled:	10/31/01
Matrix:	AQ - Ground Water		Date Received:	11/01/01
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0007017.D	1	11/09/01	JG	n/a	n/a	VB302
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	8.5	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BOART-1		
Lab Sample ID:	F11379-1	Date Sampled:	10/31/01
Matrix:	AQ - Ground Water	Date Received:	11/01/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		80-120%
17060-07-0	1,2-Dichloroethane-D4	95%		80-120%
2037-26-5	Toluene-D8	100%		80-120%
460-00-4	4-Bromofluorobenzene	102%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BOART-1		
Lab Sample ID:	F11379-1	Date Sampled:	10/31/01
Matrix:	AQ - Ground Water	Date Received:	11/01/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009404.D	1	11/06/01	ME	11/05/01	OP4097	SL540
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BOART-1		
Lab Sample ID:	F11379-1	Date Sampled:	10/31/01
Matrix:	AQ - Ground Water	Date Received:	11/01/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	3.6	5.0	ug/l	J
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	52%		20-125%
4165-62-2	Phenol-d5	35%		10-125%
118-79-6	2,4,6-Tribromophenol	88%		35-140%
4165-60-0	Nitrobenzene-d5	82%		46-125%
321-60-8	2-Fluorobiphenyl	78%		46-125%
1718-51-0	Terphenyl-d14	89%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Blank Spike Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VB302-BS	B0006996.D	1	11/09/01	JG	n/a	n/a	VB302

The QC reported here applies to the following samples: Method: SW846 8260B

F11379-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	107	86	67-125
71-43-2	Benzene	25	23.8	95	75-125
75-27-4	Bromodichloromethane	25	23.0	92	75-125
75-25-2	Bromoform	25	19.2	77	72-125
108-90-7	Chlorobenzene	25	23.4	94	75-125
75-00-3	Chloroethane	25	27.2	109	58-136
67-66-3	Chloroform	25	22.3	89	75-125
75-15-0	Carbon disulfide	125	108	86	48-142
56-23-5	Carbon tetrachloride	25	22.2	89	75-136
110-82-7	Cyclohexane	25	23.9	96	50-150 [a]
75-34-3	1,1-Dichloroethane	25	23.8	95	75-125
75-35-4	1,1-Dichloroethylene	25	23.9	96	67-138
96-12-8	1,2-Dibromo-3-chloropropane	25	20.2	81	64-125
106-93-4	1,2-Dibromoethane	25	22.1	88	75-125
107-06-2	1,2-Dichloroethane	25	21.6	86	75-125
78-87-5	1,2-Dichloropropane	25	24.5	98	75-125
124-48-1	Dibromochloromethane	25	22.1	88	75-125
75-71-8	Dichlorodifluoromethane	25	34.8	139	48-171
156-59-2	cis-1,2-Dichloroethylene	25	24.0	96	75-129
10061-01-5	cis-1,3-Dichloropropene	25	21.0	84	75-125
541-73-1	m-Dichlorobenzene	25	22.9	92	75-125
95-50-1	o-Dichlorobenzene	25	23.0	92	75-125
106-46-7	p-Dichlorobenzene	25	22.3	89	75-125
156-60-5	trans-1,2-Dichloroethylene	25	23.8	95	73-125
10061-02-6	trans-1,3-Dichloropropene	25	19.0	76	75-125
100-41-4	Ethylbenzene	25	22.7	91	68-135
76-13-1	Freon 113	25	23.4	94	75-125
591-78-6	2-Hexanone	125	112	90	68-125
98-82-8	Isopropylbenzene	25	24.7	99	75-125
108-10-1	4-Methyl-2-pentanone	125	107	86	75-125
79-20-9	Methyl Acetate	125	112	90	50-150 [a]
74-83-9	Methyl bromide	25	24.5	98	59-146
74-87-3	Methyl chloride	25	28.3	113	50-142
108-87-2	Methylcyclohexane	25	24.9	100	50-150 [a]
75-09-2	Methylene chloride	25	21.6	86	69-125
78-93-3	Methyl ethyl ketone	125	110	88	70-125

Blank Spike Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VB302-BS	B0006996.D	1	11/09/01	JG	n/a	n/a	VB302

The QC reported here applies to the following samples: Method: SW846 8260B

F11379-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
1634-04-4	Methyl Tert Butyl Ether	25	20.7	83	75-125
100-42-5	Styrene	25	21.6	86	75-125
71-55-6	1,1,1-Trichloroethane	25	24.1	96	75-132
79-34-5	1,1,2,2-Tetrachloroethane	25	22.6	90	75-125
79-00-5	1,1,2-Trichloroethane	25	23.6	94	75-125
120-82-1	1,2,4-Trichlorobenzene	25	23.2	93	75-125
127-18-4	Tetrachloroethylene	25	24.3	97	75-126
108-88-3	Toluene	25	23.2	93	75-125
79-01-6	Trichloroethylene	25	22.8	91	75-125
75-69-4	Trichlorofluoromethane	25	27.6	110	55-162
75-01-4	Vinyl chloride	25	27.1	108	60-147
1330-20-7	Xylene (total)	75	71.1	95	75-125

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	80-120%
17060-07-0	1,2-Dichloroethane-D4	99%	80-120%
2037-26-5	Toluene-D8	101%	80-120%
460-00-4	4-Bromofluorobenzene	99%	80-120%

(a) Advisory control limits.

Method Blank Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VB302-MB	B0006997.D	1	11/09/01	JG	n/a	n/a	VB302

The QC reported here applies to the following samples:

Method: SW846 8260B

F11379-1

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

Method Blank Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VB302-MB	B0006997.D	1	11/09/01	JG	n/a	n/a	VB302

The QC reported here applies to the following samples: Method: SW846 8260B

F11379-1

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	100%	80-120%
17060-07-0	1,2-Dichloroethane-D4	98%	80-120%
2037-26-5	Toluene-D8	100%	80-120%
460-00-4	4-Bromofluorobenzene	101%	80-120%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11395-15MS	B0007003.D	1	11/09/01	JG	n/a	n/a	VB302
F11395-15MSD	B0007004.D	1	11/09/01	JG	n/a	n/a	VB302
F11395-15	B0006998.D	1	11/09/01	JG	n/a	n/a	VB302

The QC reported here applies to the following samples: Method: SW846 8260B

F11379-1

CAS No.	Compound	F11395-15 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		125	115	92	120	96	4	61-125/15
71-43-2	Benzene	ND		25	23.4	94	23.3	93	0	75-125/15
75-27-4	Bromodichloromethane	ND		25	21.9	88	22.2	89	1	75-125/15
75-25-2	Bromoform	ND		25	21.1	84	20.9	84	1	66-125/15
108-90-7	Chlorobenzene	ND		25	23.1	92	22.5	90	3	75-125/15
75-00-3	Chloroethane	ND		25	27.1	108	26.5	106	2	53-125/15
67-66-3	Chloroform	ND		25	21.9	88	21.6	86	1	75-125/15
75-15-0	Carbon disulfide	ND		125	109	87	105	84	4	51-138/15
56-23-5	Carbon tetrachloride	ND		25	22.0	88	22.3	89	1	74-131/15
110-82-7	Cyclohexane	ND		25	23.0	92	22.9	92	0	50-150/30
75-34-3	1,1-Dichloroethane	ND		25	22.7	91	23.1	92	2	75-125/1[illegible]
75-35-4	1,1-Dichloroethylene	ND		25	22.7	91	22.2	89	2	66-140/15
96-12-8	1,2-Dibromo-3-chloropropane	ND		25	19.5	78	19.9	80	2	57-125/15
106-93-4	1,2-Dibromoethane	ND		25	21.9	88	21.2	85	3	75-125/15
107-06-2	1,2-Dichloroethane	ND		25	20.1	80	21.1	84	5	75-125/15
78-87-5	1,2-Dichloropropane	ND		25	23.8	95	24.4	98	2	75-125/15
124-48-1	Dibromochloromethane	ND		25	22.2	89	21.5	86	3	75-125/15
75-71-8	Dichlorodifluoromethane	ND		25	33.0	132	34.0	136	3	45-182/15
156-59-2	cis-1,2-Dichloroethylene	ND		25	23.5	94	23.1	92	2	75-136/15
10061-01-5	cis-1,3-Dichloropropene	ND		25	19.0	76	19.0	76	0	71-125/15
541-73-1	m-Dichlorobenzene	ND		25	22.3	89	22.5	90	1	75-125/15
95-50-1	o-Dichlorobenzene	ND		25	22.2	89	22.2	89	0	75-125/15
106-46-7	p-Dichlorobenzene	ND		25	22.2	89	22.5	90	1	75-125/15
156-60-5	trans-1,2-Dichloroethylene	ND		25	22.6	90	22.8	91	1	73-125/15
10061-02-6	trans-1,3-Dichloropropene	ND		25	16.9	68	16.8	67	0	62-125/15
100-41-4	Ethylbenzene	ND		25	22.4	90	22.0	88	2	75-125/15
76-13-1	Freon 113	ND		25	23.6	94	23.1	92	2	69-131/15
591-78-6	2-Hexanone	ND		125	109	87	108	86	1	71-125/15
98-82-8	Isopropylbenzene	ND		25	23.3	93	23.8	95	2	74-125/15
108-10-1	4-Methyl-2-pentanone	ND		125	106	85	106	85	0	75-125/15
79-20-9	Methyl Acetate	ND		125	107	86	109	87	2	50-150/30 [a]
74-83-9	Methyl bromide	ND		25	24.9	100	24.2	97	3	67-146/15
74-87-3	Methyl chloride	ND		25	29.0	116	28.5	114	2	47-160/15
108-87-2	Methylcyclohexane	ND		25	23.3	93	23.5	94	1	50-150/30 [a]
75-09-2	Methylene chloride	ND		25	21.2	85	21.5	86	1	69-125/15
78-93-3	Methyl ethyl ketone	ND		125	112	90	115	92	3	70-125/1[illegible]

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11395-15MS	B0007003.D	1	11/09/01	JG	n/a	n/a	VB302
F11395-15MSD	B0007004.D	1	11/09/01	JG	n/a	n/a	VB302
F11395-15	B0006998.D	1	11/09/01	JG	n/a	n/a	VB302

The QC reported here applies to the following samples: Method: SW846 8260B

F11379-1

CAS No.	Compound	F11395-15 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
1634-04-4	Methyl Tert Butyl Ether	ND		25	20.2	81	21.4	86	6	75-125/15
100-42-5	Styrene	ND		25	20.7	83	20.7	83	0	69-126/15
71-55-6	1,1,1-Trichloroethane	ND		25	23.3	93	23.2	93	0	75-131/15
79-34-5	1,1,2,2-Tetrachloroethane	ND		25	22.0	88	21.7	87	1	75-125/15
79-00-5	1,1,2-Trichloroethane	ND		25	22.7	91	22.5	90	1	75-125/15
120-82-1	1,2,4-Trichlorobenzene	ND		25	20.8	83	21.3	85	2	74-125/15
127-18-4	Tetrachloroethylene	ND		25	22.7	91	23.5	94	3	75-125/15
108-88-3	Toluene	0.52	J	25	23.3	91	22.8	89	2	75-125/15
79-01-6	Trichloroethylene	ND		25	22.8	91	22.8	91	0	75-125/15
75-69-4	Trichlorofluoromethane	ND		25	24.2	97	24.5	98	1	60-139/30
75-01-4	Vinyl chloride	ND		25	28.0	112	28.2	113	1	52-169/15
1330-20-7	Xylene (total)	ND		75	69.3	92	68.1	91	2	75-125/15

CAS No.	Surrogate Recoveries	MS	MSD	F11395-15	Limits
1868-53-7	Dibromofluoromethane	101%	103%	100%	80-120%
17060-07-0	1,2-Dichloroethane-D4	94%	95%	94%	80-120%
2037-26-5	Toluene-D8	99%	98%	100%	80-120%
460-00-4	4-Bromofluorobenzene	95%	97%	100%	80-120%

(a) Advisory control limits.

Volatile Surrogate Recovery Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8260B   Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4
F11379-1	B0007017.D	98.0	95.0	100.0	102.0
F11395-15MS	B0007003.D	101.0	94.0	99.0	95.0
F11395-15MSD	B0007004.D	103.0	95.0	98.0	97.0
VB302-BS	B0006996.D	101.0	99.0	101.0	99.0
VB302-MB	B0006997.D	100.0	98.0	100.0	101.0

Surrogate Compounds	Recovery Limits
S1 = Dibromofluoromethane	80-120%
S2 = 1,2-Dichloroethane-D4	80-120%
S3 = Toluene-D8	80-120%
S4 = 4-Bromofluorobenzene	80-120%

Blank Spike Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4097-BS	L009393.D	1	11/06/01	ME	11/05/01	OP4097	SL540

The QC reported here applies to the following samples: Method: SW846 8270C

F11379-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
95-57-8	2-Chlorophenol	50	38.9	78	60-125
59-50-7	4-Chloro-3-methyl phenol	50	40.2	80	70-125
120-83-2	2,4-Dichlorophenol	50	41.6	83	68-125
105-67-9	2,4-Dimethylphenol	50	27.2	54	42-125
51-28-5	2,4-Dinitrophenol	50	44.4	89	10-125
534-52-1	4,6-Dinitro-o-cresol	50	44.6	89	46-125
95-48-7	2-Methylphenol	50	35.5	71	51-125
	3&4-Methylphenol	100	66.1	66	46-125
88-75-5	2-Nitrophenol	50	46.6	93	64-125
100-02-7	4-Nitrophenol	50	22.6	45	17-125
87-86-5	Pentachlorophenol	50	44.0	88	60-125
108-95-2	Phenol	50	23.8	48	16-125
95-95-4	2,4,5-Trichlorophenol	50	43.3	87	74-125
88-06-2	2,4,6-Trichlorophenol	50	42.1	84	70-125
83-32-9	Acenaphthene	50	39.8	80	70-125
208-96-8	Acenaphthylene	50	44.2	88	75-125
120-12-7	Anthracene	50	43.4	87	75-125
56-55-3	Benzo(a)anthracene	50	42.7	85	75-125
50-32-8	Benzo(a)pyrene	50	45.5	91	75-125
205-99-2	Benzo(b)fluoranthene	50	44.0	88	75-125
191-24-2	Benzo(g,h,i)perylene	50	43.5	87	57-135
207-08-9	Benzo(k)fluoranthene	50	40.4	81	75-125
101-55-3	4-Bromophenyl phenyl ether	50	41.4	83	74-125
85-68-7	Butyl benzyl phthalate	50	46.2	92	38-134
91-58-7	2-Chloronaphthalene	50	40.3	81	59-125
106-47-8	4-Chloroaniline	50	40.5	81	31-125
86-74-8	Carbazole	50	43.5	87	75-125
218-01-9	Chrysene	50	41.5	83	75-125
111-91-1	bis(2-Chloroethoxy)methane	50	40.9	82	64-125
111-44-4	bis(2-Chloroethyl)ether	50	39.2	78	62-125
108-60-1	bis(2-Chloroisopropyl)ether	50	36.7	73	60-125
7005-72-3	4-Chlorophenyl phenyl ether	50	40.7	81	75-125
121-14-2	2,4-Dinitrotoluene	50	48.4	97	73-125
606-20-2	2,6-Dinitrotoluene	50	48.4	97	75-125
91-94-1	3,3'-Dichlorobenzidine	50	46.0	92	55-125
53-70-3	Dibenzo(a,h)anthracene	50	44.9	90	64-130

Blank Spike Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4097-BS	L009393.D	1	11/06/01	ME	11/05/01	OP4097	SL540

The QC reported here applies to the following samples:

Method: SW846 8270C

F11379-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
132-64-9	Dibenzofuran	50	39.6	79	73-125
84-74-2	Di-n-butyl phthalate	50	44.8	90	47-140
117-84-0	Di-n-octyl phthalate	50	46.3	93	52-125
84-66-2	Diethyl phthalate	50	42.4	85	59-125
131-11-3	Dimethyl phthalate	50	42.2	84	24-142
117-81-7	bis(2-Ethylhexyl)phthalate	50	46.9	94	71-125
206-44-0	Fluoranthene	50	43.0	86	75-125
86-73-7	Fluorene	50	41.9	84	75-125
118-74-1	Hexachlorobenzene	50	40.9	82	74-125
87-68-3	Hexachlorobutadiene	50	31.7	63	22-125
77-47-4	Hexachlorocyclopentadiene	50	28.7	57	10-125
67-72-1	Hexachloroethane	50	32.0	64	23-125
193-39-5	Indeno(1,2,3-cd)pyrene	50	44.8	90	53-130
78-59-1	Isophorone	50	40.2	80	63-125
91-57-6	2-Methylnaphthalene	50	37.0	74	51-125
88-74-4	2-Nitroaniline	50	43.0	86	75-125
99-09-2	3-Nitroaniline	50	43.0	86	62-125
100-01-6	4-Nitroaniline	50	45.4	91	67-125
91-20-3	Naphthalene	50	38.7	77	53-125
98-95-3	Nitrobenzene	50	41.6	83	67-125
621-64-7	N-Nitroso-di-n-propylamine	50	38.7	77	61-125
86-30-6	N-Nitrosodiphenylamine	50	45.9	92	75-125
85-01-8	Phenanthrene	50	41.3	83	75-125
129-00-0	Pyrene	50	39.6	79	67-125

CAS No.	Surrogate Recoveries	BSP	Limits
367-12-4	2-Fluorophenol	63%	20-125%
4165-62-2	Phenol-d5	43%	10-125%
118-79-6	2,4,6-Tribromophenol	93%	35-140%
4165-60-0	Nitrobenzene-d5	85%	46-125%
321-60-8	2-Fluorobiphenyl	79%	46-125%
1718-51-0	Terphenyl-d14	88%	49-126%

Method Blank Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4097-MB	L009394.D	1	11/06/01	ME	11/05/01	OP4097	SL540

The QC reported here applies to the following samples:

Method: SW846 8270C

F11379-1

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

Method Blank Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4097-MB	L009394.D	1	11/06/01	ME	11/05/01	OP4097	SL540

The QC reported here applies to the following samples: Method: SW846 8270C

F11379-1

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	64%	20-125%
4165-62-2	Phenol-d5	43%	10-125%
118-79-6	2,4,6-Tribromophenol	94%	35-140%

Method Blank Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4097-MB	L009427.D	1	11/07/01	ME	11/05/01	OP4097	SL541

The QC reported here applies to the following samples: Method: SW846 8270C

F11379-1

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

Method Blank Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4097-MB	L009427.D	1	11/07/01	ME	11/05/01	OP4097	SL541

The QC reported here applies to the following samples: Method: SW846 8270C

F11379-1

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	65%	20-125%
4165-62-2	Phenol-d5	48%	10-125%
118-79-6	2,4,6-Tribromophenol	84%	35-140%

Method Blank Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4097-MB	L009427.D	1	11/07/01	ME	11/05/01	OP4097	SL541

The QC reported here applies to the following samples: Method: SW846 8270C

F11379-1

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	89%	46-125%
321-60-8	2-Fluorobiphenyl	85%	46-125%
1718-51-0	Terphenyl-d14	92%	49-126%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4097-MS	L009429.D	1	11/07/01	ME	11/05/01	OP4097	SL541
OP4097-MSD	L009430.D	1	11/07/01	ME	11/05/01	OP4097	SL541
F11395-1	L009405.D	1	11/06/01	ME	11/05/01	OP4097	SL540

The QC reported here applies to the following samples: Method: SW846 8270C

F11379-1

CAS No.	Compound	F11395-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
95-57-8	2-Chlorophenol	ND		100	74.3	74	80.0	80	7	59-125/20
59-50-7	4-Chloro-3-methyl phenol	ND		100	78.2	78	82.8	83	6	72-125/20
120-83-2	2,4-Dichlorophenol	ND		100	75.8	76	83.0	83	9	65-125/20
105-67-9	2,4-Dimethylphenol	ND		100	21.3	21*	29.8	30*	33*	37-125/20
51-28-5	2,4-Dinitrophenol	ND		100	76.5	76	75.4	75	1	27-125/41
534-52-1	4,6-Dinitro-o-cresol	ND		100	75.1	75	77.1	77	3	54-125/20
95-48-7	2-Methylphenol	ND		100	68.4	68	71.4	71	4	57-125/20
	3&4-Methylphenol	ND		200	151	76	159	80	5	55-125/20
88-75-5	2-Nitrophenol	ND		100	76.1	76	85.3	85	11	67-125/20
100-02-7	4-Nitrophenol	ND		100	64.3	64	61.6	62	4	41-125/23
87-86-5	Pentachlorophenol	ND		100	90.1	90	96.3	96	7	67-126/20
108-95-2	Phenol	ND		100	60.9	61	64.7	65	6	39-125/20
95-95-4	2,4,5-Trichlorophenol	ND		100	80.9	81	86.8	87	7	75-125/20
88-06-2	2,4,6-Trichlorophenol	ND		100	73.3	73	82.7	83	12	70-125/20
83-32-9	Acenaphthene	ND		100	77.5	78	86.2	86	11	74-125/20
208-96-8	Acenaphthylene	ND		100	86.1	86	94.4	94	9	75-125/20
120-12-7	Anthracene	ND		100	84.8	85	92.5	92	9	75-125/20
56-55-3	Benzo(a)anthracene	ND		100	81.0	81	89.2	89	10	75-125/20
50-32-8	Benzo(a)pyrene	ND		100	86.6	87	95.2	95	9	75-125/20
205-99-2	Benzo(b)fluoranthene	ND		100	83.0	83	94.6	95	13	75-125/20
191-24-2	Benzo(g,h,i)perylene	ND		100	86.8	87	98.2	98	12	61-125/21
207-08-9	Benzo(k)fluoranthene	ND		100	82.4	82	90.9	91	10	75-125/20
101-55-3	4-Bromophenyl phenyl ether	ND		100	81.9	82	95.5	96	15	73-125/20
85-68-7	Butyl benzyl phthalate	ND		100	83.6	84	91.5	92	9	66-125/20
91-58-7	2-Chloronaphthalene	ND		100	77.3	77	86.9	87	12	64-125/20
106-47-8	4-Chloroaniline	ND		100	69.1	69	71.0	71	3	44-125/20
86-74-8	Carbazole	ND		100	85.6	86	92.9	93	8	75-125/20
218-01-9	Chrysene	ND		100	81.1	81	88.5	88	9	75-125/20
111-91-1	bis(2-Chloroethoxy)methane	ND		100	79.5	80	87.3	87	9	62-125/20
111-44-4	bis(2-Chloroethyl)ether	ND		100	74.5	74	81.3	81	9	61-125/20
108-60-1	bis(2-Chloroisopropyl)ether	ND		100	76.5	76	81.6	82	6	56-125/22
7005-72-3	4-Chlorophenyl phenyl ether	ND		100	85.3	85	87.5	88	2	75-125/20
121-14-2	2,4-Dinitrotoluene	ND		100	90.2	90	90.3	90	0	75-125/20
606-20-2	2,6-Dinitrotoluene	ND		100	87.4	87	89.3	89	2	75-125/20
91-94-1	3,3'-Dichlorobenzidine	ND		100	64.2	64	72.0	72	11	20-125/29
53-70-3	Dibenzo(a,h)anthracene	ND		100	82.6	83	93.4	93	12	64-127/20

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4097-MS	L009429.D	1	11/07/01	ME	11/05/01	OP4097	SL541
OP4097-MSD	L009430.D	1	11/07/01	ME	11/05/01	OP4097	SL541
F11395-1	L009405.D	1	11/06/01	ME	11/05/01	OP4097	SL540

The QC reported here applies to the following samples: Method: SW846 8270C

F11379-1

CAS No.	Compound	F11395-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
132-64-9	Dibenzofuran	ND		100	78.5	78	84.7	85	8	73-125/20
84-74-2	Di-n-butyl phthalate	ND		100	90.2	90	95.5	96	6	71-125/20
117-84-0	Di-n-octyl phthalate	ND		100	83.5	84	93.1	93	11	66-125/30
84-66-2	Diethyl phthalate	ND		100	90.2	90	85.6	86	5	64-125/20
131-11-3	Dimethyl phthalate	ND		100	85.4	85	83.0	83	3	32-139/20
117-81-7	bis(2-Ethylhexyl)phthalate	ND		100	88.8	89	93.4	93	5	74-125/20
206-44-0	Fluoranthene	ND		100	88.5	88	94.4	94	6	75-125/20
86-73-7	Fluorene	ND		100	86.1	86	89.8	90	4	75-125/20
118-74-1	Hexachlorobenzene	ND		100	83.1	83	93.9	94	12	75-125/20
87-68-3	Hexachlorobutadiene	ND		100	62.0	62	70.3	70	12	26-125/2[illegible]
77-47-4	Hexachlorocyclopentadiene	ND		100	43.9	44	56.2	56	24	18-125/2[illegible]
67-72-1	Hexachloroethane	ND		100	65.4	65	73.1	73	11	22-125/20
193-39-5	Indeno(1,2,3-cd)pyrene	ND		100	83.7	84	91.7	92	9	54-125/20
78-59-1	Isophorone	ND		100	79.6	80	86.0	86	8	62-125/20
91-57-6	2-Methylnaphthalene	ND		100	73.0	73	78.9	79	8	58-125/20
88-74-4	2-Nitroaniline	ND		100	82.5	82	85.8	86	4	67-125/20
99-09-2	3-Nitroaniline	ND		100	69.6	70	65.5	66	6	53-125/20
100-01-6	4-Nitroaniline	ND		100	85.2	85	81.3	81	5	63-125/20
91-20-3	Naphthalene	ND		100	77.8	78	84.3	84	8	55-125/20
98-95-3	Nitrobenzene	ND		100	75.8	76	85.6	86	12	63-125/20
621-64-7	N-Nitroso-di-n-propylamine	ND		100	87.2	87	90.6	91	4	58-125/20
86-30-6	N-Nitrosodiphenylamine	ND		100	88.1	88	96.8	97	9	75-125/20
85-01-8	Phenanthrene	ND		100	81.8	82	88.4	88	8	75-125/20
129-00-0	Pyrene	ND		100	75.0	75	82.7	83	10	67-125/20

CAS No.	Surrogate Recoveries	MS	MSD	F11395-1	Limits
367-12-4	2-Fluorophenol	68%	74%		20-125%
4165-62-2	Phenol-d5	56%	60%		10-125%
118-79-6	2,4,6-Tribromophenol	82%	95%		35-140%
4165-60-0	Nitrobenzene-d5	75%	85%	72%	46-125%
321-60-8	2-Fluorobiphenyl	76%	85%	68%	46-125%
1718-51-0	Terphenyl-d14	78%	87%	86%	49-126%

Semivolatile Surrogate Recovery Summary

Job Number: F11379
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8270C   Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4	S5	S6
F11379-1	L009404.D	52.0	35.0	88.0	82.0	78.0	89.0
OP4097-BS	L009393.D	63.0	43.0	93.0	85.0	79.0	88.0
OP4097-MB	L009394.D	64.0	43.0	94.0	95.0	87.0	95.0
OP4097-MB	L009427.D	65.0	48.0	84.0	89.0	85.0	92.0
OP4097-MS	L009429.D	68.0	56.0	82.0	75.0	76.0	78.0
OP4097-MSD	L009430.D	74.0	60.0	95.0	85.0	85.0	87.0

Surrogate Compounds	Recovery Limits
S1 = 2-Fluorophenol	20-125%
S2 = Phenol-d5	10-125%
S3 = 2,4,6-Tribromophenol	35-140%
S4 = Nitrobenzene-d5	46-125%
S5 = 2-Fluorobiphenyl	46-125%
S6 = Terphenyl-d14	49-126%

ACCUTEST®

CHAIN OF CUSTODY

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #: F11379
ACCUTEST QUOTE #:

CLIENT INFORMATION

KUBAL-FURR + ASSOCIATES
NAME: PO BOX 80247
ADDRESS: SIMPSONVILLE SC 29680
CITY, STATE ZIP
SEND REPORT TO: DIANE ROSSETER
PHONE # (864) 962-4490 - Voice

FACILITY INFORMATION

OMNI - OAK HAMMOCK
PROJECT NAME: ~~HOLOPAW, FL~~ GTC OAK HAMMOCK
LOCATION: HOLOPAW, FL
PROJECT NO. 480H01
FAX # (864) 962-5309

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	COLLECTION DATE	COLLECTION TIME	SAMPLED BY:	MATRIX	# OF BOTTLES	HCl	NaOH	HNO3	H2SO4	NONE	VOCs	SVOCs	LAB USE ONLY
1)	BOART-1	10/31/01	1030	GK		5	X					X	X	

DATA TURNAROUND INFORMATION

☒ STANDARD
☐ 48 HOUR RUSH
☐ 24 HOUR EMERGENCY
☐ OTHER ______

APPROVED BY:

EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

☐ STANDARD
☐ COMMERCIAL "B"
☐ DISK DELIVERABLE
☐ STATE FORMS
☐ OTHER (SPECIFY) ______

COMMENTS/REMARKS

SEE TASK ORDER # 480H01
TCL VOCs TCL SVOCs
EXTENDED TCL LIST AS IN OLM04.2

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE TIME:	RECEIVED BY:
1. [signature]	11/1/01 0600	1. SECURE AREA	2.		2. [signature] 11/01/01 - 1000
RELINQUISHED BY: 3.	DATE TIME:	RECEIVED BY: 3.	RELINQUISHED BY: 4.	DATE TIME:	RECEIVED BY: 4.
RELINQUISHED BY: 5.	DATE TIME:	RECEIVED BY: 5.	SEAL #	PRESERVE WHERE APPLICABLE ☐	ON ICE ☐ TEMPERATURE 2.2 C

Southeast
ACCUTEST

11/19/01

Technical Report for

Kubal-Furr & Associates

Omni-Oak Hammock

48OH01 HOLOPAW,FL

Accutest Job Number: F11418

Report to:

Kubal-Furr & Associates

drosseter@ix.netcom.com

ATTN: Diane Rosseter

Total number of pages in report: 8

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Sample Summary

Kubal-Furr & Associates

Job No: F11418

Omni-Oak Hammock
Project No: 48OH01 HOLOPAW,FL

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
F11418-1	11/05/01	13:10	GK	11/06/01	AQ	Water	PRECISION MOBIL COMBO RIG
F11418-2	11/05/01	00:00	GK	11/06/01	AQ	Trip Blank Water	TRIP BLANK

Report of Analysis

Client Sample ID:	PRECISION MOBIL COMBO RIG		
Lab Sample ID:	F11418-1	Date Sampled:	11/05/01
Matrix:	AQ - Water	Date Received:	11/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0006593.D	1	11/14/01	JG	n/a	n/a	VC311
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	2.6	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	7.9	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	PRECISION MOBIL COMBO RIG			
Lab Sample ID:	F11418-1		Date Sampled:	11/05/01
Matrix:	AQ - Water		Date Received:	11/06/01
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		80-120%
17060-07-0	1,2-Dichloroethane-D4	104%		80-120%
2037-26-5	Toluene-D8	107%		80-120%
460-00-4	4-Bromofluorobenzene	109%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	PRECISION MOBIL COMBO RIG		
Lab Sample ID:	F11418-1	Date Sampled:	11/05/01
Matrix:	AQ - Water	Date Received:	11/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009484.D	1	11/10/01	ME	11/08/01	OP4151	SL544
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	PRECISION MOBIL COMBO RIG		
Lab Sample ID:	F11418-1	Date Sampled:	11/05/01
Matrix:	AQ - Water	Date Received:	11/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	3.9	5.0	ug/l	J
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	45%		20-125%
4165-62-2	Phenol-d5	31%		10-125%
118-79-6	2,4,6-Tribromophenol	76%		35-140%
4165-60-0	Nitrobenzene-d5	70%		46-125%
321-60-8	2-Fluorobiphenyl	70%		46-125%
1718-51-0	Terphenyl-d14	98%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK			
Lab Sample ID:	F11418-2		Date Sampled:	11/05/01
Matrix:	AQ - Trip Blank Water		Date Received:	11/06/01
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0006594.D	1	11/14/01	JG	n/a	n/a	VC311
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	F11418-2	Date Sampled:	11/05/01
Matrix:	AQ - Trip Blank Water	Date Received:	11/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	96%		80-120%
17060-07-0	1,2-Dichloroethane-D4	104%		80-120%
2037-26-5	Toluene-D8	109%		80-120%
460-00-4	4-Bromofluorobenzene	110%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Blank Spike Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC311-BS	C0006583.D	1	11/14/01	JG	n/a	n/a	VC311

The QC reported here applies to the following samples: Method: SW846 8260B

F11418-1, F11418-2

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	127	102	67-125
71-43-2	Benzene	25	25.4	102	75-125
75-27-4	Bromodichloromethane	25	23.2	93	75-125
75-25-2	Bromoform	25	20.2	81	72-125
108-90-7	Chlorobenzene	25	22.8	91	75-125
75-00-3	Chloroethane	25	27.6	110	58-136
67-66-3	Chloroform	25	23.6	94	75-125
75-15-0	Carbon disulfide	125	116	93	48-142
56-23-5	Carbon tetrachloride	25	23.0	92	75-136
110-82-7	Cyclohexane	25	25.5	102	50-150 [a]
75-34-3	1,1-Dichloroethane	25	26.2	105	75-125
75-35-4	1,1-Dichloroethylene	25	26.0	104	67-138
96-12-8	1,2-Dibromo-3-chloropropane	25	20.8	83	64-125
106-93-4	1,2-Dibromoethane	25	22.2	89	75-125
107-06-2	1,2-Dichloroethane	25	23.4	94	75-125
78-87-5	1,2-Dichloropropane	25	27.2	109	75-125
124-48-1	Dibromochloromethane	25	21.7	87	75-125
75-71-8	Dichlorodifluoromethane	25	32.8	131	48-171
156-59-2	cis-1,2-Dichloroethylene	25	24.2	97	75-129
10061-01-5	cis-1,3-Dichloropropene	25	21.8	87	75-125
541-73-1	m-Dichlorobenzene	25	21.0	84	75-125
95-50-1	o-Dichlorobenzene	25	20.7	83	75-125
106-46-7	p-Dichlorobenzene	25	21.5	86	75-125
156-60-5	trans-1,2-Dichloroethylene	25	25.4	102	73-125
10061-02-6	trans-1,3-Dichloropropene	25	22.0	88	75-125
100-41-4	Ethylbenzene	25	24.3	97	68-135
76-13-1	Freon 113	25	23.0	92	75-125
591-78-6	2-Hexanone	125	135	108	68-125
98-82-8	Isopropylbenzene	25	23.9	96	75-125
108-10-1	4-Methyl-2-pentanone	125	130	104	75-125
79-20-9	Methyl Acetate	125	134	107	50-150 [a]
74-83-9	Methyl bromide	25	27.9	112	59-146
74-87-3	Methyl chloride	25	31.4	126	50-142
108-87-2	Methylcyclohexane	25	24.7	99	50-150 [a]
75-09-2	Methylene chloride	25	26.0	104	69-125
78-93-3	Methyl ethyl ketone	125	122	98	70-125

Blank Spike Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC311-BS	C0006583.D	1	11/14/01	JG	n/a	n/a	VC311

The QC reported here applies to the following samples:

Method: SW846 8260B

F11418-1, F11418-2

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
1634-04-4	Methyl Tert Butyl Ether	25	23.5	94	75-125
100-42-5	Styrene	25	23.8	95	75-125
71-55-6	1,1,1-Trichloroethane	25	23.5	94	75-132
79-34-5	1,1,2,2-Tetrachloroethane	25	23.6	94	75-125
79-00-5	1,1,2-Trichloroethane	25	24.4	98	75-125
120-82-1	1,2,4-Trichlorobenzene	25	19.3	77	75-125
127-18-4	Tetrachloroethylene	25	22.0	88	75-126
108-88-3	Toluene	25	24.2	97	75-125
79-01-6	Trichloroethylene	25	23.2	93	75-125
75-69-4	Trichlorofluoromethane	25	29.1	116	55-162
75-01-4	Vinyl chloride	25	29.9	120	60-147
1330-20-7	Xylene (total)	75	74.8	100	75-125

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	98%	80-120%
17060-07-0	1,2-Dichloroethane-D4	104%	80-120%
2037-26-5	Toluene-D8	106%	80-120%
460-00-4	4-Bromofluorobenzene	103%	80-120%

(a) Advisory control limits.

Method Blank Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC311-MB	C0006584.D	1	11/14/01	JG	n/a	n/a	VC311

The QC reported here applies to the following samples: Method: SW846 8260B

F11418-1, F11418-2

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

Method Blank Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC311-MB	C0006584.D	1	11/14/01	JG	n/a	n/a	VC311

The QC reported here applies to the following samples: Method: SW846 8260B

F11418-1, F11418-2

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	97%	80-120%
17060-07-0	1,2-Dichloroethane-D4	105%	80-120%
2037-26-5	Toluene-D8	108%	80-120%
460-00-4	4-Bromofluorobenzene	108%	80-120%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11440-6MS	C0006591.D	1	11/14/01	JG	n/a	n/a	VC311
F11440-6MSD	C0006592.D	1	11/14/01	JG	n/a	n/a	VC311
F11440-6	C0006589.D	1	11/14/01	JG	n/a	n/a	VC311

The QC reported here applies to the following samples: Method: SW846 8260B

F11418-1, F11418-2

CAS No.	Compound	F11440-6 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		125	131	105	122	98	7	61-125/15
71-43-2	Benzene	5.9		25	32.6	107	31.6	103	3	75-125/15
75-27-4	Bromodichloromethane	ND		25	23.7	95	23.5	94	1	75-125/15
75-25-2	Bromoform	ND		25	19.8	79	20.2	81	2	66-125/15
108-90-7	Chlorobenzene	ND		25	23.5	94	23.5	94	0	75-125/15
75-00-3	Chloroethane	ND		25	27.7	111	27.1	108	2	53-125/15
67-66-3	Chloroform	ND		25	24.1	96	23.6	94	2	75-125/15
75-15-0	Carbon disulfide	ND		125	122	98	116	93	5	51-138/15
56-23-5	Carbon tetrachloride	ND		25	23.1	92	23.2	93	0	74-131/15
110-82-7	Cyclohexane	ND		25	27.0	108	26.3	105	3	50-150/30 [a]
75-34-3	1,1-Dichloroethane	3.9		25	31.3	110	30.0	104	4	75-125/15
75-35-4	1,1-Dichloroethylene	ND		25	27.7	111	26.4	106	5	66-140/15
96-12-8	1,2-Dibromo-3-chloropropane	ND		25	22.7	91	22.5	90	1	57-125/15
106-93-4	1,2-Dibromoethane	ND		25	22.2	89	22.2	89	0	75-125/15
107-06-2	1,2-Dichloroethane	ND		25	24.5	98	23.8	95	3	75-125/15
78-87-5	1,2-Dichloropropane	ND		25	27.6	110	26.9	108	2	75-125/15
124-48-1	Dibromochloromethane	ND		25	21.8	87	22.3	89	2	75-125/15
75-71-8	Dichlorodifluoromethane	ND		25	32.9	132	31.2	125	5	45-182/15
156-59-2	cis-1,2-Dichloroethylene	2.3		25	26.6	97	26.0	95	2	75-136/15
10061-01-5	cis-1,3-Dichloropropene	ND		25	22.3	89	22.2	89	0	71-125/15
541-73-1	m-Dichlorobenzene	ND		25	22.2	89	22.0	88	1	75-125/15
95-50-1	o-Dichlorobenzene	ND		25	21.6	86	21.4	86	1	75-125/15
106-46-7	p-Dichlorobenzene	ND		25	22.4	90	22.2	89	1	75-125/15
156-60-5	trans-1,2-Dichloroethylene	ND		25	26.8	107	25.7	103	4	73-125/15
10061-02-6	trans-1,3-Dichloropropene	ND		25	22.2	89	22.2	89	0	62-125/15
100-41-4	Ethylbenzene	ND		25	25.2	101	24.8	99	2	75-125/15
76-13-1	Freon 113	ND		25	24.4	98	23.4	94	4	69-131/15
591-78-6	2-Hexanone	ND		125	148	118	144	115	3	71-125/15
98-82-8	Isopropylbenzene	1.6	J	25	26.6	100	26.7	100	0	74-125/15
108-10-1	4-Methyl-2-pentanone	ND		125	142	114	138	110	3	75-125/15
79-20-9	Methyl Acetate	ND		125	138	110	132	106	4	50-150/30 [a]
74-83-9	Methyl bromide	ND		25	27.5	110	26.4	106	4	67-146/15
74-87-3	Methyl chloride	ND		25	32.0	128	30.2	121	6	47-160/15
108-87-2	Methylcyclohexane	ND		25	25.5	102	25.0	100	2	50-150/30 [a]
75-09-2	Methylene chloride	ND		25	27.0	108	25.1	100	7	69-125/15
78-93-3	Methyl ethyl ketone	ND		125	127	102	122	98	4	70-125/15

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11440-6MS	C0006591.D	1	11/14/01	JG	n/a	n/a	VC311
F11440-6MSD	C0006592.D	1	11/14/01	JG	n/a	n/a	VC311
F11440-6	C0006589.D	1	11/14/01	JG	n/a	n/a	VC311

The QC reported here applies to the following samples: Method: SW846 8260B

F11418-1, F11418-2

CAS No.	Compound	F11440-6 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
1634-04-4	Methyl Tert Butyl Ether	ND		25	24.0	96	24.0	96	0	75-125/15
100-42-5	Styrene	ND		25	24.8	99	24.1	96	3	69-126/15
71-55-6	1,1,1-Trichloroethane	ND		25	23.9	96	23.9	96	0	75-131/15
79-34-5	1,1,2,2-Tetrachloroethane	ND		25	24.3	97	24.4	98	0	75-125/15
79-00-5	1,1,2-Trichloroethane	ND		25	24.8	99	24.9	100	0	75-125/15
120-82-1	1,2,4-Trichlorobenzene	ND		25	21.4	86	20.5	82	4	74-125/15
127-18-4	Tetrachloroethylene	ND		25	22.7	91	22.4	90	1	75-125/15
108-88-3	Toluene	ND		25	25.1	100	24.6	98	2	75-125/15
79-01-6	Trichloroethylene	ND		25	23.8	95	23.4	94	2	75-125/15
75-69-4	Trichlorofluoromethane	ND		25	29.0	116	27.3	109	6	60-139/30
75-01-4	Vinyl chloride	ND		25	31.3	125	29.8	119	5	52-169/1[illegible]
1330-20-7	Xylene (total)	ND		75	78.5	105	76.5	102	2	75-125/15

CAS No.	Surrogate Recoveries	MS	MSD	F11440-6	Limits
1868-53-7	Dibromofluoromethane	97%	98%	96%	80-120%
17060-07-0	1,2-Dichloroethane-D4	104%	104%	106%	80-120%
2037-26-5	Toluene-D8	107%	107%	109%	80-120%
460-00-4	4-Bromofluorobenzene	104%	107%	108%	80-120%

(a) Advisory control limits.

Volatile Surrogate Recovery Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8260B Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4
F11418-1	C0006593.D	98.0	104.0	107.0	109.0
F11418-2	C0006594.D	96.0	104.0	109.0	110.0
F11440-6MS	C0006591.D	97.0	104.0	107.0	104.0
F11440-6MSD	C0006592.D	98.0	104.0	107.0	107.0
VC311-BS	C0006583.D	98.0	104.0	106.0	103.0
VC311-MB	C0006584.D	97.0	105.0	108.0	108.0

Surrogate Compounds	Recovery Limits
S1 = Dibromofluoromethane	80-120%
S2 = 1,2-Dichloroethane-D4	80-120%
S3 = Toluene-D8	80-120%
S4 = 4-Bromofluorobenzene	80-120%

Blank Spike Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4151-BS	L009464.D	1	11/09/01	ME	11/08/01	OP4151	SL544

The QC reported here applies to the following samples:

Method: SW846 8270C

F11418-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
95-57-8	2-Chlorophenol	50	36.1	72	60-125
59-50-7	4-Chloro-3-methyl phenol	50	42.1	84	70-125
120-83-2	2,4-Dichlorophenol	50	37.6	75	68-125
105-67-9	2,4-Dimethylphenol	50	28.5	57	42-125
51-28-5	2,4-Dinitrophenol	50	48.8	98	10-125
534-52-1	4,6-Dinitro-o-cresol	50	38.4	77	46-125
95-48-7	2-Methylphenol	50	35.3	71	51-125
	3&4-Methylphenol	100	71.8	72	46-125
88-75-5	2-Nitrophenol	50	37.5	75	64-125
100-02-7	4-Nitrophenol	50	27.0	54	17-125
87-86-5	Pentachlorophenol	50	49.0	98	60-125
108-95-2	Phenol	50	22.5	45	16-125
95-95-4	2,4,5-Trichlorophenol	50	43.2	86	74-125
88-06-2	2,4,6-Trichlorophenol	50	40.8	82	70-125
83-32-9	Acenaphthene	50	41.9	84	70-125
208-96-8	Acenaphthylene	50	47.7	95	75-125
120-12-7	Anthracene	50	48.2	96	75-125
56-55-3	Benzo(a)anthracene	50	46.2	92	75-125
50-32-8	Benzo(a)pyrene	50	49.4	99	75-125
205-99-2	Benzo(b)fluoranthene	50	46.2	92	75-125
191-24-2	Benzo(g,h,i)perylene	50	44.5	89	57-135
207-08-9	Benzo(k)fluoranthene	50	46.8	94	75-125
101-55-3	4-Bromophenyl phenyl ether	50	43.9	88	74-125
85-68-7	Butyl benzyl phthalate	50	49.0	98	38-134
91-58-7	2-Chloronaphthalene	50	40.7	81	59-125
106-47-8	4-Chloroaniline	50	40.4	81	31-125
86-74-8	Carbazole	50	47.4	95	75-125
218-01-9	Chrysene	50	44.6	89	75-125
111-91-1	bis(2-Chloroethoxy)methane	50	40.1	80	64-125
111-44-4	bis(2-Chloroethyl)ether	50	38.0	76	62-125
108-60-1	bis(2-Chloroisopropyl)ether	50	37.8	76	60-125
7005-72-3	4-Chlorophenyl phenyl ether	50	45.5	91	75-125
121-14-2	2,4-Dinitrotoluene	50	48.9	98	73-125
606-20-2	2,6-Dinitrotoluene	50	49.8	100	75-125
91-94-1	3,3'-Dichlorobenzidine	50	40.5	81	55-125
53-70-3	Dibenzo(a,h)anthracene	50	42.8	86	64-130

Blank Spike Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4151-BS	L009464.D	1	11/09/01	ME	11/08/01	OP4151	SL544

The QC reported here applies to the following samples: Method: SW846 8270C

F11418-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
132-64-9	Dibenzofuran	50	42.1	84	73-125
84-74-2	Di-n-butyl phthalate	50	49.0	98	47-140
117-84-0	Di-n-octyl phthalate	50	54.6	109	52-125
84-66-2	Diethyl phthalate	50	50.0	100	59-125
131-11-3	Dimethyl phthalate	50	47.4	95	24-142
117-81-7	bis(2-Ethylhexyl)phthalate	50	53.7	107	71-125
206-44-0	Fluoranthene	50	48.3	97	75-125
86-73-7	Fluorene	50	46.1	92	75-125
118-74-1	Hexachlorobenzene	50	46.6	93	74-125
87-68-3	Hexachlorobutadiene	50	31.1	62	22-125
77-47-4	Hexachlorocyclopentadiene	50	24.1	48	10-125
67-72-1	Hexachloroethane	50	33.6	67	23-125
193-39-5	Indeno(1,2,3-cd)pyrene	50	43.4	87	53-130
78-59-1	Isophorone	50	42.0	84	63-125
91-57-6	2-Methylnaphthalene	50	36.4	73	51-125
88-74-4	2-Nitroaniline	50	47.2	94	75-125
99-09-2	3-Nitroaniline	50	41.8	84	62-125
100-01-6	4-Nitroaniline	50	45.9	92	67-125
91-20-3	Naphthalene	50	37.5	75	53-125
98-95-3	Nitrobenzene	50	39.7	79	67-125
621-64-7	N-Nitroso-di-n-propylamine	50	40.4	81	61-125
86-30-6	N-Nitrosodiphenylamine	50	50.5	101	75-125
85-01-8	Phenanthrene	50	45.7	91	75-125
129-00-0	Pyrene	50	46.6	93	67-125

CAS No.	Surrogate Recoveries	BSP	Limits
367-12-4	2-Fluorophenol	59%	20-125%
4165-62-2	Phenol-d5	44%	10-125%
118-79-6	2,4,6-Tribromophenol	93%	35-140%
4165-60-0	Nitrobenzene-d5	81%	46-125%
321-60-8	2-Fluorobiphenyl	83%	46-125%
1718-51-0	Terphenyl-d14	98%	49-126%

Method Blank Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4151-MB	L009465.D	1	11/09/01	ME	11/08/01	OP4151	SL544

The QC reported here applies to the following samples:

Method: SW846 8270C

F11418-1

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

Method Blank Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4151-MB	L009465.D	1	11/09/01	ME	11/08/01	OP4151	SL544

The QC reported here applies to the following samples:

Method: SW846 8270C

F11418-1

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	53%	20-125%
4165-62-2	Phenol-d5	41%	10-125%
118-79-6	2,4,6-Tribromophenol	66%	35-140%

Method Blank Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4151-MB	L009465.D	1	11/09/01	ME	11/08/01	OP4151	SL544

The QC reported here applies to the following samples:

Method: SW846 8270C

F11418-1

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	65%	46-125%
321-60-8	2-Fluorobiphenyl	68%	46-125%
1718-51-0	Terphenyl-d14	76%	49-126%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4151-MS	L009472.D	1	11/09/01	ME	11/08/01	OP4151	SL544
OP4151-MSD	L009473.D	1	11/09/01	ME	11/08/01	OP4151	SL544
F11413-12	L009471.D	1	11/09/01	ME	11/08/01	OP4151	SL544

The QC reported here applies to the following samples: Method: SW846 8270C

F11418-1

CAS No.	Compound	F11413-12 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
95-57-8	2-Chlorophenol	ND		100	67.3	67	67.9	68	1	59-125/20
59-50-7	4-Chloro-3-methyl phenol	ND		100	86.4	86	82.0	82	5	72-125/20
120-83-2	2,4-Dichlorophenol	ND		100	74.6	75	75.4	75	1	65-125/20
105-67-9	2,4-Dimethylphenol	ND		100	56.1	56	61.4	61	9	37-125/20
51-28-5	2,4-Dinitrophenol	ND		100	103	103	101	101	2	27-125/41
534-52-1	4,6-Dinitro-o-cresol	ND		100	72.2	72	75.4	75	4	54-125/20
95-48-7	2-Methylphenol	ND		100	69.6	70	69.0	69	1	57-125/20
	3&4-Methylphenol	ND		200	150	75	145	72	3	55-125/20
88-75-5	2-Nitrophenol	ND		100	71.1	71	70.8	71	0	67-125/20
100-02-7	4-Nitrophenol	ND		100	66.3	66	60.6	61	9	41-125/23
87-86-5	Pentachlorophenol	ND		100	110	110	107	107	3	67-126/20
108-95-2	Phenol	ND		100	52.8	53	51.0	51	3	39-125/20
95-95-4	2,4,5-Trichlorophenol	ND		100	84.2	84	83.2	83	1	75-125/20
88-06-2	2,4,6-Trichlorophenol	ND		100	78.7	79	79.0	79	0	70-125/20
83-32-9	Acenaphthene	ND		100	79.9	80	78.5	78	2	74-125/20
208-96-8	Acenaphthylene	ND		100	90.7	91	88.3	88	3	75-125/20
120-12-7	Anthracene	ND		100	88.9	89	87.7	88	1	75-125/20
56-55-3	Benzo(a)anthracene	ND		100	87.0	87	86.0	86	1	75-125/20
50-32-8	Benzo(a)pyrene	ND		100	95.3	95	94.1	94	1	75-125/20
205-99-2	Benzo(b)fluoranthene	ND		100	87.5	88	87.3	87	0	75-125/20
191-24-2	Benzo(g,h,i)perylene	ND		100	93.0	93	91.3	91	2	61-125/21
207-08-9	Benzo(k)fluoranthene	ND		100	87.0	87	89.1	89	2	75-125/20
101-55-3	4-Bromophenyl phenyl ether	ND		100	83.3	83	85.9	86	3	73-125/20
85-68-7	Butyl benzyl phthalate	ND		100	96.0	96	91.4	91	5	66-125/20
91-58-7	2-Chloronaphthalene	ND		100	76.6	77	76.2	76	0	64-125/20
106-47-8	4-Chloroaniline	ND		100	78.3	78	74.8	75	4	44-125/20
86-74-8	Carbazole	ND		100	88.8	89	86.8	87	2	75-125/20
218-01-9	Chrysene	ND		100	84.3	84	84.3	84	0	75-125/20
111-91-1	bis(2-Chloroethoxy)methane	ND		100	74.5	74	74.0	74	1	62-125/20
111-44-4	bis(2-Chloroethyl)ether	ND		100	70.6	71	69.2	69	2	61-125/20
108-60-1	bis(2-Chloroisopropyl)ether	ND		100	68.9	69	67.8	68	2	56-125/22
7005-72-3	4-Chlorophenyl phenyl ether	ND		100	85.5	86	84.1	84	2	75-125/20
121-14-2	2,4-Dinitrotoluene	ND		100	95.9	96	92.6	93	4	75-125/20
606-20-2	2,6-Dinitrotoluene	ND		100	95.5	96	91.9	92	4	75-125/20
91-94-1	3,3'-Dichlorobenzidine	ND		100	58.2	58	54.0	54	7	20-125/29
53-70-3	Dibenzo(a,h)anthracene	ND		100	90.4	90	89.0	89	2	64-127/20

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4151-MS	L009472.D	1	11/09/01	ME	11/08/01	OP4151	SL544
OP4151-MSD	L009473.D	1	11/09/01	ME	11/08/01	OP4151	SL544
F11413-12	L009471.D	1	11/09/01	ME	11/08/01	OP4151	SL544

The QC reported here applies to the following samples:

Method: SW846 8270C

F11418-1

CAS No.	Compound	F11413-12 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
132-64-9	Dibenzofuran	ND		100	82.4	82	80.7	81	2	73-125/20
84-74-2	Di-n-butyl phthalate	ND		100	94.8	95	90.2	90	5	71-125/20
117-84-0	Di-n-octyl phthalate	ND		100	103	103	99.1	99	4	66-125/30
84-66-2	Diethyl phthalate	ND		100	95.8	96	90.7	91	5	64-125/20
131-11-3	Dimethyl phthalate	ND		100	89.5	90	85.6	86	4	32-139/20
117-81-7	bis(2-Ethylhexyl)phthalate	ND		100	105	105	99.9	100	5	74-125/20
206-44-0	Fluoranthene	ND		100	91.0	91	86.9	87	5	75-125/20
86-73-7	Fluorene	ND		100	90.0	90	87.0	87	3	75-125/20
118-74-1	Hexachlorobenzene	ND		100	84.5	84	83.5	84	1	75-125/20
87-68-3	Hexachlorobutadiene	ND		100	57.5	58	57.6	58	0	26-125/2[illegible]
77-47-4	Hexachlorocyclopentadiene	ND		100	47.8	48	52.7	53	10	18-125/2[illegible]
67-72-1	Hexachloroethane	ND		100	59.4	59	61.3	61	3	22-125/20
193-39-5	Indeno(1,2,3-cd)pyrene	ND		100	92.2	92	91.3	91	1	54-125/20
78-59-1	Isophorone	ND		100	81.3	81	79.5	80	2	62-125/20
91-57-6	2-Methylnaphthalene	ND		100	73.5	74	72.4	72	2	58-125/20
88-74-4	2-Nitroaniline	ND		100	86.0	86	86.7	87	1	67-125/20
99-09-2	3-Nitroaniline	ND		100	78.0	78	72.5	72	7	53-125/20
100-01-6	4-Nitroaniline	ND		100	91.3	91	82.4	82	10	63-125/20
91-20-3	Naphthalene	ND		100	72.6	73	73.1	73	1	55-125/20
98-95-3	Nitrobenzene	ND		100	74.3	74	72.5	72	2	63-125/20
621-64-7	N-Nitroso-di-n-propylamine	ND		100	78.4	78	75.3	75	4	58-125/20
86-30-6	N-Nitrosodiphenylamine	ND		100	94.1	94	92.9	93	1	75-125/20
85-01-8	Phenanthrene	ND		100	85.4	85	84.1	84	2	75-125/20
129-00-0	Pyrene	ND		100	84.1	84	83.0	83	1	67-125/20

CAS No.	Surrogate Recoveries	MS	MSD	F11413-12	Limits
367-12-4	2-Fluorophenol	62%	61%	47%	20-125%
4165-62-2	Phenol-d5	51%	49%	33%	10-125%
118-79-6	2,4,6-Tribromophenol	86%	86%	83%	35-140%
4165-60-0	Nitrobenzene-d5	75%	75%	72%	46-125%
321-60-8	2-Fluorobiphenyl	76%	78%	72%	46-125%
1718-51-0	Terphenyl-d14	90%	88%	91%	49-126%

Semivolatile Surrogate Recovery Summary

Job Number: F11418
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8270C   Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4	S5	S6
F11418-1	L009484.D	45.0	31.0	76.0	70.0	70.0	98.0
OP4151-BS	L009464.D	59.0	44.0	93.0	81.0	83.0	98.0
OP4151-MB	L009465.D	53.0	41.0	66.0	65.0	68.0	76.0
OP4151-MS	L009472.D	62.0	51.0	86.0	75.0	76.0	90.0
OP4151-MSD	L009473.D	61.0	49.0	86.0	75.0	78.0	88.0

Surrogate Compounds	Recovery Limits
S1 = 2-Fluorophenol	20-125%
S2 = Phenol-d5	10-125%
S3 = 2,4,6-Tribromophenol	35-140%
S4 = Nitrobenzene-d5	46-125%
S5 = 2-Fluorobiphenyl	46-125%
S6 = Terphenyl-d14	49-126%

ACCUTEST

CHAIN OF CUSTODY

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #: F11418
ACCUTEST QUOTE #:

CLIENT INFORMATION

KUBAL-FURR + ASSOCIATES
NAME
PO BOX 80247
ADDRESS
SIMPSONVILLE SC 29680
CITY, STATE ZIP
SEND REPORT TO: DIANE ROSSETER
PHONE # (864) 962-9490 - VOICE

FACILITY INFORMATION

OMNI - OAK HAMMOCK
PROJECT NAME
LOCATION HOLOPAW, FL
PROJECT NO. 480H01
FAX # (864) 962-5309

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	COLLECTION DATE	COLLECTION TIME	SAMPLED BY:	MATRIX	# OF BOTTLES	HCl	NaOH	HNO3	H2SO4	NONE	VOCs	SVOCs	LAB USE ONLY
1)	PRECISION MOBIL COMBO RIG	11/5/01	~~1230~~ 1310	GK		5	X					✓	✓	
2)	TRIP BLANK	"				3	X					✓		

DATA TURNAROUND INFORMATION

- [x] STANDARD
- [ ] 48 HOUR RUSH
- [ ] 24 HOUR EMERGENCY
- [ ] OTHER

APPROVED BY:

EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

- [ ] STANDARD
- [ ] COMMERCIAL "B"
- [ ] DISK DELIVERABLE
- [ ] STATE FORMS
- [ ] OTHER (SPECIFY)

COMMENTS/REMARKS

SEE TASK ORDER # 480H01
TCL VOCs , TCL SVOCs
EXTENDED TCL LIST AS IN OLM04.2

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY	DATE TIME	RECEIVED BY	RELINQUISHED BY	DATE TIME	RECEIVED BY
RELINQUISHED BY SAMPLER: 1. [signature]	11/6/01	1. SECURE AREA	2.		2. [signature] 11/6/01-1500
3.		3.	4.		4.
5.		5.	SEAL #	PRESERVE WHERE APPLICABLE ☐	ON ICE ☐ TEMPERATURE 2.0 C

Southeast
ACCUTEST

11/28/01

Technical Report for

Kubal-Furr & Associates

Omni-Oak Hammock

48OH01 HOLOPAW,FL

Accutest Job Number: F11446

Report to:

Kubal-Furr & Associates

Drosseter@ix.netcom.com

ATTN: Diane Rosseter

Total number of pages in report: 8

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Sample Summary

Kubal-Furr & Associates

Job No: F11446

Omni-Oak Hammock
Project No: 48OH01 HOLOPAW,FL

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
F11446-1	11/07/01	08:00	GK	11/08/01	AQ	Ground Water	GANNARELLI RANCH WELL
F11446-2	11/07/01	00:00	GK	11/08/01	AQ	Trip Blank Water	TRIP BLANK

Report of Analysis

Client Sample ID:	GANNARELLI RANCH WELL		
Lab Sample ID:	F11446-1	Date Sampled:	11/07/01
Matrix:	AQ - Ground Water	Date Received:	11/08/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0006682.D	1	11/20/01	JG	n/a	n/a	VC316
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	GANNARELLI RANCH WELL		
Lab Sample ID:	F11446-1	Date Sampled:	11/07/01
Matrix:	AQ - Ground Water	Date Received:	11/08/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		80-120%
17060-07-0	1,2-Dichloroethane-D4	100%		80-120%
2037-26-5	Toluene-D8	100%		80-120%
460-00-4	4-Bromofluorobenzene	103%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	GANNARELLI RANCH WELL		
Lab Sample ID:	F11446-1	Date Sampled:	11/07/01
Matrix:	AQ - Ground Water	Date Received:	11/08/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009552.D	1	11/15/01	ME	11/14/01	OP4190	SL548
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	GANNARELLI RANCH WELL			
Lab Sample ID:	F11446-1		Date Sampled:	11/07/01
Matrix:	AQ - Ground Water		Date Received:	11/08/01
Method:	SW846 8270C	SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock			

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	48%		20-125%
4165-62-2	Phenol-d5	33%		10-125%
118-79-6	2,4,6-Tribromophenol	96%		35-140%
4165-60-0	Nitrobenzene-d5	86%		46-125%
321-60-8	2-Fluorobiphenyl	85%		46-125%
1718-51-0	Terphenyl-d14	93%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	F11446-2	Date Sampled:	11/07/01
Matrix:	AQ - Trip Blank Water	Date Received:	11/08/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0006683.D	1	11/20/01	JG	n/a	n/a	VC316
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK			
Lab Sample ID:	F11446-2		Date Sampled:	11/07/01
Matrix:	AQ - Trip Blank Water		Date Received:	11/08/01
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		80-120%
17060-07-0	1,2-Dichloroethane-D4	101%		80-120%
2037-26-5	Toluene-D8	100%		80-120%
460-00-4	4-Bromofluorobenzene	101%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Blank Spike Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC316-BS2	C0006679.D	1	11/20/01	JG	n/a	n/a	VC316

The QC reported here applies to the following samples: Method: SW846 8260B

F11446-1, F11446-2

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	130	104	67-125
71-43-2	Benzene	25	23.0	92	75-125
75-27-4	Bromodichloromethane	25	22.8	91	75-125
75-25-2	Bromoform	25	22.8	91	72-125
108-90-7	Chlorobenzene	25	22.8	91	75-125
75-00-3	Chloroethane	25	28.3	113	58-136
67-66-3	Chloroform	25	23.1	92	75-125
75-15-0	Carbon disulfide	125	107	86	48-142
56-23-5	Carbon tetrachloride	25	25.1	100	75-136
110-82-7	Cyclohexane	25	23.8	95	50-150 [a]
75-34-3	1,1-Dichloroethane	25	23.3	93	75-125
75-35-4	1,1-Dichloroethylene	25	23.7	95	67-138
96-12-8	1,2-Dibromo-3-chloropropane	25	22.4	90	64-125
106-93-4	1,2-Dibromoethane	25	22.0	88	75-125
107-06-2	1,2-Dichloroethane	25	21.3	85	75-125
78-87-5	1,2-Dichloropropane	25	24.0	96	75-125
124-48-1	Dibromochloromethane	25	22.9	92	75-125
75-71-8	Dichlorodifluoromethane	25	32.8	131	48-171
156-59-2	cis-1,2-Dichloroethylene	25	23.2	93	75-129
10061-01-5	cis-1,3-Dichloropropene	25	21.6	86	75-125
541-73-1	m-Dichlorobenzene	25	22.4	90	75-125
95-50-1	o-Dichlorobenzene	25	22.1	88	75-125
106-46-7	p-Dichlorobenzene	25	22.4	90	75-125
156-60-5	trans-1,2-Dichloroethylene	25	22.7	91	73-125
10061-02-6	trans-1,3-Dichloropropene	25	21.4	86	75-125
100-41-4	Ethylbenzene	25	22.3	89	68-135
76-13-1	Freon 113	25	23.9	96	75-125
591-78-6	2-Hexanone	125	113	90	68-125
98-82-8	Isopropylbenzene	25	23.1	92	75-125
108-10-1	4-Methyl-2-pentanone	125	109	87	75-125
79-20-9	Methyl Acetate	125	109	87	50-150 [a]
74-83-9	Methyl bromide	25	22.5	90	59-146
74-87-3	Methyl chloride	25	25.0	100	50-142
108-87-2	Methylcyclohexane	25	24.5	98	50-150 [a]
75-09-2	Methylene chloride	25	21.8	87	69-125
78-93-3	Methyl ethyl ketone	125	119	95	70-125

Blank Spike Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC316-BS2	C0006679.D	1	11/20/01	JG	n/a	n/a	VC316

The QC reported here applies to the following samples: Method: SW846 8260B

F11446-1, F11446-2

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
1634-04-4	Methyl Tert Butyl Ether	25	22.7	91	75-125
100-42-5	Styrene	25	23.0	92	75-125
71-55-6	1,1,1-Trichloroethane	25	24.4	98	75-132
79-34-5	1,1,2,2-Tetrachloroethane	25	21.1	84	75-125
79-00-5	1,1,2-Trichloroethane	25	22.0	88	75-125
120-82-1	1,2,4-Trichlorobenzene	25	22.7	91	75-125
127-18-4	Tetrachloroethylene	25	23.9	96	75-126
108-88-3	Toluene	25	22.8	91	75-125
79-01-6	Trichloroethylene	25	23.4	94	75-125
75-69-4	Trichlorofluoromethane	25	34.1	136	55-162
75-01-4	Vinyl chloride	25	27.6	110	60-147
1330-20-7	Xylene (total)	75	69.6	93	75-125

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	80-120%
17060-07-0	1,2-Dichloroethane-D4	99%	80-120%
2037-26-5	Toluene-D8	100%	80-120%
460-00-4	4-Bromofluorobenzene	97%	80-120%

(a) Advisory control limits.

Method Blank Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC316-MB2	C0006680.D	1	11/20/01	JG	n/a	n/a	VC316

The QC reported here applies to the following samples:

Method: SW846 8260B

F11446-1, F11446-2

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

Method Blank Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC316-MB2	C0006680.D	1	11/20/01	JG	n/a	n/a	VC316

The QC reported here applies to the following samples: Method: SW846 8260B

F11446-1, F11446-2

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	100%	80-120%
17060-07-0	1,2-Dichloroethane-D4	99%	80-120%
2037-26-5	Toluene-D8	100%	80-120%
460-00-4	4-Bromofluorobenzene	102%	80-120%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
T2031-8MS	C0006690.D	1	11/20/01	JG	n/a	n/a	VC316
T2031-8MSD	C0006691.D	1	11/20/01	JG	n/a	n/a	VC316
T2031-8	C0006685.D	1	11/20/01	JG	n/a	n/a	VC316

The QC reported here applies to the following samples: Method: SW846 8260B

F11446-1, F11446-2

CAS No.	Compound	T2031-8 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		125	116	93	118	94	2	61-125/15
71-43-2	Benzene	ND		25	23.5	94	23.4	94	0	75-125/15
75-27-4	Bromodichloromethane	ND		25	22.1	88	22.1	88	0	75-125/15
75-25-2	Bromoform	ND		25	21.3	85	21.3	85	0	66-125/15
108-90-7	Chlorobenzene	ND		25	23.0	92	22.6	90	2	75-125/15
75-00-3	Chloroethane	ND		25	30.9	124	30.0	120	3	53-125/15
67-66-3	Chloroform	ND		25	23.0	92	23.2	93	1	75-125/15
75-15-0	Carbon disulfide	ND		125	108	86	107	86	1	51-138/15
56-23-5	Carbon tetrachloride	ND		25	23.4	94	23.5	94	0	74-131/15
110-82-7	Cyclohexane	ND		25	24.0	96	23.9	96	0	50-150/30 [a]
75-34-3	1,1-Dichloroethane	ND		25	23.9	96	24.0	96	0	75-125/15
75-35-4	1,1-Dichloroethylene	ND		25	24.0	96	23.8	95	1	66-140/15
96-12-8	1,2-Dibromo-3-chloropropane	ND		25	21.0	84	20.5	82	2	57-125/15
106-93-4	1,2-Dibromoethane	ND		25	21.6	86	21.6	86	0	75-125/15
107-06-2	1,2-Dichloroethane	ND		25	20.9	84	21.1	84	1	75-125/15
78-87-5	1,2-Dichloropropane	ND		25	24.8	99	24.1	96	3	75-125/15
124-48-1	Dibromochloromethane	ND		25	21.9	88	21.8	87	0	75-125/15
75-71-8	Dichlorodifluoromethane	ND		25	30.3	121	32.4	130	7	45-182/15
156-59-2	cis-1,2-Dichloroethylene	1.2	J	25	24.7	94	24.6	94	0	75-136/15
10061-01-5	cis-1,3-Dichloropropene	ND		25	21.3	85	21.3	85	0	71-125/15
541-73-1	m-Dichlorobenzene	ND		25	22.0	88	22.0	88	0	75-125/15
95-50-1	o-Dichlorobenzene	ND		25	21.8	87	21.7	87	0	75-125/15
106-46-7	p-Dichlorobenzene	ND		25	22.4	90	22.3	89	0	75-125/15
156-60-5	trans-1,2-Dichloroethylene	ND		25	23.2	93	23.2	93	0	73-125/15
10061-02-6	trans-1,3-Dichloropropene	ND		25	20.3	81	20.6	82	1	62-125/15
100-41-4	Ethylbenzene	ND		25	22.2	89	22.2	89	0	75-125/15
76-13-1	Freon 113	ND		25	23.3	93	23.9	96	2	69-131/15
591-78-6	2-Hexanone	ND		125	119	95	118	94	1	71-125/15
98-82-8	Isopropylbenzene	ND		25	22.7	91	22.6	90	0	74-125/15
108-10-1	4-Methyl-2-pentanone	ND		125	118	94	117	94	1	75-125/15
79-20-9	Methyl Acetate	ND		125	116	93	116	93	0	50-150/30 [a]
74-83-9	Methyl bromide	ND		25	25.1	100	24.5	98	2	67-146/15
74-87-3	Methyl chloride	ND		25	26.8	107	27.2	109	1	47-160/15
108-87-2	Methylcyclohexane	ND		25	23.7	95	23.4	94	1	50-150/30 [a]
75-09-2	Methylene chloride	ND		25	23.0	92	22.7	91	1	69-125/15
78-93-3	Methyl ethyl ketone	ND		125	114	91	115	92	1	70-125/15

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
T2031-8MS	C0006690.D	1	11/20/01	JG	n/a	n/a	VC316
T2031-8MSD	C0006691.D	1	11/20/01	JG	n/a	n/a	VC316
T2031-8	C0006685.D	1	11/20/01	JG	n/a	n/a	VC316

The QC reported here applies to the following samples: Method: SW846 8260B

F11446-1, F11446-2

CAS No.	Compound	T2031-8 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
1634-04-4	Methyl Tert Butyl Ether	ND		25	22.3	89	22.4	90	0	75-125/15
100-42-5	Styrene	ND		25	23.3	93	23.2	93	0	69-126/15
71-55-6	1,1,1-Trichloroethane	ND		25	23.4	94	23.4	94	0	75-131/15
79-34-5	1,1,2,2-Tetrachloroethane	ND		25	21.6	86	21.4	86	1	75-125/15
79-00-5	1,1,2-Trichloroethane	ND		25	22.3	89	22.4	90	0	75-125/15
120-82-1	1,2,4-Trichlorobenzene	ND		25	20.8	83	20.9	84	0	74-125/15
127-18-4	Tetrachloroethylene	ND		25	24.1	96	23.8	95	1	75-125/15
108-88-3	Toluene	ND		25	23.1	92	22.8	91	1	75-125/15
79-01-6	Trichloroethylene	ND		25	23.0	92	23.0	92	0	75-125/15
75-69-4	Trichlorofluoromethane	ND		25	32.8	131	31.9	128	3	60-139/30
75-01-4	Vinyl chloride	ND		25	29.5	118	30.1	120	2	52-169/1[illegible]
1330-20-7	Xylene (total)	ND		75	69.2	92	69.3	92	0	75-125/15

CAS No.	Surrogate Recoveries	MS	MSD	T2031-8	Limits
1868-53-7	Dibromofluoromethane	100%	100%	98%	80-120%
17060-07-0	1,2-Dichloroethane-D4	96%	96%	99%	80-120%
2037-26-5	Toluene-D8	99%	99%	100%	80-120%
460-00-4	4-Bromofluorobenzene	96%	95%	101%	80-120%

(a) Advisory control limits.

Blank Spike Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4190-BS	L009549.D	1	11/15/01	ME	11/14/01	OP4190	SL548

The QC reported here applies to the following samples: Method: SW846 8270C

F11446-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
95-57-8	2-Chlorophenol	50	43.4	87	60-125
59-50-7	4-Chloro-3-methyl phenol	50	43.9	88	70-125
120-83-2	2,4-Dichlorophenol	50	44.2	88	68-125
105-67-9	2,4-Dimethylphenol	50	36.3	73	42-125
51-28-5	2,4-Dinitrophenol	50	62.9	126*	10-125
534-52-1	4,6-Dinitro-o-cresol	50	48.2	96	46-125
95-48-7	2-Methylphenol	50	40.2	80	51-125
	3&4-Methylphenol	100	78.1	78	46-125
88-75-5	2-Nitrophenol	50	46.2	92	64-125
100-02-7	4-Nitrophenol	50	25.3	51	17-125
87-86-5	Pentachlorophenol	50	61.1	122	60-125
108-95-2	Phenol	50	23.7	47	16-125
95-95-4	2,4,5-Trichlorophenol	50	50.1	100	74-125
88-06-2	2,4,6-Trichlorophenol	50	49.3	99	70-125
83-32-9	Acenaphthene	50	46.5	93	70-125
208-96-8	Acenaphthylene	50	52.6	105	75-125
120-12-7	Anthracene	50	48.7	97	75-125
56-55-3	Benzo(a)anthracene	50	48.7	97	75-125
50-32-8	Benzo(a)pyrene	50	57.2	114	75-125
205-99-2	Benzo(b)fluoranthene	50	53.1	106	75-125
191-24-2	Benzo(g,h,i)perylene	50	48.6	97	57-135
207-08-9	Benzo(k)fluoranthene	50	52.5	105	75-125
101-55-3	4-Bromophenyl phenyl ether	50	49.0	98	74-125
85-68-7	Butyl benzyl phthalate	50	51.8	104	38-134
91-58-7	2-Chloronaphthalene	50	48.0	96	59-125
106-47-8	4-Chloroaniline	50	46.0	92	31-125
86-74-8	Carbazole	50	46.4	93	75-125
218-01-9	Chrysene	50	47.4	95	75-125
111-91-1	bis(2-Chloroethoxy)methane	50	45.4	91	64-125
111-44-4	bis(2-Chloroethyl)ether	50	44.1	88	62-125
108-60-1	bis(2-Chloroisopropyl)ether	50	43.3	87	60-125
7005-72-3	4-Chlorophenyl phenyl ether	50	48.6	97	75-125
121-14-2	2,4-Dinitrotoluene	50	48.8	98	73-125
606-20-2	2,6-Dinitrotoluene	50	50.2	100	75-125
91-94-1	3,3'-Dichlorobenzidine	50	46.9	94	55-125
53-70-3	Dibenzo(a,h)anthracene	50	50.1	100	64-130

Blank Spike Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4190-BS	L009549.D	1	11/15/01	ME	11/14/01	OP4190	SL548

The QC reported here applies to the following samples: Method: SW846 8270C

F11446-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
132-64-9	Dibenzofuran	50	46.5	93	73-125
84-74-2	Di-n-butyl phthalate	50	48.3	97	47-140
117-84-0	Di-n-octyl phthalate	50	59.7	119	52-125
84-66-2	Diethyl phthalate	50	47.9	96	59-125
131-11-3	Dimethyl phthalate	50	47.4	95	24-142
117-81-7	bis(2-Ethylhexyl)phthalate	50	53.8	108	71-125
206-44-0	Fluoranthene	50	47.2	94	75-125
86-73-7	Fluorene	50	48.6	97	75-125
118-74-1	Hexachlorobenzene	50	47.5	95	74-125
87-68-3	Hexachlorobutadiene	50	39.1	78	22-125
77-47-4	Hexachlorocyclopentadiene	50	38.7	77	10-125
67-72-1	Hexachloroethane	50	42.6	85	23-125
193-39-5	Indeno(1,2,3-cd)pyrene	50	53.2	106	53-130
78-59-1	Isophorone	50	46.2	92	63-125
91-57-6	2-Methylnaphthalene	50	42.1	84	51-125
88-74-4	2-Nitroaniline	50	48.6	97	75-125
99-09-2	3-Nitroaniline	50	44.7	89	62-125
100-01-6	4-Nitroaniline	50	45.4	91	67-125
91-20-3	Naphthalene	50	45.0	90	53-125
98-95-3	Nitrobenzene	50	47.6	95	67-125
621-64-7	N-Nitroso-di-n-propylamine	50	44.7	89	61-125
86-30-6	N-Nitrosodiphenylamine	50	51.2	102	75-125
85-01-8	Phenanthrene	50	45.3	91	75-125
129-00-0	Pyrene	50	47.4	95	67-125

CAS No.	Surrogate Recoveries	BSP	Limits
367-12-4	2-Fluorophenol	70%	20-125%
4165-62-2	Phenol-d5	46%	10-125%
118-79-6	2,4,6-Tribromophenol	94%	35-140%
4165-60-0	Nitrobenzene-d5	95%	46-125%
321-60-8	2-Fluorobiphenyl	97%	46-125%
1718-51-0	Terphenyl-d14	97%	49-126%

Method Blank Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4190-MB	L009550.D	1	11/15/01	ME	11/14/01	OP4190	SL548

The QC reported here applies to the following samples: Method: SW846 8270C

F11446-1

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

Method Blank Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4190-MB	L009550.D	1	11/15/01	ME	11/14/01	OP4190	SL548

The QC reported here applies to the following samples: Method: SW846 8270C

F11446-1

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	63%	20-125%
4165-62-2	Phenol-d5	43%	10-125%
118-79-6	2,4,6-Tribromophenol	93%	35-140%

Method Blank Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4190-MB	L009550.D	1	11/15/01	ME	11/14/01	OP4190	SL548

The QC reported here applies to the following samples: Method: SW846 8270C

F11446-1

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	92%	46-125%
321-60-8	2-Fluorobiphenyl	88%	46-125%
1718-51-0	Terphenyl-d14	92%	49-126%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4190-MS	L009553.D	1	11/15/01	ME	11/14/01	OP4190	SL548
OP4190-MSD	L009554.D	1	11/15/01	ME	11/14/01	OP4190	SL548
F11446-1	L009552.D	1	11/15/01	ME	11/14/01	OP4190	SL548

The QC reported here applies to the following samples: Method: SW846 8270C

F11446-1

CAS No.	Compound	F11446-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
95-57-8	2-Chlorophenol	ND		100	80.4	80	80.2	80	0	59-125/20
59-50-7	4-Chloro-3-methyl phenol	ND		100	90.1	90	91.9	92	2	72-125/20
120-83-2	2,4-Dichlorophenol	ND		100	85.4	85	85.0	85	0	65-125/20
105-67-9	2,4-Dimethylphenol	ND		100	77.6	78	76.0	76	2	37-125/20
51-28-5	2,4-Dinitrophenol	ND		100	131	131*	132	132*	1	27-125/41
534-52-1	4,6-Dinitro-o-cresol	ND		100	105	105	99.0	99	6	54-125/20
95-48-7	2-Methylphenol	ND		100	78.2	78	81.3	81	4	57-125/20
	3&4-Methylphenol	ND		200	160	80	166	83	4	55-125/20
88-75-5	2-Nitrophenol	ND		100	87.4	87	86.6	87	1	67-125/20
100-02-7	4-Nitrophenol	ND		100	68.8	69	67.6	68	2	41-125/23
87-86-5	Pentachlorophenol	ND		100	131	131*	132	132*	1	67-126/20
108-95-2	Phenol	ND		100	53.3	53	57.2	57	7	39-125/20
95-95-4	2,4,5-Trichlorophenol	ND		100	93.7	94	96.7	97	3	75-125/20
88-06-2	2,4,6-Trichlorophenol	ND		100	93.0	93	93.7	94	1	70-125/20
83-32-9	Acenaphthene	ND		100	89.8	90	90.8	91	1	74-125/20
208-96-8	Acenaphthylene	ND		100	99.4	99	102	102	2	75-125/20
120-12-7	Anthracene	ND		100	103	103	97.8	98	5	75-125/20
56-55-3	Benzo(a)anthracene	ND		100	96.6	97	100	100	3	75-125/20
50-32-8	Benzo(a)pyrene	ND		100	114	114	112	112	2	75-125/20
205-99-2	Benzo(b)fluoranthene	ND		100	107	107	103	103	4	75-125/20
191-24-2	Benzo(g,h,i)perylene	ND		100	97.3	97	98.8	99	2	61-125/21
207-08-9	Benzo(k)fluoranthene	ND		100	107	107	104	104	3	75-125/20
101-55-3	4-Bromophenyl phenyl ether	ND		100	106	106	98.6	99	7	73-125/20
85-68-7	Butyl benzyl phthalate	ND		100	107	107	107	107	0	66-125/20
91-58-7	2-Chloronaphthalene	ND		100	89.0	89	86.6	87	3	64-125/20
106-47-8	4-Chloroaniline	ND		100	88.2	88	88.0	88	0	44-125/20
86-74-8	Carbazole	ND		100	99.1	99	95.7	96	3	75-125/20
218-01-9	Chrysene	ND		100	94.1	94	96.5	96	2	75-125/20
111-91-1	bis(2-Chloroethoxy)methane	ND		100	84.4	84	85.3	85	1	62-125/20
111-44-4	bis(2-Chloroethyl)ether	ND		100	80.8	81	80.2	80	1	61-125/20
108-60-1	bis(2-Chloroisopropyl)ether	ND		100	77.2	77	77.4	77	0	56-125/22
7005-72-3	4-Chlorophenyl phenyl ether	ND		100	93.5	94	94.3	94	1	75-125/20
121-14-2	2,4-Dinitrotoluene	ND		100	97.2	97	98.3	98	1	75-125/20
606-20-2	2,6-Dinitrotoluene	ND		100	98.1	98	101	101	3	75-125/20
91-94-1	3,3'-Dichlorobenzidine	ND		100	76.2	76	79.8	80	5	20-125/29
53-70-3	Dibenzo(a,h)anthracene	ND		100	96.4	96	102	102	6	64-127/20

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4190-MS	L009553.D	1	11/15/01	ME	11/14/01	OP4190	SL548
OP4190-MSD	L009554.D	1	11/15/01	ME	11/14/01	OP4190	SL548
F11446-1	L009552.D	1	11/15/01	ME	11/14/01	OP4190	SL548

The QC reported here applies to the following samples: Method: SW846 8270C

F11446-1

CAS No.	Compound	F11446-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
132-64-9	Dibenzofuran	ND		100	91.9	92	91.7	92	0	73-125/20
84-74-2	Di-n-butyl phthalate	ND		100	108	108	105	105	3	71-125/20
117-84-0	Di-n-octyl phthalate	ND		100	129	129*	121	121	6	66-125/30
84-66-2	Diethyl phthalate	ND		100	96.7	97	96.2	96	0	64-125/20
131-11-3	Dimethyl phthalate	ND		100	91.1	91	92.7	93	2	32-139/20
117-81-7	bis(2-Ethylhexyl)phthalate	ND		100	113	113	111	111	2	74-125/20
206-44-0	Fluoranthene	ND		100	102	102	98.1	98	4	75-125/20
86-73-7	Fluorene	ND		100	94.6	95	98.2	98	4	75-125/20
118-74-1	Hexachlorobenzene	ND		100	103	103	99.8	100	3	75-125/20
87-68-3	Hexachlorobutadiene	ND		100	71.8	72	69.9	70	3	26-125/2[illegible]
77-47-4	Hexachlorocyclopentadiene	ND		100	69.8	70	65.1	65	7	18-125/2[illegible]
67-72-1	Hexachloroethane	ND		100	73.2	73	73.6	74	0	22-125/20
193-39-5	Indeno(1,2,3-cd)pyrene	ND		100	102	102	102	102	0	54-125/20
78-59-1	Isophorone	ND		100	89.7	90	90.0	90	0	62-125/20
91-57-6	2-Methylnaphthalene	ND		100	81.9	82	81.6	82	0	58-125/20
88-74-4	2-Nitroaniline	ND		100	90.8	91	92.6	93	2	67-125/20
99-09-2	3-Nitroaniline	ND		100	76.5	76	79.8	80	4	53-125/20
100-01-6	4-Nitroaniline	ND		100	83.6	84	87.5	88	4	63-125/20
91-20-3	Naphthalene	ND		100	82.7	83	83.5	84	1	55-125/20
98-95-3	Nitrobenzene	ND		100	86.9	87	86.2	86	1	63-125/20
621-64-7	N-Nitroso-di-n-propylamine	ND		100	84.6	85	86.1	86	2	58-125/20
86-30-6	N-Nitrosodiphenylamine	ND		100	107	107	104	104	3	75-125/20
85-01-8	Phenanthrene	ND		100	100	100	94.8	95	5	75-125/20
129-00-0	Pyrene	ND		100	95.5	96	94.4	94	1	67-125/20

CAS No.	Surrogate Recoveries	MS	MSD	F11446-1	Limits
367-12-4	2-Fluorophenol	68%	70%	48%	20-125%
4165-62-2	Phenol-d5	52%	55%	33%	10-125%
118-79-6	2,4,6-Tribromophenol	103%	95%	96%	35-140%
4165-60-0	Nitrobenzene-d5	83%	84%	86%	46-125%
321-60-8	2-Fluorobiphenyl	88%	86%	85%	46-125%
1718-51-0	Terphenyl-d14	101%	97%	93%	49-126%

Semivolatile Surrogate Recovery Summary

Job Number: F11446
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8270C Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4	S5	S6
F11446-1	L009552.D	48.0	33.0	96.0	86.0	85.0	93.0
OP4190-BS	L009549.D	70.0	46.0	94.0	95.0	97.0	97.0
OP4190-MB	L009550.D	63.0	43.0	93.0	92.0	88.0	92.0
OP4190-MS	L009553.D	68.0	52.0	103.0	83.0	88.0	101.0
OP4190-MSD	L009554.D	70.0	55.0	95.0	84.0	86.0	97.0

Surrogate Compounds	Recovery Limits
S1 = 2-Fluorophenol	20-125%
S2 = Phenol-d5	10-125%
S3 = 2,4,6-Tribromophenol	35-140%
S4 = Nitrobenzene-d5	46-125%
S5 = 2-Fluorobiphenyl	46-125%
S6 = Terphenyl-d14	49-126%

ACCUTEST®

CHAIN OF CUSTODY

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #: F11446
ACCUTEST QUOTE #:

CLIENT INFORMATION

NAME: KUBAL-FURR + ASSOCIATES
ADDRESS: PO BOX 80247
CITY, STATE ZIP: SIMPSONVILLE, SC 29680
SEND REPORT TO: DIANE ROSSETER
PHONE #: (864) 962-9490

FACILITY INFORMATION

OMNI - OAK HAMMOCK
PROJECT NAME: OAK HAMMOCK - HOLOPAW, FL
LOCATION:
PROJECT NO.: 480H01
FAX #: (864) 962-5309

ANALYTICAL INFORMATION

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	DATE	TIME	SAMPLED BY:	MATRIX	# OF BOTTLES	HCl	NaOH	HNO3	H2SO4	NONE	VOCs	SVOCs	LAB USE ONLY
1)	GANNARELLI RANCH WELL	11/7/01	0800	GK		5	X				X	X	X	
2)	TRIP BLANK					3	X				X	X		

DATA TURNAROUND INFORMATION

☒ STANDARD
☐ 48 HOUR RUSH
☐ 24 HOUR EMERGENCY
☐ OTHER

APPROVED BY:

EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

☐ STANDARD
☐ COMMERCIAL "B"
☐ DISK DELIVERABLE
☐ STATE FORMS
☐ OTHER (SPECIFY)

COMMENTS/REMARKS

SEE TASKORDER # 480H01
TCL VOCs TCL SVOCs
EXTENDED TCL LIST AS IN OLM04.2

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE TIME:	RECEIVED BY:
1. [signature]	11/8/01	1. SECURE AREA	2.		2. [signature] 11/8/01-1400
RELINQUISHED BY: 3.	DATE TIME:	RECEIVED BY: 3.	RELINQUISHED BY: 4.	DATE TIME:	RECEIVED BY: 4.
RELINQUISHED BY: 5.	DATE TIME:	RECEIVED BY: 5.	SEAL #	PRESERVE WHERE APPLICABLE ☐ ON ICE ☐	TEMPERATURE 24 C

Southeast
ACCUTEST

12/06/01

Technical Report for

Kubal-Furr & Associates

Omni-Oak Hammock

48OH01 HOLOPAW,FL

Accutest Job Number: F11519

Report to:

Kubal-Furr & Associates

Drosseter@ix.netcom.com

ATTN: Diane Rosseter

Total number of pages in report: 6

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Sample Summary

Kubal-Furr & Associates

Job No: F11519

Omni-Oak Hammock
Project No: 48OH01 HOLOPAW,FL

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
F11519-1	11/15/01	09:00	GTK	11/16/01	AQ	Ground Water	MC2

Report of Analysis

Client Sample ID:	MC2			
Lab Sample ID:	F11519-1		Date Sampled:	11/15/01
Matrix:	AQ - Ground Water		Date Received:	11/16/01
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0006865.D	1	11/27/01	JG	n/a	n/a	VC323
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	5.2	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	9.1	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	2.4	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MC2		
Lab Sample ID:	F11519-1	Date Sampled:	11/15/01
Matrix:	AQ - Ground Water	Date Received:	11/16/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		80-120%
17060-07-0	1,2-Dichloroethane-D4	88%		80-120%
2037-26-5	Toluene-D8	98%		80-120%
460-00-4	4-Bromofluorobenzene	95%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MC2		
Lab Sample ID:	F11519-1	Date Sampled:	11/15/01
Matrix:	AQ - Ground Water	Date Received:	11/16/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	L009653.D	1	11/26/01	ME	11/20/01	OP4229	SL554
Run #2	L009701.D	1	11/28/01	NF	11/27/01	OP4263	SL556

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MC2			
Lab Sample ID:	F11519-1		Date Sampled:	11/15/01
Matrix:	AQ - Ground Water		Date Received:	11/16/01
Method:	SW846 8270C SW846 3510C		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	45%	42%	20-125%
4165-62-2	Phenol-d5	24%	20%	10-125%
118-79-6	2,4,6-Tribromophenol	88%	84%	35-140%
4165-60-0	Nitrobenzene-d5	88%	92%	46-125%
321-60-8	2-Fluorobiphenyl	83%	85%	46-125%
1718-51-0	Terphenyl-d14	85%	100%	49-126%

(a) Confirmed by re-extraction and reanalysis beyond holdtime.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Blank Spike Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC323-BS	C0006846.D	1	11/27/01	JG	n/a	n/a	VC323

The QC reported here applies to the following samples: Method: SW846 8260B

F11519-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	121	97	67-125
71-43-2	Benzene	25	24.9	100	75-125
75-27-4	Bromodichloromethane	25	23.4	94	75-125
75-25-2	Bromoform	25	22.1	88	72-125
108-90-7	Chlorobenzene	25	24.0	96	75-125
75-00-3	Chloroethane	25	26.4	106	58-136
67-66-3	Chloroform	25	24.2	97	75-125
75-15-0	Carbon disulfide	125	114	91	48-142
56-23-5	Carbon tetrachloride	25	24.6	98	75-136
110-82-7	Cyclohexane	25	25.2	101	50-150 [a]
75-34-3	1,1-Dichloroethane	25	25.3	101	75-125
75-35-4	1,1-Dichloroethylene	25	24.6	98	67-138
96-12-8	1,2-Dibromo-3-chloropropane	25	21.0	84	64-125
106-93-4	1,2-Dibromoethane	25	22.8	91	75-125
107-06-2	1,2-Dichloroethane	25	21.9	88	75-125
78-87-5	1,2-Dichloropropane	25	26.0	104	75-125
124-48-1	Dibromochloromethane	25	23.0	92	75-125
75-71-8	Dichlorodifluoromethane	25	20.7	83	48-171
156-59-2	cis-1,2-Dichloroethylene	25	25.4	102	75-129
10061-01-5	cis-1,3-Dichloropropene	25	23.1	92	75-125
541-73-1	m-Dichlorobenzene	25	23.4	94	75-125
95-50-1	o-Dichlorobenzene	25	22.6	90	75-125
106-46-7	p-Dichlorobenzene	25	23.1	92	75-125
156-60-5	trans-1,2-Dichloroethylene	25	24.1	96	73-125
10061-02-6	trans-1,3-Dichloropropene	25	21.2	85	75-125
100-41-4	Ethylbenzene	25	22.9	92	68-135
76-13-1	Freon 113	25	24.2	97	75-125
591-78-6	2-Hexanone	125	120	96	68-125
98-82-8	Isopropylbenzene	25	23.2	93	75-125
108-10-1	4-Methyl-2-pentanone	125	124	99	75-125
79-20-9	Methyl Acetate	125	127	102	50-150 [a]
74-83-9	Methyl bromide	25	22.1	88	59-146
74-87-3	Methyl chloride	25	21.3	85	50-142
108-87-2	Methylcyclohexane	25	25.2	101	50-150 [a]
75-09-2	Methylene chloride	25	24.7	99	69-125
78-93-3	Methyl ethyl ketone	125	122	98	70-125

Blank Spike Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC323-BS	C0006846.D	1	11/27/01	JG	n/a	n/a	VC323

The QC reported here applies to the following samples:

Method: SW846 8260B

F11519-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
1634-04-4	Methyl Tert Butyl Ether	25	24.1	96	75-125
100-42-5	Styrene	25	24.4	98	75-125
71-55-6	1,1,1-Trichloroethane	25	24.6	98	75-132
79-34-5	1,1,2,2-Tetrachloroethane	25	22.3	89	75-125
79-00-5	1,1,2-Trichloroethane	25	23.1	92	75-125
120-82-1	1,2,4-Trichlorobenzene	25	22.7	91	75-125
127-18-4	Tetrachloroethylene	25	24.6	98	75-126
108-88-3	Toluene	25	23.9	96	75-125
79-01-6	Trichloroethylene	25	25.4	102	75-125
75-69-4	Trichlorofluoromethane	25	29.0	116	55-162
75-01-4	Vinyl chloride	25	23.6	94	60-147
1330-20-7	Xylene (total)	75	71.5	95	75-125

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	100%	80-120%
17060-07-0	1,2-Dichloroethane-D4	92%	80-120%
2037-26-5	Toluene-D8	98%	80-120%
460-00-4	4-Bromofluorobenzene	94%	80-120%

(a) Advisory control limits.

Method Blank Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC323-MB	C0006847.D	1	11/27/01	JG	n/a	n/a	VC323

The QC reported here applies to the following samples:

Method: SW846 8260B

F11519-1

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

Method Blank Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC323-MB	C0006847.D	1	11/27/01	JG	n/a	n/a	VC323

The QC reported here applies to the following samples: Method: SW846 8260B

F11519-1

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	100%	80-120%
17060-07-0	1,2-Dichloroethane-D4	93%	80-120%
2037-26-5	Toluene-D8	97%	80-120%
460-00-4	4-Bromofluorobenzene	96%	80-120%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11497-1MS	C0006859.D	1	11/27/01	JG	n/a	n/a	VC323
F11497-1MSD	C0006860.D	1	11/27/01	JG	n/a	n/a	VC323
F11497-1	C0006851.D	1	11/27/01	JG	n/a	n/a	VC323

The QC reported here applies to the following samples: Method: SW846 8260B

F11519-1

CAS No.	Compound	F11497-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		125	116	93	119	95	2	61-125/15
71-43-2	Benzene	0.90	J	25	25.5	98	24.8	96	3	75-125/15
75-27-4	Bromodichloromethane	ND		25	22.6	90	21.9	88	3	75-125/15
75-25-2	Bromoform	ND		25	20.3	81	20.6	82	1	66-125/15
108-90-7	Chlorobenzene	11.4		25	35.5	96	34.5	92	3	75-125/15
75-00-3	Chloroethane	ND		25	24.1	96	22.9	92	5	53-125/15
67-66-3	Chloroform	ND		25	23.5	94	22.9	92	2	75-125/15
75-15-0	Carbon disulfide	ND		125	113	90	106	85	6	51-138/15
56-23-5	Carbon tetrachloride	ND		25	23.6	94	22.8	91	3	74-131/15
110-82-7	Cyclohexane	ND		25	29.1	116	28.0	112	4	50-150/30 [a]
75-34-3	1,1-Dichloroethane	ND		25	24.4	98	23.7	95	3	75-125/15
75-35-4	1,1-Dichloroethylene	ND		25	24.0	96	22.6	90	6	66-140/15
96-12-8	1,2-Dibromo-3-chloropropane	ND		25	20.8	83	20.8	83	0	57-125/15
106-93-4	1,2-Dibromoethane	ND		25	21.7	87	21.5	86	1	75-125/15
107-06-2	1,2-Dichloroethane	ND		25	20.5	82	20.3	81	1	75-125/15
78-87-5	1,2-Dichloropropane	ND		25	25.0	100	25.2	101	1	75-125/15
124-48-1	Dibromochloromethane	ND		25	21.7	87	21.3	85	2	75-125/15
75-71-8	Dichlorodifluoromethane	ND		25	16.2	65	17.1	68	5	45-182/15
156-59-2	cis-1,2-Dichloroethylene	17.2		25	43.1	104	41.4	97	4	75-136/15
10061-01-5	cis-1,3-Dichloropropene	ND		25	21.6	86	21.5	86	0	71-125/15
541-73-1	m-Dichlorobenzene	ND		25	22.7	91	22.0	88	3	75-125/15
95-50-1	o-Dichlorobenzene	ND		25	22.7	91	21.8	87	4	75-125/15
106-46-7	p-Dichlorobenzene	2.6		25	25.5	92	24.8	89	3	75-125/15
156-60-5	trans-1,2-Dichloroethylene	ND		25	23.1	92	22.6	90	2	73-125/15
10061-02-6	trans-1,3-Dichloropropene	ND		25	19.0	76	18.9	76	0	62-125/15
100-41-4	Ethylbenzene	ND		25	22.5	90	21.6	86	4	75-125/15
76-13-1	Freon 113	ND		25	24.2	97	23.0	92	5	69-131/15
591-78-6	2-Hexanone	ND		125	122	98	126	101	3	71-125/15
98-82-8	Isopropylbenzene	ND		25	22.4	90	21.8	87	3	74-125/15
108-10-1	4-Methyl-2-pentanone	ND		125	126	101	128	102	2	75-125/15
79-20-9	Methyl Acetate	ND		125	119	95	119	95	0	50-150/30 [a]
74-83-9	Methyl bromide	ND		25	20.2	81	19.4	78	4	67-146/15
74-87-3	Methyl chloride	ND		25	18.2	73	18.3	73	0	47-160/15
108-87-2	Methylcyclohexane	ND		25	25.4	102	24.4	98	4	50-150/30 [a]
75-09-2	Methylene chloride	ND		25	24.1	96	23.2	93	4	69-125/15
78-93-3	Methyl ethyl ketone	ND		125	118	94	118	94	0	70-125/15

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11497-1MS	C0006859.D	1	11/27/01	JG	n/a	n/a	VC323
F11497-1MSD	C0006860.D	1	11/27/01	JG	n/a	n/a	VC323
F11497-1	C0006851.D	1	11/27/01	JG	n/a	n/a	VC323

The QC reported here applies to the following samples: Method: SW846 8260B

F11519-1

CAS No.	Compound	F11497-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
1634-04-4	Methyl Tert Butyl Ether	ND		25	22.2	89	22.4	90	1	75-125/15
100-42-5	Styrene	ND		25	23.6	94	22.8	91	3	69-126/15
71-55-6	1,1,1-Trichloroethane	ND		25	23.9	96	22.9	92	4	75-131/15
79-34-5	1,1,2,2-Tetrachloroethane	ND		25	21.6	86	21.3	85	1	75-125/15
79-00-5	1,1,2-Trichloroethane	ND		25	22.8	91	22.6	90	1	75-125/15
120-82-1	1,2,4-Trichlorobenzene	ND		25	22.3	89	21.7	87	3	74-125/15
127-18-4	Tetrachloroethylene	ND		25	26.7	107	25.2	101	6	75-125/15
108-88-3	Toluene	ND		25	23.1	92	22.2	89	4	75-125/15
79-01-6	Trichloroethylene	ND		25	24.4	98	23.7	95	3	75-125/15
75-69-4	Trichlorofluoromethane	ND		25	24.1	96	22.2	89	8	60-139/3[illegible]
75-01-4	Vinyl chloride	7.4		25	27.4	80	27.5	80	0	52-169/1[illegible]
1330-20-7	Xylene (total)	ND		75	68.7	92	66.5	89	3	75-125/15

CAS No.	Surrogate Recoveries	MS	MSD	F11497-1	Limits
1868-53-7	Dibromofluoromethane	100%	100%	100%	80-120%
17060-07-0	1,2-Dichloroethane-D4	88%	89%	100%	80-120%
2037-26-5	Toluene-D8	95%	96%	96%	80-120%
460-00-4	4-Bromofluorobenzene	90%	91%	99%	80-120%

(a) Advisory control limits.

Volatile Surrogate Recovery Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8260B   Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4
F11519-1	C0006865.D	99.0	88.0	98.0	95.0
F11497-1MS	C0006859.D	100.0	88.0	95.0	90.0
F11497-1MSD	C0006860.D	100.0	89.0	96.0	91.0
VC323-BS	C0006846.D	100.0	92.0	98.0	94.0
VC323-MB	C0006847.D	100.0	93.0	97.0	96.0

Surrogate Compounds	Recovery Limits
S1 = Dibromofluoromethane	80-120%
S2 = 1,2-Dichloroethane-D4	80-120%
S3 = Toluene-D8	80-120%
S4 = 4-Bromofluorobenzene	80-120%

Blank Spike Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-BS	L009651.D	1	11/26/01	ME	11/20/01	OP4229	SL554

The QC reported here applies to the following samples:

Method: SW846 8270C

F11519-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
95-57-8	2-Chlorophenol	50	47.3	95	60-125
59-50-7	4-Chloro-3-methyl phenol	50	52.3	105	70-125
120-83-2	2,4-Dichlorophenol	50	48.4	97	68-125
105-67-9	2,4-Dimethylphenol	50	32.3	65	42-125
51-28-5	2,4-Dinitrophenol	50	53.4	107	10-125
534-52-1	4,6-Dinitro-o-cresol	50	50.2	100	46-125
95-48-7	2-Methylphenol	50	44.4	89	51-125
	3&4-Methylphenol	100	80.9	81	46-125
88-75-5	2-Nitrophenol	50	49.2	98	64-125
100-02-7	4-Nitrophenol	50	31.6	63	17-125
87-86-5	Pentachlorophenol	50	51.9	104	60-125
108-95-2	Phenol	50	28.6	57	16-125
95-95-4	2,4,5-Trichlorophenol	50	47.6	95	74-125
88-06-2	2,4,6-Trichlorophenol	50	45.4	91	70-125
83-32-9	Acenaphthene	50	46.6	93	70-125
208-96-8	Acenaphthylene	50	49.4	99	75-125
120-12-7	Anthracene	50	49.8	100	75-125
56-55-3	Benzo(a)anthracene	50	49.6	99	75-125
50-32-8	Benzo(a)pyrene	50	51.7	103	75-125
205-99-2	Benzo(b)fluoranthene	50	52.3	105	75-125
191-24-2	Benzo(g,h,i)perylene	50	38.6	77	57-135
207-08-9	Benzo(k)fluoranthene	50	51.3	103	75-125
101-55-3	4-Bromophenyl phenyl ether	50	46.0	92	74-125
85-68-7	Butyl benzyl phthalate	50	51.8	104	38-134
91-58-7	2-Chloronaphthalene	50	45.4	91	59-125
106-47-8	4-Chloroaniline	50	49.2	98	31-125
86-74-8	Carbazole	50	52.2	104	75-125
218-01-9	Chrysene	50	48.5	97	75-125
111-91-1	bis(2-Chloroethoxy)methane	50	48.5	97	64-125
111-44-4	bis(2-Chloroethyl)ether	50	48.4	97	62-125
108-60-1	bis(2-Chloroisopropyl)ether	50	47.8	96	60-125
7005-72-3	4-Chlorophenyl phenyl ether	50	49.6	99	75-125
121-14-2	2,4-Dinitrotoluene	50	57.9	116	73-125
606-20-2	2,6-Dinitrotoluene	50	54.9	110	75-125
91-94-1	3,3'-Dichlorobenzidine	50	48.9	98	55-125
53-70-3	Dibenzo(a,h)anthracene	50	41.0	82	64-130

Blank Spike Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-BS	L009651.D	1	11/26/01	ME	11/20/01	OP4229	SL554

The QC reported here applies to the following samples: Method: SW846 8270C

F11519-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
132-64-9	Dibenzofuran	50	46.1	92	73-125
84-74-2	Di-n-butyl phthalate	50	54.9	110	47-140
117-84-0	Di-n-octyl phthalate	50	55.2	110	52-125
84-66-2	Diethyl phthalate	50	56.7	113	59-125
131-11-3	Dimethyl phthalate	50	53.0	106	24-142
117-81-7	bis(2-Ethylhexyl)phthalate	50	55.4	111	71-125
206-44-0	Fluoranthene	50	54.2	108	75-125
86-73-7	Fluorene	50	50.4	101	75-125
118-74-1	Hexachlorobenzene	50	47.2	94	74-125
87-68-3	Hexachlorobutadiene	50	40.2	80	22-125
77-47-4	Hexachlorocyclopentadiene	50	29.0	58	10-125
67-72-1	Hexachloroethane	50	46.0	92	23-125
193-39-5	Indeno(1,2,3-cd)pyrene	50	41.3	83	53-130
78-59-1	Isophorone	50	51.0	102	63-125
91-57-6	2-Methylnaphthalene	50	45.0	90	51-125
88-74-4	2-Nitroaniline	50	52.6	105	75-125
99-09-2	3-Nitroaniline	50	50.3	101	62-125
100-01-6	4-Nitroaniline	50	58.7	117	67-125
91-20-3	Naphthalene	50	48.1	96	53-125
98-95-3	Nitrobenzene	50	49.4	99	67-125
621-64-7	N-Nitroso-di-n-propylamine	50	51.2	102	61-125
86-30-6	N-Nitrosodiphenylamine	50	50.1	100	75-125
85-01-8	Phenanthrene	50	46.8	94	75-125
129-00-0	Pyrene	50	46.5	93	67-125

CAS No.	Surrogate Recoveries	BSP	Limits
367-12-4	2-Fluorophenol	72%	20-125%
4165-62-2	Phenol-d5	53%	10-125%
118-79-6	2,4,6-Tribromophenol	91%	35-140%
4165-60-0	Nitrobenzene-d5	96%	46-125%
321-60-8	2-Fluorobiphenyl	86%	46-125%
1718-51-0	Terphenyl-d14	92%	49-126%

Blank Spike Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4263-BS	L009699.D	1	11/28/01	NF	11/27/01	OP4263	SL556

The QC reported here applies to the following samples:

Method: SW846 8270C

F11519-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits

CAS No.	Surrogate Recoveries	BSP	Limits
367-12-4	2-Fluorophenol	63%	20-125%
4165-62-2	Phenol-d5	46%	10-125%
118-79-6	2,4,6-Tribromophenol	88%	35-140%
4165-60-0	Nitrobenzene-d5	89%	46-125%
321-60-8	2-Fluorobiphenyl	85%	46-125%
1718-51-0	Terphenyl-d14	95%	49-126%

Method Blank Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-MB [a]	L009652.D	1	11/26/01	ME	11/20/01	OP4229	SL554

The QC reported here applies to the following samples:

Method: SW846 8270C

F11519-1

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

Method Blank Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-MB [a]	L009652.D	1	11/26/01	ME	11/20/01	OP4229	SL554

The QC reported here applies to the following samples: Method: SW846 8270C

F11519-1

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	6%*	20-125%
4165-62-2	Phenol-d5	4%*	10-125%
118-79-6	2,4,6-Tribromophenol	7%*	35-140%

Method Blank Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-MB [a]	L009652.D	1	11/26/01	ME	11/20/01	OP4229	SL554

The QC reported here applies to the following samples: Method: SW846 8270C

F11519-1

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	8%*	46-125%
321-60-8	2-Fluorobiphenyl	7%*	46-125%
1718-51-0	Terphenyl-d14	7%*	49-126%

(a) Low surrogate recoveries due to suspected leak, all associated samples re-extracted to confirm.

Method Blank Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-MB [a]	L009670.D	1	11/27/01	NF	11/20/01	OP4229	SL555

The QC reported here applies to the following samples: Method: SW846 8270C

F11519-1

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

Method Blank Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-MB [a]	L009670.D	1	11/27/01	NF	11/20/01	OP4229	SL555

The QC reported here applies to the following samples: Method: SW846 8270C

F11519-1

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	6%*	20-125%
4165-62-2	Phenol-d5	4%*	10-125%
118-79-6	2,4,6-Tribromophenol	7%*	35-140%

Method Blank Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-MB [a]	L009670.D	1	11/27/01	NF	11/20/01	OP4229	SL555

The QC reported here applies to the following samples: Method: SW846 8270C

F11519-1

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	8%*	46-125%
321-60-8	2-Fluorobiphenyl	8%*	46-125%
1718-51-0	Terphenyl-d14	8%*	49-126%

(a) Low surrogate recoveries due to suspected leak, all associated samples re-extracted to confirm.

Method Blank Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4263-MB	L009700.D	1	11/28/01	NF	11/27/01	OP4263	SL556

The QC reported here applies to the following samples:

Method: SW846 8270C

F11519-1

CAS No.	Compound	Result	RL	Units	Q

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	59%	20-125%
4165-62-2	Phenol-d5	42%	10-125%
118-79-6	2,4,6-Tribromophenol	90%	35-140%
4165-60-0	Nitrobenzene-d5	90%	46-125%
321-60-8	2-Fluorobiphenyl	83%	46-125%
1718-51-0	Terphenyl-d14	98%	49-126%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-MS	L009656.D	1	11/26/01	ME	11/20/01	OP4229	SL554
OP4229-MSD	L009657.D	1	11/26/01	ME	11/20/01	OP4229	SL554
F11531-4 [a]	L009655.D	1	11/26/01	ME	11/20/01	OP4229	SL554

The QC reported here applies to the following samples: Method: SW846 8270C

F11519-1

CAS No.	Compound	F11531-4 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
95-57-8	2-Chlorophenol	ND		100	89.9	90	97.9	98	8	59-125/20
59-50-7	4-Chloro-3-methyl phenol	ND		100	96.1	96	106	106	10	72-125/20
120-83-2	2,4-Dichlorophenol	ND		100	93.0	93	98.5	98	6	65-125/20
105-67-9	2,4-Dimethylphenol	ND		100	62.3	62	69.1	69	10	37-125/20
51-28-5	2,4-Dinitrophenol	ND		100	70.4	70	111	111	45*	27-125/41
534-52-1	4,6-Dinitro-o-cresol	ND		100	91.6	92	105	105	14	54-125/20
95-48-7	2-Methylphenol	ND		100	86.6	87	97.4	97	12	57-125/20
	3&4-Methylphenol	ND		200	170	85	179	90	5	55-125/20
88-75-5	2-Nitrophenol	ND		100	91.4	91	99.2	99	8	67-125/20
100-02-7	4-Nitrophenol	ND		100	77.0	77	87.4	87	13	41-125/2[illegible]
87-86-5	Pentachlorophenol	ND		100	105	105	114	114	8	67-126/2[illegible]
108-95-2	Phenol	ND		100	68.6	69	73.4	73	7	39-125/20
95-95-4	2,4,5-Trichlorophenol	ND		100	95.4	95	101	101	6	75-125/20
88-06-2	2,4,6-Trichlorophenol	ND		100	91.5	92	94.4	94	3	70-125/20
83-32-9	Acenaphthene	ND		100	93.8	94	95.2	95	1	74-125/20
208-96-8	Acenaphthylene	ND		100	104	104	104	104	0	75-125/20
120-12-7	Anthracene	ND		100	99.9	100	104	104	4	75-125/20
56-55-3	Benzo(a)anthracene	ND		100	94.3	94	99.8	100	6	75-125/20
50-32-8	Benzo(a)pyrene	ND		100	104	104	106	106	2	75-125/20
205-99-2	Benzo(b)fluoranthene	ND		100	100	100	107	107	7	75-125/20
191-24-2	Benzo(g,h,i)perylene	ND		100	93.3	93	79.5	80	16	61-125/21
207-08-9	Benzo(k)fluoranthene	ND		100	97.0	97	102	102	5	75-125/20
101-55-3	4-Bromophenyl phenyl ether	ND		100	92.9	93	94.8	95	2	73-125/20
85-68-7	Butyl benzyl phthalate	ND		100	98.6	99	105	105	6	66-125/20
91-58-7	2-Chloronaphthalene	ND		100	91.3	91	95.4	95	4	64-125/20
106-47-8	4-Chloroaniline	ND		100	94.9	95	100	100	5	44-125/20
86-74-8	Carbazole	ND		100	102	102	106	106	4	75-125/20
218-01-9	Chrysene	ND		100	93.3	93	98.6	99	6	75-125/20
111-91-1	bis(2-Chloroethoxy)methane	ND		100	94.3	94	98.0	98	4	62-125/20
111-44-4	bis(2-Chloroethyl)ether	ND		100	92.6	93	98.0	98	6	61-125/20
108-60-1	bis(2-Chloroisopropyl)ether	ND		100	91.6	92	98.4	98	7	56-125/22
7005-72-3	4-Chlorophenyl phenyl ether	ND		100	101	101	100	100	1	75-125/20
121-14-2	2,4-Dinitrotoluene	ND		100	112	112	119	119	6	75-125/20
606-20-2	2,6-Dinitrotoluene	ND		100	110	110	115	115	4	75-125/20
91-94-1	3,3'-Dichlorobenzidine	ND		100	97.0	97	99.4	99	2	20-125/29
53-70-3	Dibenzo(a,h)anthracene	ND		100	95.0	95	81.0	81	16	64-127/2[illegible]

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11519
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4229-MS	L009656.D	1	11/26/01	ME	11/20/01	OP4229	SL554
OP4229-MSD	L009657.D	1	11/26/01	ME	11/20/01	OP4229	SL554
F11531-4 [a]	L009655.D	1	11/26/01	ME	11/20/01	OP4229	SL554

The QC reported here applies to the following samples: Method: SW846 8270C

F11519-1

CAS No.	Compound	F11531-4 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
132-64-9	Dibenzofuran	ND		100	94.0	94	96.2	96	2	73-125/20
84-74-2	Di-n-butyl phthalate	ND		100	107	107	112	112	4	71-125/20
117-84-0	Di-n-octyl phthalate	ND		100	106	106	116	116	9	66-125/30
84-66-2	Diethyl phthalate	ND		100	107	107	112	112	4	64-125/20
131-11-3	Dimethyl phthalate	ND		100	104	104	106	106	2	32-139/20
117-81-7	bis(2-Ethylhexyl)phthalate	4.0	J	100	118	114	117	113	1	74-125/20
206-44-0	Fluoranthene	ND		100	108	108	111	111	3	75-125/20
86-73-7	Fluorene	ND		100	101	101	103	103	2	75-125/20
118-74-1	Hexachlorobenzene	ND		100	94.8	95	98.6	99	4	75-125/20
87-68-3	Hexachlorobutadiene	ND		100	76.8	77	83.6	84	8	26-125/21
77-47-4	Hexachlorocyclopentadiene	ND		100	62.5	62	69.2	69	10	18-125/27
67-72-1	Hexachloroethane	ND		100	82.5	82	95.2	95	14	22-125/20
193-39-5	Indeno(1,2,3-cd)pyrene	ND		100	95.2	95	84.4	84	12	54-125/20
78-59-1	Isophorone	ND		100	98.6	99	106	106	7	62-125/20
91-57-6	2-Methylnaphthalene	ND		100	90.3	90	95.3	95	5	58-125/20
88-74-4	2-Nitroaniline	ND		100	100	100	107	107	7	67-125/20
99-09-2	3-Nitroaniline	ND		100	97.9	98	96.7	97	1	53-125/20
100-01-6	4-Nitroaniline	ND		100	114	114	117	117	2	63-125/20
91-20-3	Naphthalene	ND		100	94.3	94	97.0	97	3	55-125/20
98-95-3	Nitrobenzene	ND		100	93.8	94	99.5	100	6	63-125/20
621-64-7	N-Nitroso-di-n-propylamine	ND		100	100	100	107	107	7	58-125/20
86-30-6	N-Nitrosodiphenylamine	ND		100	101	101	106	106	5	75-125/20
85-01-8	Phenanthrene	ND		100	96.3	96	99.5	100	3	75-125/20
129-00-0	Pyrene	ND		100	83.3	83	92.6	93	10	67-125/20

CAS No.	Surrogate Recoveries	MS	MSD	F11531-4	Limits
367-12-4	2-Fluorophenol	78%	86%	62%	20-125%
4165-62-2	Phenol-d5	64%	69%	44%	10-125%
118-79-6	2,4,6-Tribromophenol	92%	94%	87%	35-140%
4165-60-0	Nitrobenzene-d5	91%	96%	96%	46-125%
321-60-8	2-Fluorobiphenyl	86%	91%	85%	46-125%
1718-51-0	Terphenyl-d14	87%	94%	88%	49-126%

(a) Confirmed by re-extraction and reanalysis beyond holdtime.

ACCUTEST®

CHAIN OF CUSTODY

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #: F11519
ACCUTEST QUOTE #:

CLIENT INFORMATION

NAME: KUBAL-FURR + ASSOCIATES
ADDRESS: PO BOX 80247
CITY, STATE, ZIP: SIMPSONVILLE, SC 29680
SEND REPORT TO: DIANE ROSSETER
PHONE #: (864) 962-9490

FACILITY INFORMATION

PROJECT NAME: OMNI - OAK HAMMOCK
LOCATION: HOLOPAW, FL
PROJECT NO.: 480H01
FAX #: (864) 962-5309

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	COLLECTION DATE	COLLECTION TIME	SAMPLED BY:	MATRIX	# OF BOTTLES	HCl	NaOH	HNO3	H2SO4	NONE	VOC's	SVOC's	LAB USE ONLY
1	MC2	11/15/01	0900	GTK		5	X				X	X	X	

DATA TURNAROUND INFORMATION

☒ STANDARD
☐ 48 HOUR RUSH
☐ 24 HOUR EMERGENCY
☐ OTHER

APPROVED BY:

EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

☐ STANDARD
☐ COMMERCIAL "B"
☐ DISK DELIVERABLE
☐ STATE FORMS
☐ OTHER (SPECIFY)

COMMENTS/REMARKS

SEE TASK ORDER #480H01
TCL VOCs, TCL SVOCs
EXTENDED TCL LIST AS IN OLM04.2

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY	DATE TIME	RECEIVED BY	RELINQUISHED BY	DATE TIME	RECEIVED BY
1. Gregory T. [signature] (SAMPLER)	11/16/01 0600	1. SECURE AREA	2.		2. [signature] 11/16/01 930
3.		3.	4.		4.
5.		5.	SEAL #		

PRESERVE WHERE APPLICABLE ☐ ON ICE ☐ TEMPERATURE 4 C

Grab Sampling Log—Water

Project No. 480H01 Site Location: OMNI - OAK HAMMOCK

Sample Date: 10/31/01 Arrival Time: 1030 Sample Time: 1030

Sample ID: BOART - 1 Duplicate: Y / (N) Field Personnel: GK

Weather Cond. —— Locking Cap: ~~Y / N~~ Well Pad Cond. ——

Sample Temp. —— Spec. Conductivity: —— pH: ——

Sampling Method: GRAB

Method(s)	Container Desription	Preservative
8260 VOCs	3x40ml	HCl
8270 SVOCs	2x1L AMBER JUG	—

Remarks: SAMPLE TAKEN FROM BOART LONGYEAR WATER TANK, WATER WAS FROM ST. CLOUD LANDFILL HYDRANT.

NO FIELD PARAMETERS TAKEN.

Sample Date: 11/5/01 Arrival Time: 1310 Sample Time: 1310

Sample ID: PRECISION MOBIL COMBO RIG Duplicate: Y / (N) Field Personnel: GK

Weather Cond. —— Locking Cap: ~~Y / N~~ Well Pad Cond. ——

Sample Temp. —— Spec. Conductivity: —— pH: ——

Sampling Method: GRAB

Method(s)	Container Desription	Preservative
8260 VOCs	3x40ml	HCl
8270 SVOCs	2x1L AMBER JUG	—

Remarks: SAMPLE TAKEN FROM PRECISION SAMPLING WATER TANK ON MOBIL COMBO RIG.

NO FIELD PARAMETERS TAKEN

Grab Sampling Log—Water

Project No. 480A01 Site Location: OMNI - OAK HAMMOCK

Sample Date: 11/7/01 Arrival Time: 0800 Sample Time: 0800

Sample ID: GANNARELLI RANCH WELL Duplicate: Y / (N) Field Personnel: GK

Weather Cond. / Locking Cap: ~~Y / N~~ Well Pad Cond. /

Sample Temp. — Spec. Conductivity: — pH: —

Sampling Method: GRAB

Method(s)	Container Desription	Preservative
8260 VOCs	3x40ml	HCl
8270 SVOCs	2x1L AMBER JUG	—

Remarks: SPIGOT ON WELL DOES NOT WORK, SAMPLE TAKEN FROM CLOSEST SPIGOT TO WELL @ FRONT OF TRAILER. SAME SPIGOT DRILLERS USED TO FILL UP WATER TANKS. TOOK SAMPLE AFTER DRILLERS FILLED UP — APPROX 300G PURGED FROM WELL BEFORE SAMPLE TAKEN. NO FIELD PARAMETERS TAKEN.

Sample Date: 11/15/01 Arrival Time: 0900 Sample Time: 0900

Sample ID: MC2 Duplicate: ~~Y / (N)~~ Field Personnel: GK

Weather Cond. / Locking Cap: ~~Y / N~~ Well Pad Cond. /

Sample Temp. — Spec. Conductivity: — pH: —

Sampling Method: GRAB

Method(s)	Container Desription	Preservative
8260 VOCs	3x40ml	HCl
8270 SVOCs	2x1L AMBER JUG	—

Remarks: SAMPLE TAKEN FROM PRECISION SAMPLING WATER TANK ON MC2 RIG.

NO FIELD PARAMETERS TAKEN.

DATA ASSESSMENT SUMMARY CHECKLIST AND REPORT – LEVEL III

Client ID: Omni – Oak Hammock
Project Number: TFO48OH01
Project Description: Monitoring Wells

Prepared By: Diane M. Rosseter
Date: 1/24/02

Sample Delivery Group (SDG) Description:

The temporary monitoring wells installed at the Omni – Oak Hammock landfill site in Holopaw, FL, were sampled by Kubal-Furr and Associates for volatiles, semivolatiles, pesticides, herbicides, nitrate nitrogen, and total metals. Select samples were also analyzed for dissolved metals. The samples were analyzed by AccuTest Laboratories Southeast of Orlando, FL, in accordance with FLADEP approved methodology.

CONTENTS	LEVEL III	COMMENTS
Sample Results	√	All data **Class A** except as noted in the discussion section.
Chain(s) of Custody (COCs)	√	O.K.
Master Tracking List	√	O.K.
Case Narrative	√	O.K.
Sample Prep	√	O.K.
Standards Prep		
Instrument Quality Control Data	√	CCV issues with volatiles and semivolatiles. See discussion section for details.
Batch Quality Control Report	√	Various metals batch QC issues. Details given in discussion section.
Surrogate Recovery Report	√	Pesticide surrogate recoveries out of control limits for various samples. See discussion section for details
Trip/Field/Equipment Blank Report	√	O.K.
Field Notes/Logbook	√	O.K.
CLP Forms		
All Raw Data		
Electronic Deliverables	√	O.K.

Discussion:

Volatiles

1) The continuing calibration verification (CCV) associated with samples analyzed 12/13/01 in batch VB321 exceeded the acceptance criteria for percent drift (±25%D) from the initial calibration established by the *National Functional Guidelines for Organic Data Review* (USEPA 1999) for dibromochloromethane, carbon tetrachloride, and bromoform. Results for these compounds were reported as non-detected in the associated samples listed below, and were, therefore, flagged with "UJ".
   - DP-9, DP-11, DP-12, DP-18, DP-19, BLIND DUPLICATE of DP-19, and DP-23

2) Bromoform recovered above the laboratory-established upper control limit in the blank spike associated with the samples listed in item 1 above. Because results for bromoform in these samples were reported as non-detected, no additional qualifiers were assigned.

3) Acetone was found in DP-18 at a level between method detection limit (MDL) and laboratory reporting limit (RL). Although not found in any of the associated blanks, it should be noted that acetone is considered a common laboratory contaminant and is often found in environmental samples as a result. Therefore, at the professional judgment of the reviewer, results for acetone in DP-18 are being flagged as suspect, qualified with "X", and should be weighed carefully prior to use for reliable decision-making purposes.

Semivolatiles

1) The CCV associated samples analyzed 12/10/01 was outside the *NFG*-established criteria for percent drift from the initial calibration for benzaldehyde. Results for this compound were reported as non-detected in the associated samples listed below and were, therefore, flagged with "UJ".
   - DP-9, DP-11, DP-12, DP-18, DP-19, BLIND DUPLICATE of DP-19, and DP-23

2) The CCV associated samples analyzed 12/7/01 was outside the *NFG*-established criteria for percent drift from the initial calibration for benzaldehyde. Results for this compound were reported as non-detected in the associated samples listed below and were, therefore, flagged with "UJ".
   - DP-1, DP-2, DP-10, DP-22

3) The prep blank associated with samples prepared 12/6/01 contained positive results for di-n-octyl phthalate and bis(2-ethylhexyl)phthalate. These compounds were reported as non-detected in the associated samples, therefore, no qualifiers were assigned.

Pesticides

1) Recovery for surrogate compound decachlorobiphenyl was less than 10% in the original analysis of DP-18. The sample was reextracted and reanalyzed with the same results, indicating possible matrix interference. Because surrogate recovery was so low, results for all pesticide compounds in DP-18 were rejected as unusable, flagged with "R".

2) Recovery for the surrogate compound tetrachloro-m-xylene was below the laboratory-established lower control limit in the original analysis of DP-10. The sample was reextracted and reanalyzed out of holding time with acceptable surrogate recovery. Because the reextraction was performed outside the holding time, results for all pesticide compounds in DP-10 were flagged with "UJ".

3) Endrin ketone recovered above the laboratory-established upper control limit in the blank spike associated with samples prepared on 12/7/01. Because results for endrin ketone in these samples were reported as non-detected, no qualifiers were assigned.

Herbicides

1) According to the information provided by the laboratory, the samples indicated below required dilution during sample prep due to matrix interference. As a result, these samples have elevated reporting limits.
   - DP-1, DP-9, DP-10, DP-11, DP-12, DP-18, DP-22, and DP-23

Total ICP Metals

1) It should be noted that metals detected between the instrument detection limit (IDL) and the RL were flagged by the laboratory with a "B", which is typically used in CLP reporting.

2) It should be noted that the true values given on the QC summary reports for the various quality control analyses are given in mg/L with the recovered results are reported in ug/L. Also, the units listed on the instrument blank data are mg/L, but results are given in ug/L. This is issue has been addressed with the laboratory and is due to a glitch in the QC report-generation software.

3) The method blank associated with samples prepped 12/6/01 contained positive results for aluminum, beryllium, lead, and potassium between the instrument detection limit (IDL) and laboratory-reporting limit (RL). In addition, aluminum, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, selenium, thallium, and zinc were found in the various instrument calibration blanks associated with these samples. Positive results for these metals less than 5 times the highest amount found in the blanks were flagged with "U". Sample results were flagged as indicated below:
   - flag results for antimony and thallium with "U" in DP-1
   - flag results for beryllium and cobalt with "U" in DP-1, DP-2, DP-10, and DP-22
   - flag results for chromium, nickel, and zinc with "U" in DP-2
   - flag results for lead with "U" in DP-1 and DP-2
   - flag results for manganese with "U" in DP-10
   - flag results for potassium with "U" in DP-1, DP-2, and DP-22
   - flag results for selenium with "U" in DP-1, DP-10, and DP-22

4) The method blank associated with samples prepped 12/7/01 contained positive results for chromium, lead, and potassium between the IDL and RL. In addition, beryllium, lead, potassium, thallium, and zinc were found in the various instrument calibration blanks associated with these samples. Positive results for these metals less than 5 times the highest amount found in the blanks were flagged with "U". Sample results were flagged as indicated below:
   - flag results for beryllium with "U" in DP-12, DP-19, and BLIND DUPLICATE of DP-19
   - flag results for chromium, lead, potassium, and zinc with "U" in DP-19 and BLIND DUPLICATE of DP-19

5) The serial dilution associated with samples prepped 12/6/01 was outside acceptance limits for calcium, iron, magnesium, vanadium, and zinc, indicating possible matrix interference.

Positive results for these metals in the associated samples were flagged with "J" and non-detects with "UJ" as indicated below:

- flag results for calcium, iron, magnesium, and vanadium with "J" in DP-1, DP-2, DP-10, and DP-22
- flag results for zinc with "J" in DP-1, DP-10, and DP-22
- flag results for zinc with "UJ" in DP-2

6) The serial dilution associated with samples prepped 12/7/01 was outside acceptance limits for aluminum, barium, beryllium, calcium, chromium, iron, magnesium, manganese, potassium, vanadium, and zinc, indicating possible matrix interference. Positive results for these metals in the associated samples were flagged with "J" and non-detects with "UJ" as indicated below:
   - flag results for aluminum, barium, calcium, iron, magnesium, and manganese with "J" in DP-9, DP-11, DP-12, DP-18, DP-19, BLIND DUPLICATE of DP-19, and DP-23
   - flag results for chromium, potassium, vanadium, and zinc with "J" in DP-9, DP-11, DP-12, DP-18, and DP-23
   - flag results for chromium, potassium, vanadium, and zinc with "UJ in DP-19 and BLIND DUPLICATE of DP-19
   - flag results for beryllium with "J" in DP-9, DP-11, DP-18, and DP-23
   - flag results for beryllium with "UJ" in DP-12, DP-19, and BLIND DUPLICATE of DP-19

7) The matrix spike/matrix spike duplicate associated with samples prepped 12/7/01 recovered below the lower control limit for thallium. Results for thallium in the associated samples listed below were reported as non-detected, and therefore, flagged with "UJ".
   - DP-9, DP-11, DP12, DP-18, DP-19, BLIND DUPLICATE of DP-19, and DP-23

Dissolved ICP Metals

1) The method blank associated with samples prepped 12/6/01 contained positive results for aluminum, beryllium, lead, and potassium between the IDL and RL. In addition, aluminum, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, selenium, thallium, and zinc were found in the various instrument calibration blanks associated with these samples. Positive results for these metals less than 5 times the highest amount found in the blanks were flagged with "U" and the quantitation limit raised to the sample concentration, or the RL, whichever was higher. Sample results were flagged as indicated below:
   - flag results for aluminum with "U" in DP-1
   - flag results for beryllium, chromium, and lead with "U" in DP-1, DP-10, and DP-22
   - flag results for cobalt, manganese, and nickel with "U" in DP-10
   - flag results for potassium with "U" in DP-1 and DP-22

2) The method blank associated with samples prepped 12/11/01 contained positive results for aluminum, lead, potassium, and zinc between the instrument detection limit (IDL) and laboratory-reporting limit (RL). In addition, aluminum, beryllium, lead, potassium, selenium, and thallium were found in the various instrument calibration blanks associated with these samples. Positive results for these metals less than 5 times the highest amount found in the blanks were flagged with "U" and the quantitation limit raised to the sample concentration, or the RL, whichever was higher. Sample results were flagged as indicated below:

- flag results for beryllium with "U" in DP-9, DP-11, DP-18, and DP-23
- flag results for lead and zinc with "U" in DP-9, DP-11, DP-12, DP-18, and DP-23
- flag results for selenium with "U" in DP-9, DP-12, DP-18, and DP-23

3) The serial dilution associated with samples prepped 12/6/01 was outside acceptance limits for calcium, iron, magnesium, vanadium, and zinc, indicating possible matrix interference. Results for these metals were positively identified in the associated samples listed below, and were therefore, flagged with "J".
   - DP-1, DP-10, and DP-22

4) The serial dilution associated with samples prepped 12/11/01 was outside acceptance limits for calcium and sodium, indicating possible matrix interference. Results for these compounds were positively identified in the associated samples indicated below and were, therefore, flagged with "J".
   - DP-9, DP-11, DP-12, DP-18, and DP-23

5) It should be noted that a results for various dissolved metals in a few samples were higher than the total results for these metals. In addition, dissolved silver was found at trace levels in DP-1 and DP-22, but total silver was not. Based on the turbid nature of the samples, it is possible total metals results may have been affected by matrix interference, accounting for higher concentrations in the filtered samples.

Mercury

1) It should be noted the prep date given on the analytical results for the samples listed below should be 12/19/01, instead of 12/20/01, according to the preparation log provided by the laboratory.
   - total mercury: BLIND DUPLICATE of DP-9 and DP-18
   - dissolved mercury: DP-9, DP11, DP12, DP-23, and DP-18

Nitrate Nitrogen

1) Nitrate analysis was performed outside the method-required 48-hour holding time for the samples indicated below. Positive results for nitrate in these samples were flagged with "J" and non-detects with "UJ" as indicated below:
   - flag results for nitrate with "J" in DP-1
   - flag results for nitrate with "UJ" in DP-9, DP-12, and DP-23

J = positively identified, however concentration should be considered as estimated
U = not detected above the associated quantitation limit
UJ = not detected above the associated quantitation limit, however results should be as estimated
R = data rejected due to QA/QC deficiencies
B = a laboratory-assigned qualifier to indicate metals results between the IDL and RL
X = reviewer assigned qualifer

Class A = quantitative Class B = qualitative Class C = unusable

Southeast
ACCUTEST

01/23/02

Technical Report for

Kubal-Furr & Associates

Omni-Oak Hammock

48OH01 HOLOPAW,FL

Accutest Job Number: F11674

Report to:

Kubal-Furr & Associates

Drosseter@ix.netcom.com

ATTN: Diane Rosseter

Total number of pages in report: 39

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Sample Summary

Kubal-Furr & Associates

Job No: F11674

Omni-Oak Hammock
Project No: 48OH01 HOLOPAW,FL

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
F11674-1	12/03/01	11:30	GK	12/04/01	AQ	Ground Water	DP-1
F11674-2	12/03/01	13:40	GK	12/04/01	AQ	Ground Water	DP-2
F11674-3	12/03/01	15:22	GK	12/04/01	AQ	Ground Water	DP-10
F11674-4	12/03/01	16:50	GK	12/04/01	AQ	Ground Water	DP-22
F11674-5	12/03/01	00:00	GK	12/04/01	AQ	Trip Blank Water	TRIP BLANK
F11674-1A	12/03/01	11:30	GK	12/04/01	AQ	Groundwater Filtered	DP-1
F11674-3A	12/03/01	15:22	GK	12/04/01	AQ	Groundwater Filtered	DP-10
F11674-4A	12/03/01	16:50	GK	12/04/01	AQ	Groundwater Filtered	DP-22

Report of Analysis

Client Sample ID:	DP-1		
Lab Sample ID:	F11674-1	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0007199.D	1	12/13/01	JG	n/a	n/a	VC337
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-1		
Lab Sample ID:	F11674-1	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		80-120%
17060-07-0	1,2-Dichloroethane-D4	104%		80-120%
2037-26-5	Toluene-D8	99%		80-120%
460-00-4	4-Bromofluorobenzene	99%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-1		
Lab Sample ID:	F11674-1	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009918.D	1	12/07/01	ME	12/06/01	OP4325	SL564
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-1		
Lab Sample ID:	F11674-1	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	36%		20-125%
4165-62-2	Phenol-d5	25%		10-125%
118-79-6	2,4,6-Tribromophenol	86%		35-140%
4165-60-0	Nitrobenzene-d5	59%		46-125%
321-60-8	2-Fluorobiphenyl	59%		46-125%
1718-51-0	Terphenyl-d14	88%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-1		
Lab Sample ID:	F11674-1	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04113.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2							

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	87%		47-126%
2051-24-3	Decachlorobiphenyl	43%		13-144%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-1		
Lab Sample ID:	F11674-1	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG03026.D	1	12/11/01	ATX	12/08/01	T:OP633	T:GGG109
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	10	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	2.0	ug/l	
93-76-5	2,4,5-T	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	60%		10-150%

(a) Elevated reporting limits due to matrix interference, dilution required during sample prep.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-1			
Lab Sample ID:	F11674-1		Date Sampled:	12/03/01
Matrix:	AQ - Ground Water		Date Received:	12/04/01
			Percent Solids:	n/a
Project:	Omni-Oak Hammock			

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	46600	200	9.4	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Antimony	4.0 B	5.0	2.6	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Arsenic	15.8	10	3.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Barium	391	200	0.94	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Beryllium	4.4 B	5.0	0.22	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Calcium	5920	1000	10	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Chromium	34.1	10	0.35	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cobalt	3.9 B	50	0.55	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Copper	2.5 B	25	0.71	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Iron	5720	300	9.0	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Lead	12.5	5.0	1.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Magnesium	2060 B	5000	26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Manganese	16.5	15	0.26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	10.4 B	40	0.80	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Potassium	1260 B	5000	49	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Selenium	4.7 B	10	2.5	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Sodium	5750	5000	170	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Thallium	5.5 B	10	2.1	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Vanadium	41.7 B	50	0.58	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Zinc	24.1	20	0.36	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-1			
Lab Sample ID:	F11674-1		Date Sampled:	12/03/01
Matrix:	AQ - Ground Water		Date Received:	12/04/01
			Percent Solids:	n/a
Project:	Omni-Oak Hammock			

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Nitrogen, Nitrate	0.42	0.10	mg/l	1	12/05/01	AL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	DP-2		
Lab Sample ID:	F11674-2	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0007200.D	1	12/13/01	JG	n/a	n/a	VC337
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-2		
Lab Sample ID:	F11674-2	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		80-120%
17060-07-0	1,2-Dichloroethane-D4	106%		80-120%
2037-26-5	Toluene-D8	98%		80-120%
460-00-4	4-Bromofluorobenzene	98%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-2		
Lab Sample ID:	F11674-2	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009919.D	1	12/07/01	ME	12/06/01	OP4325	SL564
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-2		
Lab Sample ID:	F11674-2	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	40%		20-125%
4165-62-2	Phenol-d5	30%		10-125%
118-79-6	2,4,6-Tribromophenol	86%		35-140%
4165-60-0	Nitrobenzene-d5	63%		46-125%
321-60-8	2-Fluorobiphenyl	63%		46-125%
1718-51-0	Terphenyl-d14	94%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-2		
Lab Sample ID:	F11674-2	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04114.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2							

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	80%		47-126%
2051-24-3	Decachlorobiphenyl	63%		13-144%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-2		
Lab Sample ID:	F11674-2	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG02967.D	5	12/09/01	ATX	12/07/01	T:OP632	T:GGG108
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	5.0	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	1.0	ug/l	
93-76-5	2,4,5-T	ND	1.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	90%		10-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-2		
Lab Sample ID:	F11674-2	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	824	200	9.4	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Barium	8.4 B	200	0.94	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.96 B	5.0	0.22	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Calcium	2010	1000	10	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Chromium	0.50 B	10	0.35	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cobalt	0.66 B	50	0.55	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Copper	0.71 U	25	0.71	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Iron	1830	300	9.0	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Lead	3.0 B	5.0	1.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Magnesium	958 B	5000	26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Manganese	9.1 B	15	0.26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	2.0 B	40	0.80	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Potassium	727 B	5000	49	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Selenium	2.5 U	10	2.5	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Sodium	5400	5000	170	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Vanadium	3.1 B	50	0.58	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Zinc	6.9 B	20	0.36	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-2		
Lab Sample ID:	F11674-2	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/05/01	AL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	DP-10		
Lab Sample ID:	F11674-3	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0007201.D	1	12/13/01	JG	n/a	n/a	VC337
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-10		
Lab Sample ID:	F11674-3	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	0.53	2.0	ug/l	J
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		80-120%
17060-07-0	1,2-Dichloroethane-D4	104%		80-120%
2037-26-5	Toluene-D8	97%		80-120%
460-00-4	4-Bromofluorobenzene	97%		80-120%

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J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-10		
Lab Sample ID:	F11674-3	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009920.D	1	12/07/01	ME	12/06/01	OP4325	SL564
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-10		
Lab Sample ID:	F11674-3	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	37%		20-125%
4165-62-2	Phenol-d5	30%		10-125%
118-79-6	2,4,6-Tribromophenol	82%		35-140%
4165-60-0	Nitrobenzene-d5	62%		46-125%
321-60-8	2-Fluorobiphenyl	66%		46-125%
1718-51-0	Terphenyl-d14	90%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-10			
Lab Sample ID:	F11674-3		Date Sampled:	12/03/01
Matrix:	AQ - Ground Water		Date Received:	12/04/01
Method:	SW846 8081A SW846 3510C		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04117.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2 [a]	DD04172.D	1	12/12/01	SKW	12/11/01	OP4328	GDD154

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	45%	67%	47-126%
2051-24-3	Decachlorobiphenyl	30%	53%	13-144%

(a) Confirmed ND by re-extraction and reanalysis beyond holdtime.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-10		
Lab Sample ID:	F11674-3	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG03027.D	1	12/11/01	ATX	12/08/01	T:OP633	T:GGG109
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	10	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	2.0	ug/l	
93-76-5	2,4,5-T	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	69%		10-150%

(a) Elevated reporting limits due to matrix interference, dilution required during sample prep.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-10		
Lab Sample ID:	F11674-3	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	48600	200	9.4	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Barium	144 B	200	0.94	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Beryllium	1.7 B	5.0	0.22	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Calcium	2890	1000	10	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Chromium	34.7	10	0.35	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cobalt	2.7 B	50	0.55	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Copper	3.5 B	25	0.71	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Iron	5250	300	9.0	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Lead	38.7	5.0	1.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Magnesium	3730 B	5000	26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Manganese	7.4 B	15	0.26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	13.7 B	40	0.80	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Potassium	4590 B	5000	49	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Selenium	2.7 B	10	2.5	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Sodium	15100	5000	170	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Vanadium	50.3	50	0.58	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Zinc	12.8 B	20	0.36	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-10		
Lab Sample ID:	F11674-3	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/05/01	AL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	DP-22		
Lab Sample ID:	F11674-4	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0007202.D	1	12/13/01	JG	n/a	n/a	VC337
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-22		
Lab Sample ID:	F11674-4	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	2.1	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		80-120%
17060-07-0	1,2-Dichloroethane-D4	106%		80-120%
2037-26-5	Toluene-D8	97%		80-120%
460-00-4	4-Bromofluorobenzene	96%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-22		
Lab Sample ID:	F11674-4	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009923.D	1	12/07/01	ME	12/06/01	OP4325	SL564
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-22		
Lab Sample ID:	F11674-4	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	46%		20-125%
4165-62-2	Phenol-d5	38%		10-125%
118-79-6	2,4,6-Tribromophenol	90%		35-140%
4165-60-0	Nitrobenzene-d5	72%		46-125%
321-60-8	2-Fluorobiphenyl	77%		46-125%
1718-51-0	Terphenyl-d14	97%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Analytical Batch
T:GGG109

iated method blank
of a compound

Report of Analysis

Client Sample ID:	DP-22		
Lab Sample ID:	F11674-4	Date Sampled:	12/03/01
Matrix:	AQ - Ground Water	Date Received:	12/04/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	50600	200	9.4	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.9 B	10	3.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Barium	146 B	200	0.94	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Beryllium	2.0 B	5.0	0.22	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Calcium	5200	1000	10	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Chromium	40.9	10	0.35	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cobalt	3.1 B	50	0.55	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Copper	2.0 B	25	0.71	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Iron	6020	300	9.0	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Lead	40.4	5.0	1.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Magnesium	3960 B	5000	26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Manganese	16.2	15	0.26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	10.7 B	40	0.80	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Potassium	2280 B	5000	49	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Selenium	7.7 B	10	2.5	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Sodium	8720	5000	170	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Vanadium	57.2	50	0.58	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Zinc	12.0 B	20	0.36	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-22			
Lab Sample ID:	F11674-4		Date Sampled:	12/03/01
Matrix:	AQ - Ground Water		Date Received:	12/04/01
			Percent Solids:	n/a
Project:	Omni-Oak Hammock			

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/05/01	AL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	F11674-5	Date Sampled:	12/03/01
Matrix:	AQ - Trip Blank Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0007205.D	1	12/13/01	JG	n/a	n/a	VC337
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	F11674-5	Date Sampled:	12/03/01
Matrix:	AQ - Trip Blank Water	Date Received:	12/04/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		80-120%
17060-07-0	1,2-Dichloroethane-D4	105%		80-120%
2037-26-5	Toluene-D8	98%		80-120%
460-00-4	4-Bromofluorobenzene	97%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-1		
Lab Sample ID:	F11674-1A	Date Sampled:	12/03/01
Matrix:	AQ - Groundwater Filtered	Date Received:	12/04/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	345	200	9.4	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Barium	13.2 B	200	0.94	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.99 B	5.0	0.22	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Calcium	1680	1000	10	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Chromium	0.44 B	10	0.35	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cobalt	0.55 U	50	0.55	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Copper	0.71 U	25	0.71	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Iron	809	300	9.0	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Lead	2.8 B	5.0	1.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Magnesium	1290 B	5000	26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Manganese	9.2 B	15	0.26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	0.80 U	40	0.80	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Potassium	857 B	5000	49	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Selenium	2.5 U	10	2.5	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Silver	3.5 B	10	0.59	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Sodium	4470 B	5000	170	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Vanadium	5.6 B	50	0.58	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Zinc	37.3	20	0.36	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-10		
Lab Sample ID:	F11674-3A	Date Sampled:	12/03/01
Matrix:	AQ - Groundwater Filtered	Date Received:	12/04/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	10000	200	9.4	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Barium	30.0 B	200	0.94	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Beryllium	1.1 B	5.0	0.22	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Calcium	1630	1000	10	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Chromium	7.3 B	10	0.35	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cobalt	1.0 B	50	0.55	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Copper	0.71 U	25	0.71	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Iron	1790	300	9.0	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Lead	8.3	5.0	1.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Magnesium	1770 B	5000	26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Manganese	3.9 B	15	0.26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	3.3 B	40	0.80	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Potassium	3150 B	5000	49	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Selenium	2.5 U	10	2.5	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Sodium	10500	5000	170	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Vanadium	13.5 B	50	0.58	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Zinc	32.9	20	0.36	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-22		
Lab Sample ID:	F11674-4A	Date Sampled:	12/03/01
Matrix:	AQ - Groundwater Filtered	Date Received:	12/04/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	658	200	9.4	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Barium	16.5 B	200	0.94	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.85 B	5.0	0.22	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Calcium	3350	1000	10	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Chromium	1.6 B	10	0.35	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Cobalt	0.55 U	50	0.55	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Copper	0.71 U	25	0.71	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Iron	1410	300	9.0	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Lead	2.9 B	5.0	1.2	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Magnesium	2130 B	5000	26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Manganese	8.7 B	15	0.26	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	0.80 U	40	0.80	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Potassium	1680 B	5000	49	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Selenium	2.5 U	10	2.5	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Silver	0.65 B	10	0.59	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Sodium	7970	5000	170	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Vanadium	10.4 B	50	0.58	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A
Zinc	23.4	20	0.36	ug/l	1	12/06/01	12/06/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Blank Spike Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC337-BS	C0007195.D	1	12/13/01	JG	n/a	n/a	VC337

The QC reported here applies to the following samples:

Method: SW846 8260B

F11674-1, F11674-2, F11674-3, F11674-4, F11674-5

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	133	106	67-125
71-43-2	Benzene	25	26.6	106	75-125
75-27-4	Bromodichloromethane	25	28.0	112	75-125
75-25-2	Bromoform	25	26.3	105	72-125
108-90-7	Chlorobenzene	25	25.4	102	75-125
75-00-3	Chloroethane	25	27.0	108	58-136
67-66-3	Chloroform	25	27.4	110	75-125
75-15-0	Carbon disulfide	125	130	104	48-142
56-23-5	Carbon tetrachloride	25	30.4	122	75-136
110-82-7	Cyclohexane	25	27.8	111	50-150 [a]
75-34-3	1,1-Dichloroethane	25	27.0	108	75-125
75-35-4	1,1-Dichloroethylene	25	27.5	110	67-138
96-12-8	1,2-Dibromo-3-chloropropane	25	25.5	102	64-125
106-93-4	1,2-Dibromoethane	25	24.1	96	75-125
107-06-2	1,2-Dichloroethane	25	25.3	101	75-125
78-87-5	1,2-Dichloropropane	25	27.6	110	75-125
124-48-1	Dibromochloromethane	25	25.7	103	75-125
75-71-8	Dichlorodifluoromethane	25	28.0	112	48-171
156-59-2	cis-1,2-Dichloroethylene	25	27.7	111	75-129
10061-01-5	cis-1,3-Dichloropropene	25	23.7	95	75-125
541-73-1	m-Dichlorobenzene	25	25.5	102	75-125
95-50-1	o-Dichlorobenzene	25	25.3	101	75-125
106-46-7	p-Dichlorobenzene	25	26.0	104	75-125
156-60-5	trans-1,2-Dichloroethylene	25	26.4	106	73-125
10061-02-6	trans-1,3-Dichloropropene	25	21.8	87	75-125
100-41-4	Ethylbenzene	25	25.3	101	68-135
76-13-1	Freon 113	25	28.8	115	75-125
591-78-6	2-Hexanone	125	130	104	68-125
98-82-8	Isopropylbenzene	25	25.8	103	75-125
108-10-1	4-Methyl-2-pentanone	125	133	106	75-125
79-20-9	Methyl Acetate	125	134	107	50-150 [a]
74-83-9	Methyl bromide	25	27.0	108	59-146
74-87-3	Methyl chloride	25	26.7	107	50-142
108-87-2	Methylcyclohexane	25	28.4	114	50-150 [a]
75-09-2	Methylene chloride	25	25.1	100	69-125
78-93-3	Methyl ethyl ketone	125	129	103	70-125

Method Blank Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC337-MB	C0007196.D	1	12/13/01	JG	n/a	n/a	VC337

The QC reported here applies to the following samples: Method: SW846 8260B

F11674-1, F11674-2, F11674-3, F11674-4, F11674-5

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	103%	80-120%
17060-07-0	1,2-Dichloroethane-D4	105%	80-120%
2037-26-5	Toluene-D8	99%	80-120%
460-00-4	4-Bromofluorobenzene	96%	80-120%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11674-3MS	C0007203.D	1	12/13/01	JG	n/a	n/a	VC337
F11674-3MSD	C0007204.D	1	12/13/01	JG	n/a	n/a	VC337
F11674-3	C0007201.D	1	12/13/01	JG	n/a	n/a	VC337

The QC reported here applies to the following samples: Method: SW846 8260B

F11674-1, F11674-2, F11674-3, F11674-4, F11674-5

CAS No.	Compound	F11674-3 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		125	135	108	138	110	2	61-125/15
71-43-2	Benzene	ND		25	26.3	105	26.6	106	1	75-125/15
75-27-4	Bromodichloromethane	ND		25	27.1	108	26.2	105	3	75-125/15
75-25-2	Bromoform	ND		25	23.7	95	23.3	93	2	66-125/15
108-90-7	Chlorobenzene	ND		25	26.0	104	25.4	102	2	75-125/15
75-00-3	Chloroethane	ND		25	24.0	96	24.4	98	2	53-125/15
67-66-3	Chloroform	ND		25	26.6	106	26.9	108	1	75-125/15
75-15-0	Carbon disulfide	ND		125	127	102	127	102	0	51-138/15
56-23-5	Carbon tetrachloride	ND		25	28.1	112	28.4	114	1	74-131/15
110-82-7	Cyclohexane	ND		25	27.1	108	27.5	110	1	50-150/30 [a]
75-34-3	1,1-Dichloroethane	ND		25	27.0	108	26.8	107	1	75-125/15
75-35-4	1,1-Dichloroethylene	ND		25	26.9	108	27.5	110	2	66-140/15
96-12-8	1,2-Dibromo-3-chloropropane	ND		25	23.0	92	23.5	94	2	57-125/15
106-93-4	1,2-Dibromoethane	ND		25	24.5	98	25.3	101	3	75-125/15
107-06-2	1,2-Dichloroethane	ND		25	24.8	99	24.6	98	1	75-125/15
78-87-5	1,2-Dichloropropane	ND		25	27.5	110	27.2	109	1	75-125/15
124-48-1	Dibromochloromethane	ND		25	24.8	99	24.5	98	1	75-125/15
75-71-8	Dichlorodifluoromethane	ND		25	22.6	90	26.3	105	15	45-182/15
156-59-2	cis-1,2-Dichloroethylene	ND		25	27.4	110	27.5	110	0	75-136/15
10061-01-5	cis-1,3-Dichloropropene	ND		25	21.3	85	20.6	82	3	71-125/15
541-73-1	m-Dichlorobenzene	ND		25	25.5	102	25.2	101	1	75-125/15
95-50-1	o-Dichlorobenzene	ND		25	25.1	100	25.2	101	0	75-125/15
106-46-7	p-Dichlorobenzene	ND		25	25.6	102	25.4	102	1	75-125/15
156-60-5	trans-1,2-Dichloroethylene	ND		25	26.5	106	26.1	104	2	73-125/15
10061-02-6	trans-1,3-Dichloropropene	ND		25	19.2	77	18.7	75	3	62-125/15
100-41-4	Ethylbenzene	ND		25	25.3	101	25.3	101	0	75-125/15
76-13-1	Freon 113	ND		25	28.5	114	28.6	114	0	69-131/15
591-78-6	2-Hexanone	ND		125	131	105	136	109	4	71-125/15
98-82-8	Isopropylbenzene	ND		25	25.4	102	25.0	100	2	74-125/15
108-10-1	4-Methyl-2-pentanone	ND		125	134	107	136	109	1	75-125/15
79-20-9	Methyl Acetate	ND		125	132	106	132	106	0	50-150/30 [a]
74-83-9	Methyl bromide	ND		25	23.4	94	23.4	94	0	67-146/15
74-87-3	Methyl chloride	ND		25	21.9	88	24.8	99	12	47-160/15
108-87-2	Methylcyclohexane	ND		25	27.8	111	28.3	113	2	50-150/30 [a]
75-09-2	Methylene chloride	ND		25	24.5	98	25.0	100	2	69-125/15
78-93-3	Methyl ethyl ketone	ND		125	130	104	132	106	2	70-125/15

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11674-3MS	C0007203.D	1	12/13/01	JG	n/a	n/a	VC337
F11674-3MSD	C0007204.D	1	12/13/01	JG	n/a	n/a	VC337
F11674-3	C0007201.D	1	12/13/01	JG	n/a	n/a	VC337

The QC reported here applies to the following samples: Method: SW846 8260B

F11674-1, F11674-2, F11674-3, F11674-4, F11674-5

CAS No.	Compound	F11674-3 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
1634-04-4	Methyl Tert Butyl Ether	ND		25	26.4	106	26.9	108	2	75-125/15
100-42-5	Styrene	ND		25	24.7	99	23.8	95	4	69-126/15
71-55-6	1,1,1-Trichloroethane	ND		25	28.8	115	28.9	116	0	75-131/15
79-34-5	1,1,2,2-Tetrachloroethane	ND		25	22.9	92	23.2	93	1	75-125/15
79-00-5	1,1,2-Trichloroethane	ND		25	25.0	100	24.4	98	2	75-125/15
120-82-1	1,2,4-Trichlorobenzene	ND		25	23.9	96	23.7	95	1	74-125/15
127-18-4	Tetrachloroethylene	ND		25	26.9	108	28.0	112	4	75-125/15
108-88-3	Toluene	0.53	J	25	25.7	101	25.9	101	1	75-125/15
79-01-6	Trichloroethylene	ND		25	25.5	102	25.6	102	0	75-125/15
75-69-4	Trichlorofluoromethane	ND		25	26.3	105	27.1	108	3	60-139/30
75-01-4	Vinyl chloride	ND		25	23.2	93	24.8	99	7	52-169/1
1330-20-7	Xylene (total)	ND		75	78.9	105	78.5	105	1	75-125/15

CAS No.	Surrogate Recoveries	MS	MSD	F11674-3	Limits
1868-53-7	Dibromofluoromethane	103%	104%	103%	80-120%
17060-07-0	1,2-Dichloroethane-D4	104%	104%	104%	80-120%
2037-26-5	Toluene-D8	97%	97%	97%	80-120%
460-00-4	4-Bromofluorobenzene	90%	91%	97%	80-120%

(a) Advisory control limits.

Volatile Surrogate Recovery Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8260B Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4
F11674-1	C0007199.D	102.0	104.0	99.0	99.0
F11674-2	C0007200.D	103.0	106.0	98.0	98.0
F11674-3	C0007201.D	103.0	104.0	97.0	97.0
F11674-4	C0007202.D	102.0	106.0	97.0	96.0
F11674-5	C0007205.D	103.0	105.0	98.0	97.0
F11674-3MS	C0007203.D	103.0	104.0	97.0	90.0
F11674-3MSD	C0007204.D	104.0	104.0	97.0	91.0
VC337-BS	C0007195.D	104.0	106.0	96.0	93.0
VC337-MB	C0007196.D	103.0	105.0	99.0	96.0

Surrogate Compounds	Recovery Limits
S1 = Dibromofluoromethane	80-120%
S2 = 1,2-Dichloroethane-D4	80-120%
S3 = Toluene-D8	80-120%
S4 = 4-Bromofluorobenzene	80-120%

Blank Spike Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4325-BS	L009916.D	1	12/07/01	ME	12/06/01	OP4325	SL564

The QC reported here applies to the following samples: Method: SW846 8270C

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
95-57-8	2-Chlorophenol	50	39.9	80	60-125
59-50-7	4-Chloro-3-methyl phenol	50	45.7	91	70-125
120-83-2	2,4-Dichlorophenol	50	43.2	86	68-125
105-67-9	2,4-Dimethylphenol	50	35.0	70	42-125
51-28-5	2,4-Dinitrophenol	50	49.9	100	10-125
534-52-1	4,6-Dinitro-o-cresol	50	52.2	104	46-125
95-48-7	2-Methylphenol	50	37.1	74	51-125
	3&4-Methylphenol	100	74.8	75	46-125
88-75-5	2-Nitrophenol	50	44.6	89	64-125
100-02-7	4-Nitrophenol	50	29.7	59	17-125
87-86-5	Pentachlorophenol	50	51.3	103	60-125
108-95-2	Phenol	50	25.1	50	16-125
95-95-4	2,4,5-Trichlorophenol	50	46.0	92	74-125
88-06-2	2,4,6-Trichlorophenol	50	42.6	85	70-125
83-32-9	Acenaphthene	50	43.9	88	70-125
208-96-8	Acenaphthylene	50	48.5	97	75-125
120-12-7	Anthracene	50	49.9	100	75-125
56-55-3	Benzo(a)anthracene	50	50.4	101	75-125
50-32-8	Benzo(a)pyrene	50	53.8	108	75-125
205-99-2	Benzo(b)fluoranthene	50	51.2	102	75-125
191-24-2	Benzo(g,h,i)perylene	50	61.4	123	57-135
207-08-9	Benzo(k)fluoranthene	50	49.4	99	75-125
101-55-3	4-Bromophenyl phenyl ether	50	48.6	97	74-125
85-68-7	Butyl benzyl phthalate	50	58.1	116	38-134
91-58-7	2-Chloronaphthalene	50	43.0	86	59-125
106-47-8	4-Chloroaniline	50	45.8	92	31-125
86-74-8	Carbazole	50	49.3	99	75-125
218-01-9	Chrysene	50	48.8	98	75-125
111-91-1	bis(2-Chloroethoxy)methane	50	43.7	87	64-125
111-44-4	bis(2-Chloroethyl)ether	50	40.4	81	62-125
108-60-1	bis(2-Chloroisopropyl)ether	50	39.2	78	60-125
7005-72-3	4-Chlorophenyl phenyl ether	50	48.8	98	75-125
121-14-2	2,4-Dinitrotoluene	50	55.0	110	73-125
606-20-2	2,6-Dinitrotoluene	50	53.9	108	75-125
91-94-1	3,3'-Dichlorobenzidine	50	56.3	113	55-125
53-70-3	Dibenzo(a,h)anthracene	50	58.4	117	64-130

Blank Spike Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4325-BS	L009916.D	1	12/07/01	ME	12/06/01	OP4325	SL564

The QC reported here applies to the following samples: Method: SW846 8270C

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
132-64-9	Dibenzofuran	50	45.4	91	73-125
84-74-2	Di-n-butyl phthalate	50	55.3	111	47-140
117-84-0	Di-n-octyl phthalate	50	59.8	120	52-125
84-66-2	Diethyl phthalate	50	56.1	112	59-125
131-11-3	Dimethyl phthalate	50	53.9	108	24-142
117-81-7	bis(2-Ethylhexyl)phthalate	50	62.0	124	71-125
206-44-0	Fluoranthene	50	49.3	99	75-125
86-73-7	Fluorene	50	47.6	95	75-125
118-74-1	Hexachlorobenzene	50	48.2	96	74-125
87-68-3	Hexachlorobutadiene	50	35.1	70	22-125
67-72-1	Hexachloroethane	50	28.5	57	23-125
193-39-5	Indeno(1,2,3-cd)pyrene	50	61.2	122	53-130
78-59-1	Isophorone	50	45.7	91	63-125
91-57-6	2-Methylnaphthalene	50	41.9	84	51-125
88-74-4	2-Nitroaniline	50	51.3	103	75-125
99-09-2	3-Nitroaniline	50	49.4	99	62-125
100-01-6	4-Nitroaniline	50	53.7	107	67-125
91-20-3	Naphthalene	50	42.0	84	53-125
98-95-3	Nitrobenzene	50	42.4	85	67-125
621-64-7	N-Nitroso-di-n-propylamine	50	47.2	94	61-125
86-30-6	N-Nitrosodiphenylamine	50	53.8	108	75-125
85-01-8	Phenanthrene	50	47.5	95	75-125
129-00-0	Pyrene	50	47.7	95	67-125

CAS No.	Surrogate Recoveries	BSP	Limits
367-12-4	2-Fluorophenol	60%	20-125%
4165-62-2	Phenol-d5	45%	10-125%
118-79-6	2,4,6-Tribromophenol	92%	35-140%
4165-60-0	Nitrobenzene-d5	83%	46-125%
321-60-8	2-Fluorobiphenyl	81%	46-125%
1718-51-0	Terphenyl-d14	99%	49-126%

Method Blank Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4325-MB	L009917.D	1	12/07/01	ME	12/06/01	OP4325	SL564

The QC reported here applies to the following samples: Method: SW846 8270C

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

Method Blank Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4325-MB	L009917.D	1	12/07/01	ME	12/06/01	OP4325	SL564

The QC reported here applies to the following samples: Method: SW846 8270C

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate [a]	3.6	5.0	ug/l	J
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate [a]	6.5	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	57%	20-125%
4165-62-2	Phenol-d5	44%	10-125%
118-79-6	2,4,6-Tribromophenol	87%	35-140%

Method Blank Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4325-MB	L009917.D	1	12/07/01	ME	12/06/01	OP4325	SL564

The QC reported here applies to the following samples: Method: SW846 8270C

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	77%	46-125%
321-60-8	2-Fluorobiphenyl	72%	46-125%
1718-51-0	Terphenyl-d14	95%	49-126%

(a) Suspected laboratory contaminant. Compound not detected in associated samples.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4325-MS	L009921.D	1	12/07/01	ME	12/06/01	OP4325	SL564
OP4325-MSD	L009922.D	1	12/07/01	ME	12/06/01	OP4325	SL564
F11674-3	L009920.D	1	12/07/01	ME	12/06/01	OP4325	SL564

The QC reported here applies to the following samples: Method: SW846 8270C

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Compound	F11674-3 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
95-57-8	2-Chlorophenol	ND		100	59.3	59	63.3	63	7	59-125/20
59-50-7	4-Chloro-3-methyl phenol	ND		100	78.6	79	80.0	80	2	72-125/20
120-83-2	2,4-Dichlorophenol	ND		100	65.6	66	69.2	69	5	65-125/20
105-67-9	2,4-Dimethylphenol	ND		100	55.2	55	58.1	58	5	37-125/20
51-28-5	2,4-Dinitrophenol	ND		100	88.8	89	85.7	86	4	27-125/41
534-52-1	4,6-Dinitro-o-cresol	ND		100	88.0	88	92.4	92	5	54-125/20
95-48-7	2-Methylphenol	ND		100	57.3	57	61.7	62	7	57-125/20
	3&4-Methylphenol	ND		200	115	58	124	62	8	55-125/20
88-75-5	2-Nitrophenol	ND		100	66.7	67	68.5	69	3	67-125/20
100-02-7	4-Nitrophenol	ND		100	62.8	63	66.7	67	6	41-125/23
87-86-5	Pentachlorophenol	ND		100	89.3	89	94.6	95	6	67-126/20
108-95-2	Phenol	ND		100	42.2	42	47.6	48	12	39-125/20
95-95-4	2,4,5-Trichlorophenol	ND		100	79.7	80	82.6	83	4	75-125/20
88-06-2	2,4,6-Trichlorophenol	ND		100	75.2	75	76.3	76	1	70-125/20
83-32-9	Acenaphthene	ND		100	77.5	78	79.5	80	3	74-125/20
208-96-8	Acenaphthylene	ND		100	85.0	85	87.1	87	2	75-125/20
120-12-7	Anthracene	ND		100	95.2	95	97.4	97	2	75-125/20
56-55-3	Benzo(a)anthracene	ND		100	93.5	94	100	100	7	75-125/20
50-32-8	Benzo(a)pyrene	ND		100	96.8	97	101	101	4	75-125/20
205-99-2	Benzo(b)fluoranthene	ND		100	92.0	92	95.4	95	4	75-125/20
191-24-2	Benzo(g,h,i)perylene	ND		100	117	117	117	117	0	61-125/21
207-08-9	Benzo(k)fluoranthene	ND		100	87.4	87	93.9	94	7	75-125/20
101-55-3	4-Bromophenyl phenyl ether	ND		100	86.1	86	90.3	90	5	73-125/20
85-68-7	Butyl benzyl phthalate	ND		100	106	106	112	112	6	66-125/20
91-58-7	2-Chloronaphthalene	ND		100	69.0	69	72.5	73	5	64-125/20
106-47-8	4-Chloroaniline	ND		100	76.8	77	78.5	79	2	44-125/20
86-74-8	Carbazole	ND		100	92.1	92	98.0	98	6	75-125/20
218-01-9	Chrysene	ND		100	92.1	92	94.0	94	2	75-125/20
111-91-1	bis(2-Chloroethoxy)methane	ND		100	65.3	65	70.6	71	8	62-125/20
111-44-4	bis(2-Chloroethyl)ether	ND		100	62.8	63	66.5	67	6	61-125/20
108-60-1	bis(2-Chloroisopropyl)ether	ND		100	63.7	64	64.9	65	2	56-125/22
7005-72-3	4-Chlorophenyl phenyl ether	ND		100	85.6	86	90.2	90	5	75-125/20
121-14-2	2,4-Dinitrotoluene	ND		100	104	104	109	109	5	75-125/20
606-20-2	2,6-Dinitrotoluene	ND		100	102	102	103	103	1	75-125/20
91-94-1	3,3'-Dichlorobenzidine	ND		100	102	102	104	104	2	20-125/29
53-70-3	Dibenzo(a,h)anthracene	ND		100	109	109	111	111	2	64-127/20

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4325-MS	L009921.D	1	12/07/01	ME	12/06/01	OP4325	SL564
OP4325-MSD	L009922.D	1	12/07/01	ME	12/06/01	OP4325	SL564
F11674-3	L009920.D	1	12/07/01	ME	12/06/01	OP4325	SL564

The QC reported here applies to the following samples: Method: SW846 8270C

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Compound	F11674-3 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
132-64-9	Dibenzofuran	ND		100	79.7	80	82.3	82	3	73-125/20
84-74-2	Di-n-butyl phthalate	ND		100	105	105	109	109	4	71-125/20
117-84-0	Di-n-octyl phthalate	ND		100	111	111	111	111	0	66-125/30
84-66-2	Diethyl phthalate	ND		100	106	106	108	108	2	64-125/20
131-11-3	Dimethyl phthalate	ND		100	98.5	99	101	101	3	32-139/20
117-81-7	bis(2-Ethylhexyl)phthalate	ND		100	127	127*	121	121	5	74-125/20
206-44-0	Fluoranthene	ND		100	92.8	93	95.2	95	3	75-125/20
86-73-7	Fluorene	ND		100	87.7	88	89.2	89	2	75-125/20
118-74-1	Hexachlorobenzene	ND		100	86.0	86	92.5	93	7	75-125/20
87-68-3	Hexachlorobutadiene	ND		100	55.8	56	58.0	58	4	26-125/2[illegible]
67-72-1	Hexachloroethane	ND		100	41.4	41	42.1	42	2	22-125/2[illegible]
193-39-5	Indeno(1,2,3-cd)pyrene	ND		100	114	114	115	115	1	54-125/20
78-59-1	Isophorone	ND		100	73.0	73	74.1	74	1	62-125/20
91-57-6	2-Methylnaphthalene	ND		100	65.5	66	69.7	70	6	58-125/20
88-74-4	2-Nitroaniline	ND		100	92.1	92	95.3	95	3	67-125/20
99-09-2	3-Nitroaniline	ND		100	91.6	92	91.9	92	0	53-125/20
100-01-6	4-Nitroaniline	ND		100	103	103	104	104	1	63-125/20
91-20-3	Naphthalene	ND		100	67.7	68	70.1	70	3	55-125/20
98-95-3	Nitrobenzene	ND		100	66.8	67	70.3	70	5	63-125/20
621-64-7	N-Nitroso-di-n-propylamine	ND		100	72.9	73	76.7	77	5	58-125/20
86-30-6	N-Nitrosodiphenylamine	ND		100	100	100	103	103	3	75-125/20
85-01-8	Phenanthrene	ND		100	92.1	92	92.9	93	1	75-125/20
129-00-0	Pyrene	ND		100	90.3	90	95.9	96	6	67-125/20

CAS No.	Surrogate Recoveries	MS	MSD	F11674-3	Limits
367-12-4	2-Fluorophenol	48%	53%	37%	20-125%
4165-62-2	Phenol-d5	39%	44%	30%	10-125%
118-79-6	2,4,6-Tribromophenol	84%	88%	82%	35-140%
4165-60-0	Nitrobenzene-d5	64%	68%	62%	46-125%
321-60-8	2-Fluorobiphenyl	66%	71%	66%	46-125%
1718-51-0	Terphenyl-d14	93%	98%	90%	49-126%

Semivolatile Surrogate Recovery Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8270C   Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4	S5	S6
F11674-1	L009918.D	36.0	25.0	86.0	59.0	59.0	88.0
F11674-2	L009919.D	40.0	30.0	86.0	63.0	63.0	94.0
F11674-3	L009920.D	37.0	30.0	82.0	62.0	66.0	90.0
F11674-4	L009923.D	46.0	38.0	90.0	72.0	77.0	97.0
OP4325-BS	L009916.D	60.0	45.0	92.0	83.0	81.0	99.0
OP4325-MB	L009917.D	57.0	44.0	87.0	77.0	72.0	95.0
OP4325-MS	L009921.D	48.0	39.0	84.0	64.0	66.0	93.0
OP4325-MSD	L009922.D	53.0	44.0	88.0	68.0	71.0	98.0

Surrogate Compounds	Recovery Limits
S1 = 2-Fluorophenol	20-125%
S2 = Phenol-d5	10-125%
S3 = 2,4,6-Tribromophenol	35-140%
S4 = Nitrobenzene-d5	46-125%
S5 = 2-Fluorobiphenyl	46-125%
S6 = Terphenyl-d14	49-126%

Blank Spike Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-BS	DD04112.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152

The QC reported here applies to the following samples: Method: SW846 8081A

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
309-00-2	Aldrin	0.5	0.44	88	36-123
319-84-6	alpha-BHC	0.5	0.48	96	71-124
319-85-7	beta-BHC	0.5	0.48	96	66-124
319-86-8	delta-BHC	0.5	0.53	106	48-133
58-89-9	gamma-BHC (Lindane).	0.5	0.50	100	70-125
5103-71-9	alpha-Chlordane	0.5	0.47	94	61-120
5103-74-2	gamma-Chlordane	0.5	0.48	96	61-121
60-57-1	Dieldrin	0.5	0.48	96	68-123
72-54-8	4,4'-DDD	0.5	0.52	104	61-134
72-55-9	4,4'-DDE	0.5	0.48	96	59-131
50-29-3	4,4'-DDT	0.5	0.51	102	65-124
72-20-8	Endrin	0.5	0.25	50	46-160
1031-07-8	Endosulfan sulfate	0.5	0.47	94	67-118
7421-93-4	Endrin aldehyde	0.5	0.12	24	5-120
53494-70-5	Endrin ketone	0.5	0.65	130*	57-128
959-98-8	Endosulfan-I	0.5	0.47	94	68-120
33213-65-9	Endosulfan-II	0.5	0.50	100	74-120
76-44-8	Heptachlor	0.5	0.43	86	46-124
1024-57-3	Heptachlor epoxide	0.5	0.47	94	70-127
72-43-5	Methoxychlor	0.5	0.51	102	66-122

CAS No.	Surrogate Recoveries	BSP	Limits
877-09-8	Tetrachloro-m-xylene	86%	47-126%
2051-24-3	Decachlorobiphenyl	103%	13-144%

Blank Spike Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-BS2	DD04170.D	1	12/12/01	SKW	12/11/01	OP4328	GDD154

The QC reported here applies to the following samples:

Method: SW846 8081A

F11674-3

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits

CAS No.	Surrogate Recoveries	BSP	Limits
877-09-8	Tetrachloro-m-xylene	82%	47-126%
2051-24-3	Decachlorobiphenyl	109%	13-144%

Method Blank Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-MB	DD04111.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152

The QC reported here applies to the following samples: Method: SW846 8081A

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries		Limits
877-09-8	Tetrachloro-m-xylene	87%	47-126%
2051-24-3	Decachlorobiphenyl	105%	13-144%

Method Blank Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-MB2	DD04169.D	1	12/12/01	SKW	12/11/01	OP4328	GDD154

The QC reported here applies to the following samples: Method: SW846 8081A

F11674-3

CAS No.	Compound	Result	RL	Units	Q

CAS No.	Surrogate Recoveries		Limits
877-09-8	Tetrachloro-m-xylene	81%	47-126%
2051-24-3	Decachlorobiphenyl	105%	13-144%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-MS	DD04115.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
OP4328-MSD	DD04116.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
F11674-2	DD04114.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152

The QC reported here applies to the following samples:

Method: SW846 8081A

F11674-1, F11674-2, F11674-3, F11674-4

CAS No.	Compound	F11674-2 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
309-00-2	Aldrin	ND		1	0.90	90	0.90	90	0	54-120/20
319-84-6	alpha-BHC	ND		1	1.0	100	1.0	100	0	73-123/20
319-85-7	beta-BHC	ND		1	1.0	100	1.1	110	10	77-120/20
319-86-8	delta-BHC	ND		1	1.2	120	1.2	120	0	44-134/20
58-89-9	gamma-BHC (Lindane)	ND		1	1.1	110	1.1	110	0	80-120/20
5103-71-9	alpha-Chlordane	ND		1	1.0	100	1.0	100	0	72-120/20
5103-74-2	gamma-Chlordane	ND		1	0.98	98	1.0	100	2	70-124/20
60-57-1	Dieldrin	ND		1	1.0	100	1.0	100	0	75-120/20
72-54-8	4,4'-DDD	ND		1	1.1	110	1.2	120	9	66-130/20
72-55-9	4,4'-DDE	ND		1	1.0	100	1.1	110	10	60-133/2?
50-29-3	4,4'-DDT	ND		1	1.1	110	1.1	110	0	67-120/2?
72-20-8	Endrin	ND		1	0.99	99	1.0	100	1	77-155/20
1031-07-8	Endosulfan sulfate	ND		1	1.1	110	1.2	120	9	59-131/20
7421-93-4	Endrin aldehyde	ND		1	0.32	32	0.36	36	12	5-120/58
53494-70-5	Endrin ketone	ND		1	1.2	120	1.2	120	0	70-120/20
959-98-8	Endosulfan-I	ND		1	0.99	99	1.0	100	1	76-120/20
33213-65-9	Endosulfan-II	ND		1	1.1	110	1.1	110	0	77-121/20
76-44-8	Heptachlor	ND		1	0.96	96	0.96	96	0	62-120/20
1024-57-3	Heptachlor epoxide	ND		1	1.0	100	1.0	100	0	77-120/20
72-43-5	Methoxychlor	ND		1	1.1	110	1.2	120	9	65-128/20

CAS No.	Surrogate Recoveries	MS	MSD	F11674-2	Limits
877-09-8	Tetrachloro-m-xylene	88%	81%	80%	47-126%
2051-24-3	Decachlorobiphenyl	80%	86%	63%	13-144%

Semivolatile Surrogate Recovery Summary

Job Number: F11674
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8081A   Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1 [a]	S2 [a]
F11674-1	DD04113.D	87.0	43.0
F11674-2	DD04114.D	80.0	63.0
F11674-3	DD04172.D	67.0	53.0
F11674-3	DD04117.D	45.0*	30.0
F11674-4	DD04118.D	80.0	51.0
OP4328-BS	DD04112.D	86.0	103.0
OP4328-BS2	DD04170.D	82.0	109.0
OP4328-MB	DD04111.D	87.0	105.0
OP4328-MB2	DD04169.D	81.0	105.0
OP4328-MS	DD04115.D	88.0	80.0
OP4328-MSD	DD04116.D	81.0	86.0

Surrogate Compounds	Recovery Limits
S1 = Tetrachloro-m-xylene	47-126%
S2 = Decachlorobiphenyl	13-144%

(a) Recovery from GC signal #1

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4004
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/06/01

Metal	RL	IDL	MB raw	final
Aluminum	200	9.44	18.8	<200
Antimony	5.0	2.56	1.9	<5.0
Arsenic	10	3.15	1.7	<10
Barium	200	.94	-0.16	<200
Beryllium	5.0	.22	0.63	<5.0
Cadmium	5.0	.27	-0.54	<5.0
Calcium	1000	10.2	-5.7	<1000
Chromium	10	.35	0.040	<10
Cobalt	50	.55	-0.42	<50
Copper	25	.71	-0.69	<25
Iron	300	9.02	-4.9	<300
Lead	5.0	1.16	2.4	<5.0
Magnesium	5000	25.5	-3.4	<5000
Manganese	15	.26	-0.19	<15
Molybdenum	50	1.01		
Nickel	40	.8	-0.58	<40
Potassium	5000	49	547	<5000
Selenium	10	2.5	-0.31	<10
Silver	10	.59	0.0	<10
Sodium	5000	173	-84	<5000
Thallium	10	2.07	-10	<10
Tin	50	1.03		
Vanadium	50	.58	0.0	<50
Zinc	20	.36	0.0	<20

Associated samples MP4004: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4004
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date:			12/06/01					12/06/01		
Metal	F11674-1 Original	MS	Spikelot MPFLICP	% Rec	QC Limits	F11674-1 Original	MSD	Spikelot MPFLICP	% Rec	QC Limits
Aluminum	46600	74300	29000	95.5	70-122	46600	77000	29000	104.8	70-122
Antimony	4.0	891	1000	88.7	66-120	4.0	887	1000	88.3	66-120
Arsenic	15.8	3790	4000	94.4	75-120	15.8	3720	4000	92.6	75-120
Barium	391	3990	4000	90.0	72-120	391	3960	4000	89.2	72-120
Beryllium	4.4	99.1	100	94.7	73-120	4.4	97.4	100	93.0	73-120
Cadmium	0.0	89.0	100	89.0	72-120	0.0	87.3	100	87.3	72-120
Calcium	5920	31100	25000	100.7	37-150	5920	30600	25000	98.7	37-150
Chromium	34.1	403	400	92.2	69-122	34.1	400	400	91.5	69-122
Cobalt	3.9	915	1000	91.1	69-120	3.9	902	1000	89.8	69-120
Copper	2.5	481	500	95.7	70-120	2.5	480	500	95.5	70-120
Iron	5720	32900	27000	100.7	72-122	5720	32600	27000	99.6	72-122
Lead	12.5	935	1000	92.3	70-126	12.5	921	1000	90.9	70-126
Magnesium	2060	27000	25000	99.8	73-127	2060	26600	25000	98.2	73-127
Manganese	16.5	957	1000	94.1	74-122	16.5	948	1000	93.2	74-122
Molybdenum										
Nickel	10.4	931	1000	92.1	69-120	10.4	920	1000	91.0	69-120
Potassium	1260	24300	25000	92.2	61-122	1260	24100	25000	91.4	61-122
Selenium	4.7	3870	4000	96.6	74-120	4.7	3770	4000	94.1	74-120
Silver	0.0	91.7	100	91.7	52-126	0.0	90.5	100	90.5	52-126
Sodium	5750	30400	25000	98.6	56-130	5750	30400	25000	98.6	56-130
Thallium	5.5	3560	4000	88.9	80-122	5.5	3530	4000	88.1	80-122
Tin										
Vanadium	41.7	982	1000	94.0	75-122	41.7	973	1000	93.1	75-122
Zinc	24.1	1020	1000	99.6	68-123	24.1	975	1000	95.1	68-123

Associated samples MP4004: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4004
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/06/01

Metal	F11674-1 Original	DUP	RPD	QC Limits
Aluminum	46600	50700	8.4	0-23
Antimony	4.0	0.0	200.0(a)	0-20
Arsenic	15.8	9.0	54.8 (a)	0-29
Barium	391	423	7.9	0-20
Beryllium	4.4	4.4	0.0	0-25
Cadmium	0.0	0.0	NC	0-20
Calcium	5920	6380	7.5	0-20
Chromium	34.1	36.7	7.3	0-47
Cobalt	3.9	3.7	5.3	0-30
Copper	2.5	2.3	8.3	0-21
Iron	5720	6170	7.6	0-23
Lead	12.5	11.4	9.2	0-44
Magnesium	2060	2190	6.1	0-20
Manganese	16.5	17.3	4.7	0-30
Molybdenum				
Nickel	10.4	10.4	0.0	0-56
Potassium	1260	1340	6.2	0-20
Selenium	4.7	0.0	200.0(a)	0-36
Silver	0.0	0.98	200.0(a)	0-20
Sodium	5750	6190	7.4	0-20
Thallium	5.5	3.1	55.8 (a)	0-26
Tin				
Vanadium	41.7	44.8	7.2	0-28
Zinc	24.1	26.5	9.5	0-54

Associated samples MP4004: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) RPD acceptable due to low duplicate and sample concentrations.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4004
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/06/01

Metal	BSP Result	Spikelot MPFLICP	% Rec	QC Limits
Aluminum	30700	29000	105.9	80-120
Antimony	1010	1000	101.0	80-120
Arsenic	4180	4000	104.5	80-120
Barium	3980	4000	99.5	80-120
Beryllium	106	100	106.0	80-120
Cadmium	99.7	100	99.7	80-120
Calcium	27900	25000	111.6	80-120
Chromium	412	400	103.0	80-120
Cobalt	1020	1000	102.0	80-120
Copper	518	500	103.6	80-120
Iron	30400	27000	112.6	80-120
Lead	1030	1000	103.0	80-120
Magnesium	27600	25000	110.4	80-120
Manganese	1050	1000	105.0	80-120
Molybdenum				
Nickel	1030	1000	103.0	80-120
Potassium	25300	25000	101.2	80-120
Selenium	4200	4000	105.0	80-120
Silver	101	100	101.0	80-120
Sodium	24700	25000	98.8	80-120
Thallium	4110	4000	102.8	80-120
Tin				
Vanadium	1050	1000	105.0	80-120
Zinc	1090	1000	109.0	80-120

Associated samples MP4004: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01

Metal	F11612-19 Original	MSD	Spikelot HGFLWS	% Rec	QC Limits
Mercury	0.0	3.2	3	106.7	62-131

Associated samples MP4042: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01

Metal	BSP Result	Spikelot HGFLWS	% Rec	QC Limits
Mercury	3.1	3	103.3	80-120

Associated samples MP4042: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4004
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/06/01

Metal	RL	IDL	MB raw	final
Aluminum	200	9.44	18.8	<200
Antimony	5.0	2.56	1.9	<5.0
Arsenic	10	3.15	1.7	<10
Barium	200	.94	-0.16	<200
Beryllium	5.0	.22	0.63	<5.0
Cadmium	5.0	.27	-0.54	<5.0
Calcium	1000	10.2	-5.7	<1000
Chromium	10	.35	0.040	<10
Cobalt	50	.55	-0.42	<50
Copper	25	.71	-0.69	<25
Iron	300	9.02	-4.9	<300
Lead	5.0	1.16	2.4	<5.0
Magnesium	5000	25.5	-3.4	<5000
Manganese	15	.26	-0.19	<15
Molybdenum	50	1.01		
Nickel	40	.8	-0.58	<40
Potassium	5000	49	547	<5000
Selenium	10	2.5	-0.31	<10
Silver	10	.59	0.0	<10
Sodium	5000	173	-84	<5000
Thallium	10	2.07	-10	<10
Tin	50	1.03		
Vanadium	50	.58	0.0	<50
Zinc	20	.36	0.0	<20

Associated samples MP4004: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4004
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/06/01 12/06/01

Metal	F11674-1 Original	MS	Spikelot MPFLICP	% Rec	QC Limits	F11674-1 Original	MSD	Spikelot MPFLICP	% Rec	QC Limits
Aluminum	46600	74300	29000	95.5	70-122	46600	77000	29000	104.8	70-122
Antimony	4.0	891	1000	88.7	66-120	4.0	887	1000	88.3	66-120
Arsenic	15.8	3790	4000	94.4	75-120	15.8	3720	4000	92.6	75-120
Barium	391	3990	4000	90.0	72-120	391	3960	4000	89.2	72-120
Beryllium	4.4	99.1	100	94.7	73-120	4.4	97.4	100	93.0	73-120
Cadmium	0.0	89.0	100	89.0	72-120	0.0	87.3	100	87.3	72-120
Calcium	5920	31100	25000	100.7	37-150	5920	30600	25000	98.7	37-150
Chromium	34.1	403	400	92.2	69-122	34.1	400	400	91.5	69-122
Cobalt	3.9	915	1000	91.1	69-120	3.9	902	1000	89.8	69-120
Copper	2.5	481	500	95.7	70-120	2.5	480	500	95.5	70-120
Iron	5720	32900	27000	100.7	72-122	5720	32600	27000	99.6	72-122
Lead	12.5	935	1000	92.3	70-126	12.5	921	1000	90.9	70-126
Magnesium	2060	27000	25000	99.8	73-127	2060	26600	25000	98.2	73-127
Manganese	16.5	957	1000	94.1	74-122	16.5	948	1000	93.2	74-122
Molybdenum										
Nickel	10.4	931	1000	92.1	69-120	10.4	920	1000	91.0	69-120
Potassium	1260	24300	25000	92.2	61-122	1260	24100	25000	91.4	61-122
Selenium	4.7	3870	4000	96.6	74-120	4.7	3770	4000	94.1	74-120
Silver	0.0	91.7	100	91.7	52-126	0.0	90.5	100	90.5	52-126
Sodium	5750	30400	25000	98.6	56-130	5750	30400	25000	98.6	56-130
Thallium	5.5	3560	4000	88.9	80-122	5.5	3530	4000	88.1	80-122
Tin										
Vanadium	41.7	982	1000	94.0	75-122	41.7	973	1000	93.1	75-122
Zinc	24.1	1020	1000	99.6	68-123	24.1	975	1000	95.1	68-123

Associated samples MP4004: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4004
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/06/01

Metal	F11674-1 Original	DUP	RPD	QC Limits
Aluminum	46600	50700	8.4	0-23
Antimony	4.0	0.0	200.0(a)	0-20
Arsenic	15.8	9.0	54.8 (a)	0-29
Barium	391	423	7.9	0-20
Beryllium	4.4	4.4	0.0	0-25
Cadmium	0.0	0.0	NC	0-20
Calcium	5920	6380	7.5	0-20
Chromium	34.1	36.7	7.3	0-47
Cobalt	3.9	3.7	5.3	0-30
Copper	2.5	2.3	8.3	0-21
Iron	5720	6170	7.6	0-23
Lead	12.5	11.4	9.2	0-44
Magnesium	2060	2190	6.1	0-20
Manganese	16.5	17.3	4.7	0-30
Molybdenum				
Nickel	10.4	10.4	0.0	0-56
Potassium	1260	1340	6.2	0-20
Selenium	4.7	0.0	200.0(a)	0-36
Silver	0.0	0.98	200.0(a)	0-20
Sodium	5750	6190	7.4	0-20
Thallium	5.5	3.1	55.8 (a)	0-26
Tin				
Vanadium	41.7	44.8	7.2	0-28
Zinc	24.1	26.5	9.5	0-54

Associated samples MP4004: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) RPD acceptable due to low duplicate and sample concentrations.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4004
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/06/01

Metal	BSP Result	Spikelot MPFLICP	% Rec	QC Limits
Aluminum	30700	29000	105.9	80-120
Antimony	1010	1000	101.0	80-120
Arsenic	4180	4000	104.5	80-120
Barium	3980	4000	99.5	80-120
Beryllium	106	100	106.0	80-120
Cadmium	99.7	100	99.7	80-120
Calcium	27900	25000	111.6	80-120
Chromium	412	400	103.0	80-120
Cobalt	1020	1000	102.0	80-120
Copper	518	500	103.6	80-120
Iron	30400	27000	112.6	80-120
Lead	1030	1000	103.0	80-120
Magnesium	27600	25000	110.4	80-120
Manganese	1050	1000	105.0	80-120
Molybdenum				
Nickel	1030	1000	103.0	80-120
Potassium	25300	25000	101.2	80-120
Selenium	4200	4000	105.0	80-120
Silver	101	100	101.0	80-120
Sodium	24700	25000	98.8	80-120
Thallium	4110	4000	102.8	80-120
Tin				
Vanadium	1050	1000	105.0	80-120
Zinc	1090	1000	109.0	80-120

Associated samples MP4004: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4004
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/06/01

Metal	F11674-1 Original	SDL 1:5	RPD	QC Limits
Aluminum	46600	49600	6.5	0-10
Antimony	3.95	13.3	235.7(a)	0-10
Arsenic	15.8	0.00	100.0(a)	0-10
Barium	391	430	9.9	0-10
Beryllium	4.38	8.35	90.6 (a)	0-10
Cadmium	0.00	0.00	NC	0-10
Calcium	5920	6940	17.1*(b)	0-10
Chromium	34.1	37.6	10.0	0-10
Cobalt	3.91	3.54	9.5	0-10
Copper	2.47	0.00	100.0(a)	0-10
Iron	5720	6340	10.9*(b)	0-10
Lead	12.5	24.6	96.6 (a)	0-10
Magnesium	2060	2290	11.4*(b)	0-10
Manganese	16.5	17.8	8.1	0-10
Molybdenum				
Nickel	10.4	13.0	25.9 (a)	0-10
Potassium	1260	3670	190.7(a)	0-10
Selenium	4.67	0.00	100.0(a)	0-10
Silver	0.00	0.00	NC	0-10
Sodium	5750	5640	1.9	0-10
Thallium	5.52	0.00	100.0(a)	0-10
Tin				
Vanadium	41.7	46.2	10.7*(b)	0-10
Zinc	24.1	29.2	21.0*(b)	0-10

Associated samples MP4004: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
(b) Serial dilution indicates possible matrix interference.

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01

Metal	RL	IDL	MB raw	final
Mercury	1.0	.06	-0.19	<1.0

Associated samples MP4042: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01 12/17/01

Metal	F11612-19 Original	DUP	RPD	QC Limits	F11612-19 Original	MS	Spikelot HGFLWS	% Rec	QC Limits
Mercury	0.0	0.0	NC	0-20	0.0	3.2	3	106.7	62-131

Associated samples MP4042: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01

Metal	F11612-19 Original	MSD	Spikelot HGFLWS	% Rec	QC Limits
Mercury	0.0	3.2	3	106.7	62-131

Associated samples MP4042: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01

Metal	BSP Result	Spikelot HGFLWS	% Rec	QC Limits
Mercury	3.1	3	103.3	80-120

Associated samples MP4042: F11674-1, F11674-2, F11674-3, F11674-4, F11674-1A, F11674-3A, F11674-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

Method Blank Summary

Job Number: F11674
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP633-MB2	GG02999.D	1	12/10/01	JH	12/08/01	OP633	GGG109

The QC reported here applies to the following samples: **Method:** SW846 8151

F11674-1, F11674-3, F11674-4

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	1.0	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	ug/l	
93-76-5	2,4,5-T	ND	0.20	ug/l	

CAS No.	Surrogate Recoveries		Limits
19719-28-9	2,4-DCAA	70%	10-150%

Method Blank Summary

Job Number: F11674
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP633-MB	GG03017.D	1	12/11/01	JH	12/07/01	OP633	GGG109

The QC reported here applies to the following samples: **Method:** SW846 8151

OP633-MS, OP633-MSD

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	1.0	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	ug/l	
93-76-5	2,4,5-T	ND	0.20	ug/l	

CAS No.	Surrogate Recoveries		Limits
19719-28-9	2,4-DCAA	80%	10-150%

Method Blank Summary

Job Number: F11674
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP632-MB	GG02961.D	1	12/09/01	JH	12/07/01	OP632	GGG108

The QC reported here applies to the following samples: **Method:** SW846 8151

F11674-2

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	1.0	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	ug/l	
93-76-5	2,4,5-T	ND	0.20	ug/l	

CAS No.	Surrogate Recoveries		Limits
19719-28-9	2,4-DCAA	62%	10-150%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11674
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP632-MS	GG02968.D	1	12/09/01	JH	12/07/01	OP632	GGG108
OP632-MSD	GG02969.D	1	12/09/01	JH	12/07/01	OP632	GGG108
F11672-1	GG02966.D	1	12/09/01	JH	12/07/01	OP632	GGG108

The QC reported here applies to the following samples: **Method:** SW846 8151

F11674-2

CAS No.	Compound	F11672-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
94-75-7	2,4-D	ND		4	3.4	85	3.4	85	0	50-150/30 [a]
93-72-1	2,4,5-TP (Silvex)	ND		0.8	0.55	69	0.57	71	4	50-150/30 [a]
93-76-5	2,4,5-T	ND		0.8	0.48	60	0.56	70	15	50-150/30 [a]

CAS No.	Surrogate Recoveries	MS	MSD	F11672-1	Limits
19719-28-9	2,4-DCAA	83%	87%	69%	10-150%

(a) Advisory control limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11674
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP633-MS	GG03044.D	1	12/11/01	JH	12/07/01	OP633	GGG109
OP633-MSD	GG03045.D	1	12/11/01	JH	12/07/01	OP633	GGG109
F11691-1	GG03043.D	1	12/11/01	JH	12/07/01	OP633	GGG109

The QC reported here applies to the following samples: **Method:** SW846 8151

F11674-1, F11674-3, F11674-4

CAS No.	Compound	F11691-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
94-75-7	2,4-D	ND		4	4.3	108	4.4	110	2	50-150/30 [a]
93-72-1	2,4,5-TP (Silvex)	ND		0.8	0.59	74	0.56	70	5	50-150/30 [a]
93-76-5	2,4,5-T	ND		0.8	0.56	70	0.53	66	6	50-150/30 [a]

CAS No.	Surrogate Recoveries	MS	MSD	F11691-1	Limits
19719-28-9	2,4-DCAA	93%	94%	65%	10-150%

(a) Advisory control limits.

Blank Spike Summary

Job Number: F11674
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP632-BS	GG02960.D	1	12/09/01	JH	12/07/01	OP632	GGG108

The QC reported here applies to the following samples: **Method:** SW846 8151

F11674-2

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
94-75-7	2,4-D	2	2.0	100	50-150 [a]
93-72-1	2,4,5-TP (Silvex)	0.4	0.35	88	50-150 [a]
93-76-5	2,4,5-T	0.4	0.32	80	50-150 [a]

CAS No.	Surrogate Recoveries	BSP	Limits
19719-28-9	2,4-DCAA	88%	10-150%

(a) Advisory control limits.

Blank Spike Summary

Job Number: F11674
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP633-BS2	GG02998.D	1	12/10/01	JH	12/08/01	OP633	GGG109

The QC reported here applies to the following samples: **Method:** SW846 8151

F11674-1, F11674-3, F11674-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
94-75-7	2,4-D	2	1.9	95	50-150 [a]
93-72-1	2,4,5-TP (Silvex)	0.4	0.30	75	50-150 [a]
93-76-5	2,4,5-T	0.4	0.28	70	50-150 [a]

CAS No.	Surrogate Recoveries	BSP	Limits
19719-28-9	2,4-DCAA	80%	10-150%

(a) Advisory control limits.

Semivolatile Surrogate Recovery Summary

Job Number: F11674
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Method: SW846 8151 **Matrix:** AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1 [a]
F11674-1	GG03026.D	60.0
F11674-2	GG02967.D	90.0
F11674-3	GG03027.D	69.0
F11674-4	GG03028.D	55.0
OP632-BS	GG02960.D	88.0
OP632-MB	GG02961.D	62.0
OP632-MS	GG02968.D	83.0
OP632-MSD	GG02969.D	87.0
OP633-BS2	GG02998.D	80.0
OP633-MB2	GG02999.D	70.0
OP633-MS	GG03044.D	93.0
OP633-MSD	GG03045.D	94.0
OP633-MB	GG03017.D	80.0

Surrogate Compounds	Recovery Limits
S1 = 2,4-DCAA	10-150%

(a) Recovery from GC signal #1

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

Analyte	Batch ID	RL	MB Result	Units	BSP %Recov	QC Limits
Nitrogen, Nitrate	GP2780/GN8525	0.10	<0.10	mg/l	94.0	90-110%
Nitrogen, Nitrite	GP2780/GN8525	0.10	<0.10	mg/l	92.0	90-110%

Associated Samples:
Batch GP2780: F11674-1, F11674-2, F11674-3, F11674-4

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Nitrogen, Nitrate	GP2780/GN8525	F11661-1	mg/l	0.52	1	1.5	98.0	80-120%
Nitrogen, Nitrate	GP2780/GN8525	F11661-1	mg/l	0.52	1	1.5	98.0	80-120%
Nitrogen, Nitrite	GP2780/GN8525	F11661-1	mg/l	<0.010	1	1.2	120.0	80-120%
Nitrogen, Nitrite	GP2780/GN8525	F11661-1	mg/l	<0.010	1	1.2	120.0	80-120%

Associated Samples:
Batch GP2780: F11674-1, F11674-2, F11674-3, F11674-4

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: F11674
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Nitrogen, Nitrate	GP2780/GN8525	F11661-1	mg/l	0.52	0.53	1.9	0-20%
Nitrogen, Nitrite	GP2780/GN8525	F11661-1	mg/l	<0.010	<0.010	0.0	0-20%

Associated Samples:
Batch GP2780: F11674-1, F11674-2, F11674-3, F11674-4

2 COOLERS

ACCUTEST®

CHAIN OF CUSTODY

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #: F11679

ACCUTEST QUOTE #: 112601A-JF

CLIENT INFORMATION

NAME: KUBAL-FURR + ASSOCIATES
ADDRESS: PO BOX 80247
CITY: SIMPSONVILLE STATE: SC ZIP: 29650
SEND REPORT TO: DIANE ROSSETER
PHONE #: (864) 962-9490

FACILITY INFORMATION

OHNI - OAK HAMMOCK
PROJECT NAME
LOCATION: ALACHUA, FL
PROJECT NO.: 480H01
FAX #: (864) 962-5309

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	COLLECTION DATE	COLLECTION TIME	SAMPLED BY	MATRIX	# OF BOTTLES	HCl	NaOH	HNO3	H2SO4	NONE	TCL VOCs	TCL SVOCs	TCL PESTICIDES	TAL METALS (TOTAL)	HERBICIDES	NITRATE	TAL METALS (DISSOLVED)	LAB USE ONLY
	DP-1	12/3/01	1130	GK/SN	GW	12	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	
	DP-2	12/3/01	1340	GK/SN	GW	11	✓		✓		✓	✓	✓	✓	✓	✓	✓		
	DP-10	12/3/01	1522	GK/SN	GW	12	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	
	DP-22	12/3/01	1650	GK/SN	GW	12	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	
	TRIP BLANK	11/29/01	0815			2	✓					✓							

DATA TURNAROUND INFORMATION

- [x] STANDARD
- [ ] 48 HOUR RUSH
- [ ] 24 HOUR EMERGENCY
- [ ] OTHER

APPROVED BY:

EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

- [ ] STANDARD
- [ ] COMMERCIAL "B"
- [ ] DISK DELIVERABLE
- [ ] STATE FORMS
- [ ] OTHER (SPECIFY)

COMMENTS/REMARKS

EXTENDED TCL LIST AS IN OLM04.2
SEE TASKORDER 480H01 ADDENDUM
PLEASE FAX COPY OF CHAIN TO SIMPSONVILLE

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY	DATE TIME	RECEIVED BY	RELINQUISHED BY	DATE TIME	RECEIVED BY
1. (signature) (SAMPLER)	12/3/01 2306	1. SECURE AREA	2.		2. (signature) 12-4-01 12:00
3.		3.	4.		4.
5.		5.	SEAL #	PRESERVE WHERE APPLICABLE ☐	ON ICE ☐ 3.8 TEMPERATURE 4.0 C

Southeast
ACCUTEST

01/23/02

Technical Report for

Kubal-Furr & Associates

Omni-Oak Hammock

48OH01 HOLOPAW,FL

Accutest Job Number: F11691

Report to:

Kubal-Furr & Associates

Drosseter@ix.netcom.com

ATTN: Diane Rosseter

Total number of pages in report: 65

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Sample Summary

Kubal-Furr & Associates

Job No: F11691

Omni-Oak Hammock
Project No: 48OH01 HOLOPAW,FL

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
F11691-1	12/04/01	16:15	GK	12/06/01	AQ	Ground Water	DP-19
F11691-2	12/04/01	14:05	GK	12/06/01	AQ	Ground Water	DP-11
F11691-3	12/04/01	12:40	GK	12/06/01	AQ	Ground Water	DP-12
F11691-4	12/04/01	10:40	GK	12/06/01	AQ	Ground Water	DP-23
F11691-5	12/04/01	09:05	GK	12/06/01	AQ	Ground Water	DP-9
F11691-6	12/04/01	00:00	GK	12/06/01	AQ	Ground Water	BLIND DUPLICATE
F11691-7	12/04/01	00:00	GK	12/06/01	AQ	Trip Blank Water	TRIP BLANK
F11691-8	12/05/01	08:35	GK	12/06/01	AQ	Ground Water	DP-18
F11691-2A	12/04/01	14:05	GK	12/06/01	AQ	Groundwater Filtered	DP-11
F11691-3A	12/04/01	12:40	GK	12/06/01	AQ	Groundwater Filtered	DP-12
F11691-4A	12/04/01	10:40	GK	12/06/01	AQ	Groundwater Filtered	DP-23
F11691-5A	12/04/01	09:05	GK	12/06/01	AQ	Groundwater Filtered	DP-9
F11691-8A	12/05/01	08:35	GK	12/06/01	AQ	Groundwater Filtered	DP-18

Report of Analysis

Client Sample ID:	DP-19			
Lab Sample ID:	F11691-1		Date Sampled:	12/04/01
Matrix:	AQ - Ground Water		Date Received:	12/06/01
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0007500.D	1	12/13/01	JG	n/a	n/a	VB321
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-19			
Lab Sample ID:	F11691-1		Date Sampled:	12/04/01
Matrix:	AQ - Ground Water		Date Received:	12/06/01
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		80-120%
17060-07-0	1,2-Dichloroethane-D4	98%		80-120%
2037-26-5	Toluene-D8	97%		80-120%
460-00-4	4-Bromofluorobenzene	106%		80-120%

ND = Not detected
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J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-19		
Lab Sample ID:	F11691-1	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009929.D	1	12/10/01	ME	12/07/01	OP4336	SL565
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	3.6	5.0	ug/l	J
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-19		
Lab Sample ID:	F11691-1	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	50%		20-125%
4165-62-2	Phenol-d5	36%		10-125%
118-79-6	2,4,6-Tribromophenol	86%		35-140%
4165-60-0	Nitrobenzene-d5	74%		46-125%
321-60-8	2-Fluorobiphenyl	69%		46-125%
1718-51-0	Terphenyl-d14	89%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-19		
Lab Sample ID:	F11691-1	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04122.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2							

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	88%		47-126%
2051-24-3	Decachlorobiphenyl	82%		13-144%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-19		
Lab Sample ID:	F11691-1	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG03043.D	1	12/11/01	ATX	12/07/01	T:OP633	T:GGG109
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	1.0	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	ug/l	
93-76-5	2,4,5-T	ND	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	65%		10-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-19		
Lab Sample ID:	F11691-1	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	350	200	9.4	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Barium	9.1 B	200	0.94	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.34 B	5.0	0.22	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Calcium	20900	1000	10	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Chromium	0.99 B	10	0.35	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cobalt	0.55 U	50	0.55	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Copper	0.71 U	25	0.71	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Iron	1080	300	9.0	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Lead	1.7 B	5.0	1.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Magnesium	1460 B	5000	26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Manganese	20.5	15	0.26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	0.80 U	40	0.80	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Potassium	727 B	5000	49	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Selenium	2.5 U	10	2.5	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Sodium	9260	5000	170	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Vanadium	1.4 B	50	0.58	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Zinc	1.1 B	20	0.36	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-19		
Lab Sample ID:	F11691-1	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/06/01	SJL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	DP-11		
Lab Sample ID:	F11691-2	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0007501.D	1	12/13/01	JG	n/a	n/a	VB321
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-11		
Lab Sample ID:	F11691-2	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		80-120%
17060-07-0	1,2-Dichloroethane-D4	99%		80-120%
2037-26-5	Toluene-D8	97%		80-120%
460-00-4	4-Bromofluorobenzene	102%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-11		
Lab Sample ID:	F11691-2	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009932.D	1	12/10/01	ME	12/07/01	OP4336	SL565
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-11		
Lab Sample ID:	F11691-2	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	37%		20-125%
4165-62-2	Phenol-d5	27%		10-125%
118-79-6	2,4,6-Tribromophenol	73%		35-140%
4165-60-0	Nitrobenzene-d5	85%		46-125%
321-60-8	2-Fluorobiphenyl	73%		46-125%
1718-51-0	Terphenyl-d14	79%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-11		
Lab Sample ID:	F11691-2	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04123.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2							

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.10	ug/l	
319-84-6	alpha-BHC	ND	0.10	ug/l	
319-85-7	beta-BHC	ND	0.10	ug/l	
319-86-8	delta-BHC	ND	0.10	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.10	ug/l	
5103-71-9	alpha-Chlordane	ND	0.20	ug/l	
5103-74-2	gamma-Chlordane	ND	0.20	ug/l	
60-57-1	Dieldrin	ND	0.10	ug/l	
72-54-8	4,4'-DDD	ND	0.20	ug/l	
72-55-9	4,4'-DDE	ND	0.20	ug/l	
50-29-3	4,4'-DDT	ND	0.20	ug/l	
72-20-8	Endrin	ND	0.20	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.20	ug/l	
7421-93-4	Endrin aldehyde	ND	0.20	ug/l	
53494-70-5	Endrin ketone	ND	0.20	ug/l	
959-98-8	Endosulfan-I	ND	0.10	ug/l	
33213-65-9	Endosulfan-II	ND	0.20	ug/l	
76-44-8	Heptachlor	ND	0.10	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.10	ug/l	
72-43-5	Methoxychlor	ND	0.40	ug/l	
8001-35-2	Toxaphene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	72%		47-126%
2051-24-3	Decachlorobiphenyl	15%		13-144%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-11		
Lab Sample ID:	F11691-2	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG03029.D	1	12/11/01	ATX	12/08/01	T:OP633	T:GGG109
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	10	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	2.0	ug/l	
93-76-5	2,4,5-T	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	49%		10-150%

(a) Elevated reporting limits due to matrix interference, dilution required during sample prep.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-11		
Lab Sample ID:	F11691-2	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	191000	200	9.4	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Arsenic	81.3	10	3.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Barium	2150	200	0.94	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Beryllium	18.6	5.0	0.22	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cadmium	4.2 B	5.0	0.27	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Calcium	28900	1000	10	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Chromium	224	10	0.35	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cobalt	18.0 B	50	0.55	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Copper	18.5 B	25	0.71	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Iron	34300	300	9.0	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Lead	71.3	5.0	1.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Magnesium	4380 B	5000	26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Manganese	35.7	15	0.26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	44.2	40	0.80	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Potassium	9290	5000	49	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Selenium	13.0	10	2.5	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Sodium	8320	5000	170	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Vanadium	266	50	0.58	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Zinc	91.2	20	0.36	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-11		
Lab Sample ID:	F11691-2	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/06/01	SJL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	DP-12			
Lab Sample ID:	F11691-3		Date Sampled:	12/04/01
Matrix:	AQ - Ground Water		Date Received:	12/06/01
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0007502.D	1	12/13/01	JG	n/a	n/a	VB321
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-12		
Lab Sample ID:	F11691-3	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		80-120%
17060-07-0	1,2-Dichloroethane-D4	99%		80-120%
2037-26-5	Toluene-D8	98%		80-120%
460-00-4	4-Bromofluorobenzene	105%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-12		
Lab Sample ID:	F11691-3	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009933.D	1	12/10/01	ME	12/07/01	OP4336	SL565
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-12		
Lab Sample ID:	F11691-3	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	38%		20-125%
4165-62-2	Phenol-d5	28%		10-125%
118-79-6	2,4,6-Tribromophenol	75%		35-140%
4165-60-0	Nitrobenzene-d5	77%		46-125%
321-60-8	2-Fluorobiphenyl	72%		46-125%
1718-51-0	Terphenyl-d14	89%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-12		
Lab Sample ID:	F11691-3	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04124.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2							

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	87%		47-126%
2051-24-3	Decachlorobiphenyl	26%		13-144%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-12		
Lab Sample ID:	F11691-3	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG03030.D	1	12/11/01	ATX	12/08/01	T:OP633	T:GGC109
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	10	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	2.0	ug/l	
93-76-5	2,4,5-T	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	81%		10-150%

(a) Elevated reporting limits due to matrix interference, dilution required during sample prep.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-12		
Lab Sample ID:	F11691-3	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	16300	200	9.4	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Barium	35.7 B	200	0.94	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.64 B	5.0	0.22	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Calcium	5810	1000	10	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Chromium	18.1	10	0.35	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cobalt	2.6 B	50	0.55	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Copper	1.9 B	25	0.71	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Iron	3430	300	9.0	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Lead	12.2	5.0	1.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Magnesium	2510 B	5000	26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Manganese	9.5 B	15	0.26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	5.2 B	40	0.80	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Potassium	7120	5000	49	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Selenium	2.5 U	10	2.5	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Sodium	13700	5000	170	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Vanadium	23.4 B	50	0.58	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Zinc	19.0 B	20	0.36	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-12		
Lab Sample ID:	F11691-3	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/06/01 SJL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	DP-23		
Lab Sample ID:	F11691-4	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0007503.D	1	12/13/01	JG	n/a	n/a	VB321
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-23		
Lab Sample ID:	F11691-4	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	2.5	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		80-120%
17060-07-0	1,2-Dichloroethane-D4	99%		80-120%
2037-26-5	Toluene-D8	97%		80-120%
460-00-4	4-Bromofluorobenzene	106%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-23		
Lab Sample ID:	F11691-4	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009934.D	1	12/10/01	ME	12/07/01	OP4336	SL565
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-23		
Lab Sample ID:	F11691-4	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	31%		20-125%
4165-62-2	Phenol-d5	23%		10-125%
118-79-6	2,4,6-Tribromophenol	67%		35-140%
4165-60-0	Nitrobenzene-d5	67%		46-125%
321-60-8	2-Fluorobiphenyl	63%		46-125%
1718-51-0	Terphenyl-d14	76%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-23		
Lab Sample ID:	F11691-4	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04125.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2							

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	77%		47-126%
2051-24-3	Decachlorobiphenyl	31%		13-144%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-23		
Lab Sample ID:	F11691-4	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG03031.D	1	12/11/01	ATX	12/08/01	T:OP633	T:GGG109
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	10	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	2.0	ug/l	
93-76-5	2,4,5-T	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	79%		10-150%

(a) Elevated reporting limits due to matrix interference, dilution required during sample prep.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-23		
Lab Sample ID:	F11691-4	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	71800	200	9.4	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Arsenic	27.3	10	3.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Barium	1430	200	0.94	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Beryllium	11.1	5.0	0.22	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cadmium	3.9 B	5.0	0.27	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Calcium	23300	1000	10	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Chromium	104	10	0.35	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cobalt	15.4 B	50	0.55	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Copper	5.5 B	25	0.71	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Iron	16500	300	9.0	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Lead	24.9	5.0	1.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Magnesium	3640 B	5000	26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Manganese	27.4	15	0.26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	28.2 B	40	0.80	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Potassium	5140	5000	49	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Selenium	3.2 B	10	2.5	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Sodium	9760	5000	170	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Vanadium	131	50	0.58	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Zinc	46.7	20	0.36	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-23		
Lab Sample ID:	F11691-4	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/06/01	SJL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	DP-9		
Lab Sample ID:	F11691-5	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0007504.D	1	12/13/01	JG	n/a	n/a	VB321
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-9		
Lab Sample ID:	F11691-5	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		80-120%
17060-07-0	1,2-Dichloroethane-D4	99%		80-120%
2037-26-5	Toluene-D8	98%		80-120%
460-00-4	4-Bromofluorobenzene	107%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-9		
Lab Sample ID:	F11691-5	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009935.D	1	12/10/01	ME	12/07/01	OP4336	SL565
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-9			
Lab Sample ID:	F11691-5		Date Sampled:	12/04/01
Matrix:	AQ - Ground Water		Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	29%		20-125%
4165-62-2	Phenol-d5	20%		10-125%
118-79-6	2,4,6-Tribromophenol	60%		35-140%
4165-60-0	Nitrobenzene-d5	72%		46-125%
321-60-8	2-Fluorobiphenyl	67%		46-125%
1718-51-0	Terphenyl-d14	69%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-9		
Lab Sample ID:	F11691-5	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04126.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2							

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	66%		47-126%
2051-24-3	Decachlorobiphenyl	16%		13-144%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-9		
Lab Sample ID:	F11691-5	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG03032.D	1	12/11/01	ATX	12/08/01	T:OP633	T:GGG109
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	10	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	2.0	ug/l	
93-76-5	2,4,5-T	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	42%		10-150%

(a) Elevated reporting limits due to matrix interference, dilution required during sample prep.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-9			
Lab Sample ID:	F11691-5		Date Sampled:	12/04/01
Matrix:	AQ - Ground Water		Date Received:	12/06/01
			Percent Solids:	n/a
Project:	Omni-Oak Hammock			

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	82500	200	9.4	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Arsenic	28.5	10	3.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Barium	1140	200	0.94	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Beryllium	14.9	5.0	0.22	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cadmium	2.1 B	5.0	0.27	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Calcium	33200	1000	10	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Chromium	108	10	0.35	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cobalt	11.8 B	50	0.55	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Copper	3.7 B	25	0.71	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Iron	13100	300	9.0	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Lead	38.5	5.0	1.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Magnesium	4080 B	5000	26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Manganese	18.6	15	0.26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/17/01	12/18/01	LIR	SW846 7470A	EPA 245.1
Nickel	31.3 B	40	0.80	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Potassium	8260	5000	49	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Selenium	5.4 B	10	2.5	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Sodium	10400	5000	170	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Vanadium	142	50	0.58	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Zinc	29.1	20	0.36	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-9		
Lab Sample ID:	F11691-5	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/06/01	SJL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BLIND DUPLICATE		
Lab Sample ID:	F11691-6	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0007505.D	1	12/13/01	JG	n/a	n/a	VB321
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BLIND DUPLICATE		
Lab Sample ID:	F11691-6	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		80-120%
17060-07-0	1,2-Dichloroethane-D4	100%		80-120%
2037-26-5	Toluene-D8	100%		80-120%
460-00-4	4-Bromofluorobenzene	104%		80-120%

ND = Not detected
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J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BLIND DUPLICATE		
Lab Sample ID:	F11691-6	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009936.D	1	12/10/01	ME	12/07/01	OP4336	SL565
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	2.9	5.0	ug/l	J
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BLIND DUPLICATE		
Lab Sample ID:	F11691-6	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	39%		20-125%
4165-62-2	Phenol-d5	28%		10-125%
118-79-6	2,4,6-Tribromophenol	94%		35-140%
4165-60-0	Nitrobenzene-d5	61%		46-125%
321-60-8	2-Fluorobiphenyl	60%		46-125%
1718-51-0	Terphenyl-d14	91%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BLIND DUPLICATE		
Lab Sample ID:	F11691-6	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04127.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2							

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	87%		47-126%
2051-24-3	Decachlorobiphenyl	80%		13-144%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BLIND DUPLICATE		
Lab Sample ID:	F11691-6	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG03046.D	1	12/11/01	ATX	12/07/01	T:OP633	T:GGG109
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	1.0	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	ug/l	
93-76-5	2,4,5-T	ND	0.20	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	59%		10-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	BLIND DUPLICATE		
Lab Sample ID:	F11691-6	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	314	200	9.4	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Barium	9.9 B	200	0.94	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.36 B	5.0	0.22	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Calcium	22100	1000	10	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Chromium	0.93 B	10	0.35	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cobalt	0.55 U	50	0.55	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Copper	0.71 U	25	0.71	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Iron	1170	300	9.0	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Lead	2.0 B	5.0	1.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Magnesium	1580 B	5000	26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Manganese	21.7	15	0.26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/20/01	12/20/01	LIR	SW846 7470A	EPA 245.1
Nickel	0.80 U	40	0.80	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Potassium	747 B	5000	49	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Selenium	2.5 U	10	2.5	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Sodium	10100	5000	170	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Vanadium	1.6 B	50	0.58	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Zinc	0.65 B	20	0.36	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	BLIND DUPLICATE		
Lab Sample ID:	F11691-6	Date Sampled:	12/04/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/06/01 SJL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	F11691-7	Date Sampled:	12/04/01
Matrix:	AQ - Trip Blank Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0007497.D	1	12/13/01	JG	n/a	n/a	VB321
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK			
Lab Sample ID:	F11691-7		Date Sampled:	12/04/01
Matrix:	AQ - Trip Blank Water		Date Received:	12/06/01
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock			

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		80-120%
17060-07-0	1,2-Dichloroethane-D4	101%		80-120%
2037-26-5	Toluene-D8	97%		80-120%
460-00-4	4-Bromofluorobenzene	103%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-18		
Lab Sample ID:	F11691-8	Date Sampled:	12/05/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	B0007506.D	1	12/13/01	JG	n/a	n/a	VB321
Run #2							

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	25.2	50	ug/l	J
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-18		
Lab Sample ID:	F11691-8	Date Sampled:	12/05/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

VOA CLP List

CAS No.	Compound	Result	RL	Units	Q

Method: SW846 8260B Percent Solids: n/a
Project: Omni-Oak Hammock

VOA CLP List

CAS No. Compound Result RL Units Q

Method: SW846 8260B Percent Solids: n/a
Project: Omni-Oak Hammock

VOA CLP List

CAS No. Compound Result RL Units Q

Method: SW846 8260B Percent Solids: n/a
Project: Omni-Oak Hammock

VOA CLP List

CAS No. Compound Result RL Units Q

Method: SW846 8260B Percent Solids: n/a
Project: Omni-Oak Hammock

VOA CLP List

CAS No. Compound Result RL Units Q

Method: SW846 8260B Percent Solids: n/a
Project: Omni-Oak Hammock

VOA CLP List

CAS No. Compound Result RL Units Q

Method: SW846 8260B Percent Solids: n/a
Project: Omni-Oak Hammock

VOA CLP List

CAS No. Compound Result RL Units Q

Method: SW846 8260B Percent Solids: n/a
Project: Omni-Oak Hammock

VOA CLP List

CAS No. Compound Result RL Units Q

Method: SW846 8260B Percent Solids: n/a
Project: Omni-Oak Hammock

Report of Analysis

Client Sample ID:	DP-18		
Lab Sample ID:	F11691-8	Date Sampled:	12/05/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L009937.D	1	12/10/01	ME	12/07/01	OP4336	SL565
Run #2							

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-18		
Lab Sample ID:	F11691-8	Date Sampled:	12/05/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8270C SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

ABN CLP List

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	30%		20-125%
4165-62-2	Phenol-d5	22%		10-125%
118-79-6	2,4,6-Tribromophenol	67%		35-140%
4165-60-0	Nitrobenzene-d5	72%		46-125%
321-60-8	2-Fluorobiphenyl	74%		46-125%
1718-51-0	Terphenyl-d14	63%		49-126%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-18		
Lab Sample ID:	F11691-8	Date Sampled:	12/05/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8081A SW846 3510C	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DD04128.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
Run #2	DD04171.D	1	12/12/01	SKW	12/11/01	OP4328	GDD154

Pesticide TCL List

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	49%	57%	47-126%
2051-24-3	Decachlorobiphenyl	8%	9% [a]	13-144%

(a) Confirmed by re-extraction and reanalysis.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DP-18		
Lab Sample ID:	F11691-8	Date Sampled:	12/05/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
Method:	SW846 8151	Percent Solids:	n/a
Project:	Omni-Oak Hammock		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	GG03033.D	1	12/11/01	ATX	12/08/01	T:OP633	T:GGG109
Run #2							

Herbicide List

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	10	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	2.0	ug/l	
93-76-5	2,4,5-T	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
19719-28-9	2,4-DCAA	27%		10-150%

(a) Elevated reporting limits due to matrix interference, dilution required during sample prep.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: DP-18
Lab Sample ID: F11691-8
Matrix: AQ - Ground Water
Date Sampled: 12/05/01
Date Received: 12/06/01
Percent Solids: n/a
Project: Omni-Oak Hammock

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	190000	200	9.4	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Arsenic	46.8	10	3.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Barium	1950	200	0.94	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Beryllium	9.2	5.0	0.22	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cadmium	5.2	5.0	0.27	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Calcium	40500	1000	10	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Chromium	221	10	0.35	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Cobalt	12.5 B	50	0.55	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Copper	22.5 B	25	0.71	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Iron	14600	300	9.0	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Lead	103	5.0	1.2	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Magnesium	3330 B	5000	26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Manganese	18.1	15	0.26	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/20/01	12/20/01	LIR	SW846 7470A	EPA 245.1
Nickel	66.6	40	0.80	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Potassium	30800	5000	49	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Selenium	18.4	10	2.5	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Sodium	35500	5000	170	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Vanadium	286	50	0.58	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A
Zinc	56.4	20	0.36	ug/l	1	12/07/01	12/10/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit
U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-18		
Lab Sample ID:	F11691-8	Date Sampled:	12/05/01
Matrix:	AQ - Ground Water	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	12/06/01	SJL	EPA 300/SW846 9056

RL = Reporting Limit

Report of Analysis

Client Sample ID:	DP-11		
Lab Sample ID:	F11691-2A	Date Sampled:	12/04/01
Matrix:	AQ - Groundwater Filtered	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	4950	200	9.4	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Arsenic	21.0	10	3.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Barium	60.5 B	200	0.94	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.39 B	5.0	0.22	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Calcium	6310	1000	10	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Chromium	13.9	10	0.35	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cobalt	0.91 B	50	0.55	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Copper	11.6 B	25	0.71	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Iron	695	300	9.0	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Lead	3.1 B	5.0	1.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Magnesium	1650 B	5000	26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Manganese	6.5 B	15	0.26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/20/01	12/20/01	LIR	SW846 7470A	EPA 245.1
Nickel	2.1 B	40	0.80	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Potassium	6120	5000	49	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Selenium	2.5 U	10	2.5	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Sodium	9900	5000	170	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Vanadium	67.8	50	0.58	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Zinc	28.2	20	0.36	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-12		
Lab Sample ID:	F11691-3A	Date Sampled:	12/04/01
Matrix:	AQ - Groundwater Filtered	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	2410	200	9.4	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Barium	15.2 B	200	0.94	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.22 U	5.0	0.22	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Calcium	3870	1000	10	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Chromium	5.7 B	10	0.35	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cobalt	0.68 B	50	0.55	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Copper	6.5 B	25	0.71	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Iron	1100	300	9.0	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Lead	4.0 B	5.0	1.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Magnesium	1460 B	5000	26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Manganese	6.2 B	15	0.26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/20/01	12/20/01	LIR	SW846 7470A	EPA 245.1
Nickel	2.0 B	40	0.80	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Potassium	5690	5000	49	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Selenium	2.7 B	10	2.5	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Sodium	16300	5000	170	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Vanadium	10.0 B	50	0.58	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Zinc	38.9	20	0.36	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-23		
Lab Sample ID:	F11691-4A	Date Sampled:	12/04/01
Matrix:	AQ - Groundwater Filtered	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	859	200	9.4	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Arsenic	3.2 U	10	3.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Barium	50.7 B	200	0.94	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.25 B	5.0	0.22	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Calcium	8450	1000	10	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Chromium	3.3 B	10	0.35	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cobalt	1.2 B	50	0.55	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Copper	1.9 B	25	0.71	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Iron	287 B	300	9.0	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Lead	1.9 B	5.0	1.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Magnesium	2120 B	5000	26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Manganese	10.4 B	15	0.26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/20/01	12/20/01	LIR	SW846 7470A	EPA 245.1
Nickel	2.4 B	40	0.80	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Potassium	4200 B	5000	49	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Selenium	2.8 B	10	2.5	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Sodium	14900	5000	170	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Vanadium	36.8 B	50	0.58	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Zinc	21.9	20	0.36	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-9		
Lab Sample ID:	F11691-5A	Date Sampled:	12/04/01
Matrix:	AQ - Groundwater Filtered	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	1970	200	9.4	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Arsenic	4.3 B	10	3.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Barium	42.1 B	200	0.94	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.42 B	5.0	0.22	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Calcium	5120	1000	10	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Chromium	3.4 B	10	0.35	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cobalt	0.55 U	50	0.55	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Copper	2.0 B	25	0.71	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Iron	276 B	300	9.0	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Lead	3.2 B	5.0	1.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Magnesium	2030 B	5000	26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Manganese	4.2 B	15	0.26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/20/01	12/20/01	LIR	SW846 7470A	EPA 245.1
Nickel	1.5 B	40	0.80	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Potassium	9360	5000	49	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Selenium	2.8 B	10	2.5	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Sodium	20300	5000	170	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Vanadium	62.1	50	0.58	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Zinc	10.1 B	20	0.36	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Report of Analysis

Client Sample ID:	DP-18		
Lab Sample ID:	F11691-8A	Date Sampled:	12/05/01
Matrix:	AQ - Groundwater Filtered	Date Received:	12/06/01
		Percent Solids:	n/a
Project:	Omni-Oak Hammock		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Aluminum	16000	200	9.4	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Antimony	2.6 U	5.0	2.6	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Arsenic	6.2 B	10	3.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Barium	166 B	200	0.94	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Beryllium	0.83 B	5.0	0.22	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cadmium	0.27 U	5.0	0.27	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Calcium	13500	1000	10	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Chromium	63.7	10	0.35	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Cobalt	1.4 B	50	0.55	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Copper	7.9 B	25	0.71	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Iron	1160	300	9.0	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Lead	11.0	5.0	1.2	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Magnesium	729 B	5000	26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Manganese	5.0 B	15	0.26	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	0.060	ug/l	1	12/20/01	12/20/01	LIR	SW846 7470A	EPA 245.1
Nickel	9.2 B	40	0.80	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Potassium	21900	5000	49	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Selenium	4.1 B	10	2.5	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Silver	0.59 U	10	0.59	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Sodium	34400	5000	170	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Thallium	2.1 U	10	2.1	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Vanadium	126	50	0.58	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A
Zinc	23.3	20	0.36	ug/l	1	12/11/01	12/11/01	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result > = IDL but < RL

Blank Spike Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VB321-BS	B0007488.D	1	12/13/01	JG	n/a	n/a	VB321

The QC reported here applies to the following samples: Method: SW846 8260B

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-7, F11691-8

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	121	97	67-125
71-43-2	Benzene	25	26.8	107	75-125
75-27-4	Bromodichloromethane	25	28.0	112	75-125
75-25-2	Bromoform	25	31.4	126*	72-125
108-90-7	Chlorobenzene	25	25.0	100	75-125
75-00-3	Chloroethane	25	24.0	96	58-136
67-66-3	Chloroform	25	26.4	106	75-125
75-15-0	Carbon disulfide	125	129	103	48-142
56-23-5	Carbon tetrachloride	25	32.5	130	75-136
110-82-7	Cyclohexane	25	30.3	121	50-150 [a]
75-34-3	1,1-Dichloroethane	25	25.9	104	75-125
75-35-4	1,1-Dichloroethylene	25	28.9	116	67-138
96-12-8	1,2-Dibromo-3-chloropropane	25	24.2	97	64-125
106-93-4	1,2-Dibromoethane	25	25.0	100	75-125
107-06-2	1,2-Dichloroethane	25	23.5	94	75-125
78-87-5	1,2-Dichloropropane	25	27.6	110	75-125
124-48-1	Dibromochloromethane	25	27.9	112	75-125
75-71-8	Dichlorodifluoromethane	25	25.2	101	48-171
156-59-2	cis-1,2-Dichloroethylene	25	26.7	107	75-129
10061-01-5	cis-1,3-Dichloropropene	25	26.4	106	75-125
541-73-1	m-Dichlorobenzene	25	24.1	96	75-125
95-50-1	o-Dichlorobenzene	25	23.7	95	75-125
106-46-7	p-Dichlorobenzene	25	24.3	97	75-125
156-60-5	trans-1,2-Dichloroethylene	25	26.2	105	73-125
10061-02-6	trans-1,3-Dichloropropene	25	24.6	98	75-125
100-41-4	Ethylbenzene	25	25.0	100	68-135
76-13-1	Freon 113	25	28.0	112	75-125
591-78-6	2-Hexanone	125	124	99	68-125
98-82-8	Isopropylbenzene	25	26.4	106	75-125
108-10-1	4-Methyl-2-pentanone	125	127	102	75-125
79-20-9	Methyl Acetate	125	131	105	50-150 [a]
74-83-9	Methyl bromide	25	21.6	86	59-146
74-87-3	Methyl chloride	25	25.3	101	50-142
108-87-2	Methylcyclohexane	25	28.7	115	50-150 [a]
75-09-2	Methylene chloride	25	24.8	99	69-125
78-93-3	Methyl ethyl ketone	125	127	102	70-125

Blank Spike Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VB321-BS	B0007488.D	1	12/13/01	JG	n/a	n/a	VB321

The QC reported here applies to the following samples: Method: SW846 8260B

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-7, F11691-8

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
1634-04-4	Methyl Tert Butyl Ether	25	25.8	103	75-125
100-42-5	Styrene	25	26.0	104	75-125
71-55-6	1,1,1-Trichloroethane	25	26.7	107	75-132
79-34-5	1,1,2,2-Tetrachloroethane	25	23.8	95	75-125
79-00-5	1,1,2-Trichloroethane	25	24.0	96	75-125
120-82-1	1,2,4-Trichlorobenzene	25	26.1	104	75-125
127-18-4	Tetrachloroethylene	25	26.9	108	75-126
108-88-3	Toluene	25	26.0	104	75-125
79-01-6	Trichloroethylene	25	26.2	105	75-125
75-69-4	Trichlorofluoromethane	25	25.5	102	55-162
75-01-4	Vinyl chloride	25	25.2	101	60-147
1330-20-7	Xylene (total)	75	76.3	102	75-125

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	102%	80-120%
17060-07-0	1,2-Dichloroethane-D4	101%	80-120%
2037-26-5	Toluene-D8	99%	80-120%
460-00-4	4-Bromofluorobenzene	98%	80-120%

(a) Advisory control limits.

Method Blank Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VB321-MB	B0007489.D	1	12/13/01	JG	n/a	n/a	VB321

The QC reported here applies to the following samples: Method: SW846 8260B

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-7, F11691-8

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
110-82-7	Cyclohexane	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
75-71-8	Dichlorodifluoromethane	ND	5.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
541-73-1	m-Dichlorobenzene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
76-13-1	Freon 113	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
98-82-8	Isopropylbenzene	ND	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
79-20-9	Methyl Acetate	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
108-87-2	Methylcyclohexane	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	

Method Blank Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VB321-MB	B0007489.D	1	12/13/01	JG	n/a	n/a	VB321

The QC reported here applies to the following samples: Method: SW846 8260B

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-7, F11691-8

CAS No.	Compound	Result	RL	Units	Q
1634-04-4	Methyl Tert Butyl Ether	ND	2.0	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	102%	80-120%
17060-07-0	1,2-Dichloroethane-D4	101%	80-120%
2037-26-5	Toluene-D8	99%	80-120%
460-00-4	4-Bromofluorobenzene	106%	80-120%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11681-1MS	B0007498.D	1	12/13/01	JG	n/a	n/a	VB321
F11681-1MSD	B0007499.D	1	12/13/01	JG	n/a	n/a	VB321
F11681-1	B0007491.D	1	12/13/01	JG	n/a	n/a	VB321

The QC reported here applies to the following samples: Method: SW846 8260B

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-7, F11691-8

CAS No.	Compound	F11681-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		125	130	104	133	106	2	61-125/15
71-43-2	Benzene	ND		25	26.6	106	25.8	103	3	75-125/15
75-27-4	Bromodichloromethane	ND		25	26.8	107	26.3	105	2	75-125/15
75-25-2	Bromoform	ND		25	27.8	111	27.7	111	0	66-125/15
108-90-7	Chlorobenzene	ND		25	24.7	99	24.5	98	1	75-125/15
75-00-3	Chloroethane	ND		25	23.9	96	22.9	92	4	53-125/15
67-66-3	Chloroform	0.76	J	25	26.9	105	26.8	104	0	75-125/15
75-15-0	Carbon disulfide	ND		125	126	101	124	99	2	51-138/15
56-23-5	Carbon tetrachloride	ND		25	31.2	125	30.8	123	1	74-131/15
110-82-7	Cyclohexane	ND		25	30.2	121	29.9	120	1	50-150/30 [a]
75-34-3	1,1-Dichloroethane	ND		25	26.4	106	25.0	100	5	75-125/15
75-35-4	1,1-Dichloroethylene	ND		25	27.5	110	27.5	110	0	66-140/15
96-12-8	1,2-Dibromo-3-chloropropane	ND		25	23.3	93	24.1	96	3	57-125/15
106-93-4	1,2-Dibromoethane	ND		25	24.9	100	25.0	100	0	75-125/15
107-06-2	1,2-Dichloroethane	ND		25	23.2	93	22.7	91	2	75-125/15
78-87-5	1,2-Dichloropropane	ND		25	27.6	110	28.0	112	1	75-125/15
124-48-1	Dibromochloromethane	ND		25	26.7	107	26.9	108	1	75-125/15
75-71-8	Dichlorodifluoromethane	ND		25	20.0	80	20.7	83	3	45-182/15
156-59-2	cis-1,2-Dichloroethylene	ND		25	26.7	107	26.1	104	2	75-136/15
10061-01-5	cis-1,3-Dichloropropene	ND		25	24.6	98	25.0	100	2	71-125/15
541-73-1	m-Dichlorobenzene	ND		25	23.7	95	23.8	95	0	75-125/15
95-50-1	o-Dichlorobenzene	ND		25	23.3	93	23.4	94	0	75-125/15
106-46-7	p-Dichlorobenzene	ND		25	23.7	95	23.9	96	1	75-125/15
156-60-5	trans-1,2-Dichloroethylene	ND		25	26.3	105	25.6	102	3	73-125/15
10061-02-6	trans-1,3-Dichloropropene	ND		25	22.8	91	22.8	91	0	62-125/15
100-41-4	Ethylbenzene	ND		25	24.0	96	24.6	98	2	75-125/15
76-13-1	Freon 113	ND		25	27.8	111	26.7	107	4	69-131/15
591-78-6	2-Hexanone	ND		125	122	98	127	102	4	71-125/15
98-82-8	Isopropylbenzene	ND		25	25.7	103	25.7	103	0	74-125/15
108-10-1	4-Methyl-2-pentanone	ND		125	125	100	129	103	3	75-125/15
79-20-9	Methyl Acetate	ND		125	135	108	135	108	0	50-150/30 [a]
74-83-9	Methyl bromide	ND		25	20.2	81	19.5	78	4	67-146/15
74-87-3	Methyl chloride	ND		25	23.3	93	23.3	93	0	47-160/15
108-87-2	Methylcyclohexane	ND		25	27.4	110	26.8	107	2	50-150/30 [a]
75-09-2	Methylene chloride	ND		25	24.6	98	24.1	96	2	69-125/15
78-93-3	Methyl ethyl ketone	ND		125	131	105	131	105	0	70-125/15

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F11681-1MS	B0007498.D	1	12/13/01	JG	n/a	n/a	VB321
F11681-1MSD	B0007499.D	1	12/13/01	JG	n/a	n/a	VB321
F11681-1	B0007491.D	1	12/13/01	JG	n/a	n/a	VB321

The QC reported here applies to the following samples: Method: SW846 8260B

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-7, F11691-8

CAS No.	Compound	F11681-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
1634-04-4	Methyl Tert Butyl Ether	ND		25	25.3	101	25.3	101	0	75-125/15
100-42-5	Styrene	ND		25	24.3	97	24.8	99	2	69-126/15
71-55-6	1,1,1-Trichloroethane	ND		25	26.6	106	25.8	103	3	75-131/15
79-34-5	1,1,2,2-Tetrachloroethane	ND		25	24.3	97	24.0	96	1	75-125/15
79-00-5	1,1,2-Trichloroethane	ND		25	24.1	96	24.4	98	1	75-125/15
120-82-1	1,2,4-Trichlorobenzene	ND		25	24.1	96	24.7	99	2	74-125/15
127-18-4	Tetrachloroethylene	ND		25	25.2	101	25.9	104	3	75-125/15
108-88-3	Toluene	ND		25	25.2	101	25.5	102	1	75-125/15
79-01-6	Trichloroethylene	ND		25	25.8	103	26.1	104	1	75-125/15
75-69-4	Trichlorofluoromethane	ND		25	22.2	89	22.0	88	1	60-139/[illegible]
75-01-4	Vinyl chloride	ND		25	22.8	91	22.7	91	0	52-169/1[illegible]
1330-20-7	Xylene (total)	ND		75	74.5	99	73.7	98	1	75-125/15

CAS No.	Surrogate Recoveries	MS	MSD	F11681-1	Limits
1868-53-7	Dibromofluoromethane	102%	101%	101%	80-120%
17060-07-0	1,2-Dichloroethane-D4	101%	99%	97%	80-120%
2037-26-5	Toluene-D8	98%	99%	98%	80-120%
460-00-4	4-Bromofluorobenzene	100%	100%	106%	80-120%

(a) Advisory control limits.

Volatile Surrogate Recovery Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8260B   Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4
F11691-1	B0007500.D	102.0	98.0	97.0	106.0
F11691-2	B0007501.D	102.0	99.0	97.0	102.0
F11691-3	B0007502.D	102.0	99.0	98.0	105.0
F11691-4	B0007503.D	102.0	99.0	97.0	106.0
F11691-5	B0007504.D	101.0	99.0	98.0	107.0
F11691-6	B0007505.D	101.0	100.0	100.0	104.0
F11691-7	B0007497.D	103.0	101.0	97.0	103.0
F11691-8	B0007506.D	103.0	100.0	97.0	106.0
F11681-1MS	B0007498.D	102.0	101.0	98.0	100.0
F11681-1MSD	B0007499.D	101.0	99.0	99.0	100.0
VB321-BS	B0007488.D	102.0	101.0	99.0	98.0
VB321-MB	B0007489.D	102.0	101.0	99.0	106.0

Surrogate Compounds	Recovery Limits
S1 = Dibromofluoromethane	80-120%
S2 = 1,2-Dichloroethane-D4	80-120%
S3 = Toluene-D8	80-120%
S4 = 4-Bromofluorobenzene	80-120%

Blank Spike Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4336-BS	L009927.D	1	12/10/01	ME	12/07/01	OP4336	SL565

The QC reported here applies to the following samples: Method: SW846 8270C

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
95-57-8	2-Chlorophenol	50	40.7	81	60-125
59-50-7	4-Chloro-3-methyl phenol	50	40.7	81	70-125
120-83-2	2,4-Dichlorophenol	50	41.5	83	68-125
105-67-9	2,4-Dimethylphenol	50	25.4	51	42-125
51-28-5	2,4-Dinitrophenol	50	22.6	45	10-125
534-52-1	4,6-Dinitro-o-cresol	50	45.0	90	46-125
95-48-7	2-Methylphenol	50	34.5	69	51-125
	3&4-Methylphenol	100	66.5	67	46-125
88-75-5	2-Nitrophenol	50	41.7	83	64-125
100-02-7	4-Nitrophenol	50	21.8	44	17-125
87-86-5	Pentachlorophenol	50	47.5	95	60-125
108-95-2	Phenol	50	21.1	42	16-125
95-95-4	2,4,5-Trichlorophenol	50	43.9	88	74-125
88-06-2	2,4,6-Trichlorophenol	50	42.1	84	70-125
83-32-9	Acenaphthene	50	42.1	84	70-125
208-96-8	Acenaphthylene	50	46.3	93	75-125
120-12-7	Anthracene	50	44.2	88	75-125
56-55-3	Benzo(a)anthracene	50	42.4	85	75-125
50-32-8	Benzo(a)pyrene	50	45.1	90	75-125
205-99-2	Benzo(b)fluoranthene	50	47.4	95	75-125
191-24-2	Benzo(g,h,i)perylene	50	38.4	77	57-135
207-08-9	Benzo(k)fluoranthene	50	43.9	88	75-125
101-55-3	4-Bromophenyl phenyl ether	50	43.5	87	74-125
85-68-7	Butyl benzyl phthalate	50	47.5	95	38-134
91-58-7	2-Chloronaphthalene	50	43.5	87	59-125
106-47-8	4-Chloroaniline	50	44.1	88	31-125
86-74-8	Carbazole	50	44.9	90	75-125
218-01-9	Chrysene	50	41.5	83	75-125
111-91-1	bis(2-Chloroethoxy)methane	50	42.1	84	64-125
111-44-4	bis(2-Chloroethyl)ether	50	41.0	82	62-125
108-60-1	bis(2-Chloroisopropyl)ether	50	41.6	83	60-125
7005-72-3	4-Chlorophenyl phenyl ether	50	44.6	89	75-125
121-14-2	2,4-Dinitrotoluene	50	48.6	97	73-125
606-20-2	2,6-Dinitrotoluene	50	47.4	95	75-125
91-94-1	3,3'-Dichlorobenzidine	50	42.3	85	55-125
53-70-3	Dibenzo(a,h)anthracene	50	39.9	80	64-130

Blank Spike Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4336-BS	L009927.D	1	12/10/01	ME	12/07/01	OP4336	SL565

The QC reported here applies to the following samples: Method: SW846 8270C

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
132-64-9	Dibenzofuran	50	41.9	84	73-125
84-74-2	Di-n-butyl phthalate	50	48.1	96	47-140
117-84-0	Di-n-octyl phthalate	50	51.1	102	52-125
84-66-2	Diethyl phthalate	50	46.6	93	59-125
131-11-3	Dimethyl phthalate	50	45.2	90	24-142
117-81-7	bis(2-Ethylhexyl)phthalate	50	49.5	99	71-125
206-44-0	Fluoranthene	50	44.2	88	75-125
86-73-7	Fluorene	50	43.5	87	75-125
118-74-1	Hexachlorobenzene	50	43.9	88	74-125
87-68-3	Hexachlorobutadiene	50	34.5	69	22-125
77-47-4	Hexachlorocyclopentadiene	50	20.1	40	10-125
67-72-1	Hexachloroethane	50	37.6	75	23-125
193-39-5	Indeno(1,2,3-cd)pyrene	50	40.3	81	53-130
78-59-1	Isophorone	50	44.1	88	63-125
91-57-6	2-Methylnaphthalene	50	39.4	79	51-125
88-74-4	2-Nitroaniline	50	44.3	89	75-125
99-09-2	3-Nitroaniline	50	43.1	86	62-125
100-01-6	4-Nitroaniline	50	46.0	92	67-125
91-20-3	Naphthalene	50	41.3	83	53-125
98-95-3	Nitrobenzene	50	43.8	88	67-125
621-64-7	N-Nitroso-di-n-propylamine	50	45.3	91	61-125
86-30-6	N-Nitrosodiphenylamine	50	45.9	92	75-125
85-01-8	Phenanthrene	50	42.2	84	75-125
129-00-0	Pyrene	50	41.7	83	67-125

CAS No.	Surrogate Recoveries	BSP	Limits
367-12-4	2-Fluorophenol	59%	20-125%
4165-62-2	Phenol-d5	38%	10-125%
118-79-6	2,4,6-Tribromophenol	89%	35-140%
4165-60-0	Nitrobenzene-d5	87%	46-125%
321-60-8	2-Fluorobiphenyl	83%	46-125%
1718-51-0	Terphenyl-d14	90%	49-126%

Method Blank Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4336-MB	L009928.D	1	12/10/01	ME	12/07/01	OP4336	SL565

The QC reported here applies to the following samples: Method: SW846 8270C

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	Result	RL	Units	Q
95-57-8	2-Chlorophenol	ND	5.0	ug/l	
59-50-7	4-Chloro-3-methyl phenol	ND	5.0	ug/l	
120-83-2	2,4-Dichlorophenol	ND	5.0	ug/l	
105-67-9	2,4-Dimethylphenol	ND	25	ug/l	
51-28-5	2,4-Dinitrophenol	ND	25	ug/l	
534-52-1	4,6-Dinitro-o-cresol	ND	10	ug/l	
95-48-7	2-Methylphenol	ND	5.0	ug/l	
	3&4-Methylphenol	ND	5.0	ug/l	
88-75-5	2-Nitrophenol	ND	5.0	ug/l	
100-02-7	4-Nitrophenol	ND	25	ug/l	
87-86-5	Pentachlorophenol	ND	25	ug/l	
108-95-2	Phenol	ND	5.0	ug/l	
95-95-4	2,4,5-Trichlorophenol	ND	5.0	ug/l	
88-06-2	2,4,6-Trichlorophenol	ND	5.0	ug/l	
83-32-9	Acenaphthene	ND	5.0	ug/l	
208-96-8	Acenaphthylene	ND	5.0	ug/l	
98-86-2	Acetophenone	ND	5.0	ug/l	
120-12-7	Anthracene	ND	5.0	ug/l	
1912-24-9	Atrazine	ND	5.0	ug/l	
100-52-7	Benzaldehyde	ND	25	ug/l	
56-55-3	Benzo(a)anthracene	ND	5.0	ug/l	
50-32-8	Benzo(a)pyrene	ND	5.0	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	5.0	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	5.0	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	5.0	ug/l	
101-55-3	4-Bromophenyl phenyl ether	ND	5.0	ug/l	
85-68-7	Butyl benzyl phthalate	ND	5.0	ug/l	
92-52-4	1,1'-Biphenyl	ND	5.0	ug/l	
91-58-7	2-Chloronaphthalene	ND	5.0	ug/l	
106-47-8	4-Chloroaniline	ND	5.0	ug/l	
105-60-2	Caprolactam	ND	5.0	ug/l	
86-74-8	Carbazole	ND	5.0	ug/l	
218-01-9	Chrysene	ND	5.0	ug/l	
111-91-1	bis(2-Chloroethoxy)methane	ND	5.0	ug/l	
111-44-4	bis(2-Chloroethyl)ether	ND	5.0	ug/l	
108-60-1	bis(2-Chloroisopropyl)ether	ND	5.0	ug/l	

Method Blank Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4336-MB	L009928.D	1	12/10/01	ME	12/07/01	OP4336	SL565

The QC reported here applies to the following samples: Method: SW846 8270C

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	Result	RL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
91-94-1	3,3'-Dichlorobenzidine	ND	10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	5.0	ug/l	
132-64-9	Dibenzofuran	ND	5.0	ug/l	
84-74-2	Di-n-butyl phthalate	ND	5.0	ug/l	
117-84-0	Di-n-octyl phthalate	ND	5.0	ug/l	
84-66-2	Diethyl phthalate	ND	5.0	ug/l	
131-11-3	Dimethyl phthalate	ND	5.0	ug/l	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	5.0	ug/l	
206-44-0	Fluoranthene	ND	5.0	ug/l	
86-73-7	Fluorene	ND	5.0	ug/l	
118-74-1	Hexachlorobenzene	ND	5.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	5.0	ug/l	
77-47-4	Hexachlorocyclopentadiene	ND	5.0	ug/l	
67-72-1	Hexachloroethane	ND	5.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	5.0	ug/l	
78-59-1	Isophorone	ND	5.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	5.0	ug/l	
88-74-4	2-Nitroaniline	ND	5.0	ug/l	
99-09-2	3-Nitroaniline	ND	5.0	ug/l	
100-01-6	4-Nitroaniline	ND	5.0	ug/l	
91-20-3	Naphthalene	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
621-64-7	N-Nitroso-di-n-propylamine	ND	5.0	ug/l	
86-30-6	N-Nitrosodiphenylamine	ND	5.0	ug/l	
85-01-8	Phenanthrene	ND	5.0	ug/l	
129-00-0	Pyrene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	59%	20-125%
4165-62-2	Phenol-d5	44%	10-125%
118-79-6	2,4,6-Tribromophenol	85%	35-140%

Method Blank Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4336-MB	L009928.D	1	12/10/01	ME	12/07/01	OP4336	SL565

The QC reported here applies to the following samples:

Method: SW846 8270C

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	84%	46-125%
321-60-8	2-Fluorobiphenyl	79%	46-125%
1718-51-0	Terphenyl-d14	83%	49-126%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4336-MS	L009930.D	1	12/10/01	ME	12/07/01	OP4336	SL565
OP4336-MSD	L009931.D	1	12/10/01	ME	12/07/01	OP4336	SL565
F11691-1	L009929.D	1	12/10/01	ME	12/07/01	OP4336	SL565

The QC reported here applies to the following samples: Method: SW846 8270C

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	F11691-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
95-57-8	2-Chlorophenol	ND		100	81.1	81	71.8	72	12	59-125/20
59-50-7	4-Chloro-3-methyl phenol	ND		100	81.9	82	81.3	81	1	72-125/20
120-83-2	2,4-Dichlorophenol	ND		100	82.5	83	76.2	76	8	65-125/20
105-67-9	2,4-Dimethylphenol	ND		100	55.6	56	53.4	53	4	37-125/20
51-28-5	2,4-Dinitrophenol	ND		100	30.2	30	29.8	30	1	27-125/41
534-52-1	4,6-Dinitro-o-cresol	ND		100	82.8	83	79.6	80	4	54-125/20
95-48-7	2-Methylphenol	ND		100	76.5	77	67.6	68	12	57-125/20
	3&4-Methylphenol	3.6	J	200	150	73	143	70	5	55-125/20
88-75-5	2-Nitrophenol	ND		100	85.3	85	74.7	75	13	67-125/20
100-02-7	4-Nitrophenol	ND		100	56.8	57	59.2	59	4	41-125/23
87-86-5	Pentachlorophenol	ND		100	95.4	95	90.4	90	5	67-126/20
108-95-2	Phenol	ND		100	59.6	60	55.8	56	7	39-125/20
95-95-4	2,4,5-Trichlorophenol	ND		100	88.1	88	80.4	80	9	75-125/20
88-06-2	2,4,6-Trichlorophenol	ND		100	84.1	84	80.3	80	5	70-125/20
83-32-9	Acenaphthene	ND		100	82.4	82	79.3	79	4	74-125/20
208-96-8	Acenaphthylene	ND		100	92.5	93	88.0	88	5	75-125/20
120-12-7	Anthracene	ND		100	90.1	90	86.4	86	4	75-125/20
56-55-3	Benzo(a)anthracene	ND		100	91.4	91	87.9	88	4	75-125/20
50-32-8	Benzo(a)pyrene	ND		100	96.2	96	90.5	91	6	75-125/20
205-99-2	Benzo(b)fluoranthene	ND		100	92.8	93	91.4	91	2	75-125/20
191-24-2	Benzo(g,h,i)perylene	ND		100	84.9	85	78.3	78	8	61-125/21
207-08-9	Benzo(k)fluoranthene	ND		100	89.2	89	86.1	86	4	75-125/20
101-55-3	4-Bromophenyl phenyl ether	ND		100	87.5	88	83.4	83	5	73-125/20
85-68-7	Butyl benzyl phthalate	ND		100	97.5	98	93.9	94	4	66-125/20
91-58-7	2-Chloronaphthalene	ND		100	84.6	85	80.2	80	5	64-125/20
106-47-8	4-Chloroaniline	ND		100	83.3	83	80.1	80	4	44-125/20
86-74-8	Carbazole	ND		100	88.2	88	86.2	86	2	75-125/20
218-01-9	Chrysene	ND		100	85.2	85	86.2	86	1	75-125/20
111-91-1	bis(2-Chloroethoxy)methane	ND		100	85.7	86	77.2	77	10	62-125/20
111-44-4	bis(2-Chloroethyl)ether	ND		100	81.9	82	71.4	71	14	61-125/20
108-60-1	bis(2-Chloroisopropyl)ether	ND		100	83.3	83	71.3	71	16	56-125/22
7005-72-3	4-Chlorophenyl phenyl ether	ND		100	88.0	88	84.9	85	4	75-125/20
121-14-2	2,4-Dinitrotoluene	ND		100	93.5	94	94.6	95	1	75-125/20
606-20-2	2,6-Dinitrotoluene	ND		100	95.3	95	90.3	90	5	75-125/20
91-94-1	3,3'-Dichlorobenzidine	ND		100	86.1	86	84.1	84	2	20-125/29
53-70-3	Dibenzo(a,h)anthracene	ND		100	85.5	86	81.8	82	4	64-127/20

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4336-MS	L009930.D	1	12/10/01	ME	12/07/01	OP4336	SL565
OP4336-MSD	L009931.D	1	12/10/01	ME	12/07/01	OP4336	SL565
F11691-1	L009929.D	1	12/10/01	ME	12/07/01	OP4336	SL565

The QC reported here applies to the following samples:

Method: SW846 8270C

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	F11691-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
132-64-9	Dibenzofuran	ND		100	84.7	85	81.2	81	4	73-125/20
84-74-2	Di-n-butyl phthalate	ND		100	95.1	95	94.3	94	1	71-125/20
117-84-0	Di-n-octyl phthalate	ND		100	105	105	96.4	96	9	66-125/30
84-66-2	Diethyl phthalate	ND		100	94.6	95	90.4	90	5	64-125/20
131-11-3	Dimethyl phthalate	ND		100	88.9	89	86.1	86	3	32-139/20
117-81-7	bis(2-Ethylhexyl)phthalate	ND		100	106	106	98.8	99	7	74-125/20
206-44-0	Fluoranthene	ND		100	84.9	85	85.2	85	0	75-125/20
86-73-7	Fluorene	ND		100	87.7	88	85.3	85	3	75-125/20
118-74-1	Hexachlorobenzene	ND		100	90.8	91	88.2	88	3	75-125/20
87-68-3	Hexachlorobutadiene	ND		100	71.5	72	62.4	62	14	26-125/2[illegible]
77-47-4	Hexachlorocyclopentadiene	ND		100	43.5	44	45.5	46	4	18-125/2[illegible]
67-72-1	Hexachloroethane	ND		100	75.5	76	67.7	68	11	22-125/20
193-39-5	Indeno(1,2,3-cd)pyrene	ND		100	89.0	89	84.1	84	6	54-125/20
78-59-1	Isophorone	ND		100	87.1	87	80.9	81	7	62-125/20
91-57-6	2-Methylnaphthalene	ND		100	78.8	79	72.2	72	9	58-125/20
88-74-4	2-Nitroaniline	ND		100	85.8	86	87.1	87	2	67-125/20
99-09-2	3-Nitroaniline	ND		100	76.9	77	80.5	81	5	53-125/20
100-01-6	4-Nitroaniline	ND		100	84.3	84	88.2	88	5	63-125/20
91-20-3	Naphthalene	ND		100	80.7	81	74.3	74	8	55-125/20
98-95-3	Nitrobenzene	ND		100	84.5	85	75.4	75	11	63-125/20
621-64-7	N-Nitroso-di-n-propylamine	ND		100	88.7	89	82.2	82	8	58-125/20
86-30-6	N-Nitrosodiphenylamine	ND		100	97.3	97	93.0	93	5	75-125/20
85-01-8	Phenanthrene	ND		100	86.1	86	81.2	81	6	75-125/20
129-00-0	Pyrene	ND		100	90.1	90	86.5	87	4	67-125/20

CAS No.	Surrogate Recoveries	MS	MSD	F11691-1	Limits
367-12-4	2-Fluorophenol	71%	64%	50%	20-125%
4165-62-2	Phenol-d5	55%	52%	36%	10-125%
118-79-6	2,4,6-Tribromophenol	92%	88%	86%	35-140%
4165-60-0	Nitrobenzene-d5	84%	74%	74%	46-125%
321-60-8	2-Fluorobiphenyl	84%	78%	69%	46-125%
1718-51-0	Terphenyl-d14	91%	87%	89%	49-126%

Semivolatile Surrogate Recovery Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8270C Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4	S5	S6
F11691-1	L009929.D	50.0	36.0	86.0	74.0	69.0	89.0
F11691-2	L009932.D	37.0	27.0	73.0	85.0	73.0	79.0
F11691-3	L009933.D	38.0	28.0	75.0	77.0	72.0	89.0
F11691-4	L009934.D	31.0	23.0	67.0	67.0	63.0	76.0
F11691-5	L009935.D	29.0	20.0	60.0	72.0	67.0	69.0
F11691-6	L009936.D	39.0	28.0	94.0	61.0	60.0	91.0
F11691-8	L009937.D	30.0	22.0	67.0	72.0	74.0	63.0
OP4336-BS	L009927.D	59.0	38.0	89.0	87.0	83.0	90.0
OP4336-MB	L009928.D	59.0	44.0	85.0	84.0	79.0	83.0
OP4336-MS	L009930.D	71.0	55.0	92.0	84.0	84.0	91.0
OP4336-MSD	L009931.D	64.0	52.0	88.0	74.0	78.0	87.0

Surrogate Compounds	Recovery Limits
S1 = 2-Fluorophenol	20-125%
S2 = Phenol-d5	10-125%
S3 = 2,4,6-Tribromophenol	35-140%
S4 = Nitrobenzene-d5	46-125%
S5 = 2-Fluorobiphenyl	46-125%
S6 = Terphenyl-d14	49-126%

Blank Spike Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-BS	DD04112.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152

The QC reported here applies to the following samples: Method: SW846 8081A

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
309-00-2	Aldrin	0.5	0.44	88	36-123
319-84-6	alpha-BHC	0.5	0.48	96	71-124
319-85-7	beta-BHC	0.5	0.48	96	66-124
319-86-8	delta-BHC	0.5	0.53	106	48-133
58-89-9	gamma-BHC (Lindane)	0.5	0.50	100	70-125
5103-71-9	alpha-Chlordane	0.5	0.47	94	61-120
5103-74-2	gamma-Chlordane	0.5	0.48	96	61-121
60-57-1	Dieldrin	0.5	0.48	96	68-123
72-54-8	4,4'-DDD	0.5	0.52	104	61-134
72-55-9	4,4'-DDE	0.5	0.48	96	59-131
50-29-3	4,4'-DDT	0.5	0.51	102	65-124
72-20-8	Endrin	0.5	0.25	50	46-160
1031-07-8	Endosulfan sulfate	0.5	0.47	94	67-118
7421-93-4	Endrin aldehyde	0.5	0.12	24	5-120
53494-70-5	Endrin ketone	0.5	0.65	130*	57-128
959-98-8	Endosulfan-I	0.5	0.47	94	68-120
33213-65-9	Endosulfan-II	0.5	0.50	100	74-120
76-44-8	Heptachlor	0.5	0.43	86	46-124
1024-57-3	Heptachlor epoxide	0.5	0.47	94	70-127
72-43-5	Methoxychlor	0.5	0.51	102	66-122

CAS No.	Surrogate Recoveries	BSP	Limits
877-09-8	Tetrachloro-m-xylene	86%	47-126%
2051-24-3	Decachlorobiphenyl	103%	13-144%

Blank Spike Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-BS2	DD04170.D	1	12/12/01	SKW	12/11/01	OP4328	GDD154

The QC reported here applies to the following samples: Method: SW846 8081A

F11691-8

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits

CAS No.	Surrogate Recoveries	BSP	Limits
877-09-8	Tetrachloro-m-xylene	82%	47-126%
2051-24-3	Decachlorobiphenyl	109%	13-144%

Method Blank Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-MB	DD04111.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152

The QC reported here applies to the following samples: Method: SW846 8081A

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	Result	RL	Units	Q
309-00-2	Aldrin	ND	0.050	ug/l	
319-84-6	alpha-BHC	ND	0.050	ug/l	
319-85-7	beta-BHC	ND	0.050	ug/l	
319-86-8	delta-BHC	ND	0.050	ug/l	
58-89-9	gamma-BHC (Lindane)	ND	0.050	ug/l	
5103-71-9	alpha-Chlordane	ND	0.10	ug/l	
5103-74-2	gamma-Chlordane	ND	0.10	ug/l	
60-57-1	Dieldrin	ND	0.050	ug/l	
72-54-8	4,4'-DDD	ND	0.10	ug/l	
72-55-9	4,4'-DDE	ND	0.10	ug/l	
50-29-3	4,4'-DDT	ND	0.10	ug/l	
72-20-8	Endrin	ND	0.10	ug/l	
1031-07-8	Endosulfan sulfate	ND	0.10	ug/l	
7421-93-4	Endrin aldehyde	ND	0.10	ug/l	
53494-70-5	Endrin ketone	ND	0.10	ug/l	
959-98-8	Endosulfan-I	ND	0.050	ug/l	
33213-65-9	Endosulfan-II	ND	0.10	ug/l	
76-44-8	Heptachlor	ND	0.050	ug/l	
1024-57-3	Heptachlor epoxide	ND	0.050	ug/l	
72-43-5	Methoxychlor	ND	0.20	ug/l	
8001-35-2	Toxaphene	ND	2.5	ug/l	

CAS No.	Surrogate Recoveries		Limits
877-09-8	Tetrachloro-m-xylene	87%	47-126%
2051-24-3	Decachlorobiphenyl	105%	13-144%

Method Blank Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-MB2	DD04169.D	1	12/12/01	SKW	12/11/01	OP4328	GDD154

The QC reported here applies to the following samples: Method: SW846 8081A

F11691-8

CAS No.	Compound	Result	RL	Units	Q

CAS No.	Surrogate Recoveries		Limits
877-09-8	Tetrachloro-m-xylene	81%	47-126%
2051-24-3	Decachlorobiphenyl	105%	13-144%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP4328-MS	DD04115.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
OP4328-MSD	DD04116.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152
F11674-2	DD04114.D	1	12/10/01	SKW	12/07/01	OP4328	GDD152

The QC reported here applies to the following samples: Method: SW846 8081A

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	F11674-2 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
309-00-2	Aldrin	ND		1	0.90	90	0.90	90	0	54-120/20
319-84-6	alpha-BHC	ND		1	1.0	100	1.0	100	0	73-123/20
319-85-7	beta-BHC	ND		1	1.0	100	1.1	110	10	77-120/20
319-86-8	delta-BHC	ND		1	1.2	120	1.2	120	0	44-134/20
58-89-9	gamma-BHC (Lindane)	ND		1	1.1	110	1.1	110	0	80-120/20
5103-71-9	alpha-Chlordane	ND		1	1.0	100	1.0	100	0	72-120/20
5103-74-2	gamma-Chlordane	ND		1	0.98	98	1.0	100	2	70-124/20
60-57-1	Dieldrin	ND		1	1.0	100	1.0	100	0	75-120/20
72-54-8	4,4'-DDD	ND		1	1.1	110	1.2	120	9	66-130/20
72-55-9	4,4'-DDE	ND		1	1.0	100	1.1	110	10	60-133/20
50-29-3	4,4'-DDT	ND		1	1.1	110	1.1	110	0	67-120/20
72-20-8	Endrin	ND		1	0.99	99	1.0	100	1	77-155/20
1031-07-8	Endosulfan sulfate	ND		1	1.1	110	1.2	120	9	59-131/20
7421-93-4	Endrin aldehyde	ND		1	0.32	32	0.36	36	12	5-120/58
53494-70-5	Endrin ketone	ND		1	1.2	120	1.2	120	0	70-120/20
959-98-8	Endosulfan-I	ND		1	0.99	99	1.0	100	1	76-120/20
33213-65-9	Endosulfan-II	ND		1	1.1	110	1.1	110	0	77-121/20
76-44-8	Heptachlor	ND		1	0.96	96	0.96	96	0	62-120/20
1024-57-3	Heptachlor epoxide	ND		1	1.0	100	1.0	100	0	77-120/20
72-43-5	Methoxychlor	ND		1	1.1	110	1.2	120	9	65-128/20

CAS No.	Surrogate Recoveries	MS	MSD	F11674-2	Limits
877-09-8	Tetrachloro-m-xylene	88%	81%	80%	47-126%
2051-24-3	Decachlorobiphenyl	80%	86%	63%	13-144%

Semivolatile Surrogate Recovery Summary

Job Number: F11691
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock

Method: SW846 8081A   Matrix: AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1 [a]	S2 [a]
F11691-1	DD04122.D	88.0	82.0
F11691-2	DD04123.D	72.0	15.0
F11691-3	DD04124.D	87.0	26.0
F11691-4	DD04125.D	77.0	31.0
F11691-5	DD04126.D	66.0	16.0
F11691-6	DD04127.D	87.0	80.0
F11691-8	DD04171.D	57.0	9.0* [b]
F11691-8	DD04128.D	49.0	8.0*
OP4328-BS	DD04112.D	86.0	103.0
OP4328-BS2	DD04170.D	82.0	109.0
OP4328-MB	DD04111.D	87.0	105.0
OP4328-MB2	DD04169.D	81.0	105.0
OP4328-MS	DD04115.D	88.0	80.0
OP4328-MSD	DD04116.D	81.0	86.0

Surrogate Compounds	Recovery Limits
S1 = Tetrachloro-m-xylene	47-126%
S2 = Decachlorobiphenyl	13-144%

(a) Recovery from GC signal #1
(b) Confirmed by re-extraction and reanalysis.

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4011
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/07/01

Metal	RL	IDL	MB raw	final
Aluminum	200	9.44	-13	<200
Antimony	5.0	2.56	-2.2	<5.0
Arsenic	10	3.15	-3.2	<10
Barium	200	.94	0.010	<200
Beryllium	5.0	.22	0.17	<5.0
Cadmium	5.0	.27	-0.35	<5.0
Calcium	1000	10.2	6.6	<1000
Chromium	10	.35	0.60	<10
Cobalt	50	.55	0.060	<50
Copper	25	.71	0.14	<25
Iron	300	9.02	-3.8	<300
Lead	5.0	1.16	2.3	<5.0
Magnesium	5000	25.5	1.6	<5000
Manganese	15	.26	0.12	<15
Molybdenum	50	1.01	anr	
Nickel	40	.8	-0.42	<40
Potassium	5000	49	655	<5000
Selenium	10	2.5	-1.6	<10
Silver	10	.59	-0.43	<10
Sodium	5000	173	42.5	<5000
Thallium	10	2.07	-2.6	<10
Tin	50	1.03		
Vanadium	50	.58	0.040	<50
Zinc	20	.36	0.020	<20

Associated samples MP4011: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4011
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date:			12/07/01					12/07/01		
Metal	F11691-4 Original	MS	Spikelot MPFLICP	% Rec	QC Limits	F11691-4 Original	MSD	Spikelot MPFLICP	% Rec	QC Limits
Aluminum	71800	98800	29000	93.1	70-122	71800	94800	29000	79.3	70-122
Antimony	0.0	528	1000	52.8N(a)	66-120	0.0	512	1000	51.2N(a)	66-120
Arsenic	27.3	3080	4000	76.3	75-120	27.3	3090	4000	76.6	75-120
Barium	1430	4510	4000	77.0	72-120	1430	4440	4000	75.3	72-120
Beryllium	11.1	90.3	100	79.2	73-120	11.1	90.3	100	79.2	73-120
Cadmium	3.9	80.0	100	76.1	72-120	3.9	80.3	100	76.4	72-120
Calcium	23300	44000	25000	82.8	37-150	23300	44000	25000	82.8	37-150
Chromium	104	422	400	79.5	69-122	104	418	400	78.5	69-122
Cobalt	15.4	788	1000	77.3	69-120	15.4	787	1000	77.2	69-120
Copper	5.5	406	500	80.1	70-120	5.5	400	500	78.9	70-120
Iron	16500	39300	27000	84.4	72-122	16500	39000	27000	83.3	72-122
Lead	24.9	795	1000	77.0	70-126	24.9	789	1000	76.4	70-126
Magnesium	3640	23700	25000	80.2	73-127	3640	23400	25000	79.0	73-127
Manganese	27.4	818	1000	79.1	74-122	27.4	812	1000	78.5	74-122
Molybdenum										
Nickel	28.2	807	1000	77.9	69-120	28.2	809	1000	78.1	69-120
Potassium	5140	27100	25000	87.8	61-122	5140	26700	25000	86.2	61-122
Selenium	3.2	3110	4000	77.7	74-120	3.2	3140	4000	78.4	74-120
Silver	0.0	81.8	100	81.8	52-126	0.0	80.6	100	80.6	52-126
Sodium	9760	30900	25000	84.6	56-130	9760	30600	25000	83.4	56-130
Thallium	0.0	2980	4000	74.5N(a)	80-122	0.0	2940	4000	73.5N(a)	80-122
Tin										
Vanadium	131	919	1000	78.8	75-122	131	910	1000	77.9	75-122
Zinc	46.7	833	1000	78.6	68-123	46.7	841	1000	79.4	68-123

Associated samples MP4011: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4011
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/07/01

Metal	F11691-4 Original	DUP	RPD	QC Limits
Aluminum	71800	73000	1.7	0-23
Antimony	0.0	0.0	NC	0-20
Arsenic	27.3	31.2	13.3	0-29
Barium	1430	1480	3.4	0-20
Beryllium	11.1	11.2	0.9	0-25
Cadmium	3.9	4.2	7.4	0-20
Calcium	23300	23600	1.3	0-20
Chromium	104	107	2.8	0-47
Cobalt	15.4	16.2	5.1	0-30
Copper	5.5	5.7	3.6	0-21
Iron	16500	17000	3.0	0-23
Lead	24.9	27.3	9.2	0-44
Magnesium	3640	3670	0.8	0-20
Manganese	27.4	27.7	1.1	0-30
Molybdenum	anr			
Nickel	28.2	29.2	3.5	0-56
Potassium	5140	5190	1.0	0-20
Selenium	3.2	3.5	9.0	0-36
Silver	0.0	0.0	NC	0-20
Sodium	9760	9790	0.3	0-20
Thallium	0.0	7.2	200.0(a)	0-26
Tin				
Vanadium	131	134	2.3	0-28
Zinc	46.7	53.4	13.4	0-54

Associated samples MP4011: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) RPD acceptable due to low duplicate and sample concentrations.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4011
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/07/01

Metal	BSP Result	Spikelot MPFLICP	% Rec	QC Limits
Aluminum	29500	29000	101.7	80-120
Antimony	1010	1000	101.0	80-120
Arsenic	4040	4000	101.0	80-120
Barium	3900	4000	97.5	80-120
Beryllium	105	100	105.0	80-120
Cadmium	103	100	103.0	80-120
Calcium	27100	25000	108.4	80-120
Chromium	420	400	105.0	80-120
Cobalt	1030	1000	103.0	80-120
Copper	495	500	99.0	80-120
Iron	29800	27000	110.4	80-120
Lead	1040	1000	104.0	80-120
Magnesium	26000	25000	104.0	80-120
Manganese	1050	1000	105.0	80-120
Molybdenum				
Nickel	1050	1000	105.0	80-120
Potassium	25500	25000	102.0	80-120
Selenium	4150	4000	103.8	80-120
Silver	107	100	107.0	80-120
Sodium	23600	25000	94.4	80-120
Thallium	4110	4000	102.8	80-120
Tin				
Vanadium	1040	1000	104.0	80-120
Zinc	1090	1000	109.0	80-120

Associated samples MP4011: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4011
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/07/01

Metal	F11691-4 Original	SDL 1:5	RPD	QC Limits
Aluminum	71800	87100	21.3*(a)	0-10
Antimony	0.00	0.00	NC	0-10
Arsenic	27.3	44.6	63.2 (b)	0-10
Barium	1430	1810	26.1*(a)	0-10
Beryllium	11.1	16.4	47.9*(a)	0-10
Cadmium	3.90	4.08	4.6	0-10
Calcium	23300	32100	37.5*(a)	0-10
Chromium	104	135	30.3*(a)	0-10
Cobalt	15.4	20.4	31.9 (b)	0-10
Copper	5.49	5.86	6.7	0-10
Iron	16500	21600	30.5*(a)	0-10
Lead	24.9	40.2	61.5 (b)	0-10
Magnesium	3640	4720	29.8*(a)	0-10
Manganese	27.4	42.4	54.6*(a)	0-10
Molybdenum	anr			
Nickel	28.2	33.7	19.3 (b)	0-10
Potassium	5140	7970	55.1*(a)	0-10
Selenium	3.22	13.1	305.6(b)	0-10
Silver	0.00	0.00	NC	0-10
Sodium	9760	10800	10.0	0-10
Thallium	0.00	0.00	NC	0-10
Tin				
Vanadium	131	169	28.7*(a)	0-10
Zinc	46.7	148	216.4*(a	0-10

Associated samples MP4011: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) Serial dilution indicates possible matrix interference.
(b) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4015
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/11/01

Metal	RL	IDL	MB raw	final
Aluminum	200	9.44	20.6	<200
Antimony	5.0	2.56	-0.68	<5.0
Arsenic	10	3.15	1.6	<10
Barium	200	.94	0.39	<200
Beryllium	5.0	.22	0.21	<5.0
Cadmium	5.0	.27	-0.080	<5.0
Calcium	1000	10.2	3.0	<1000
Chromium	10	.35	0.42	<10
Cobalt	50	.55	-0.21	<50
Copper	25	.71	0.75	<25
Iron	300	9.02	32.5	<300
Lead	5.0	1.16	3.0	<5.0
Magnesium	5000	25.5	4.2	<5000
Manganese	15	.26	0.11	<15
Molybdenum	50	1.01	anr	
Nickel	40	.8	-0.25	<40
Potassium	5000	49	734	<5000
Selenium	10	2.5	2.3	<10
Silver	10	.59	-0.53	<10
Sodium	5000	173	53.3	<5000
Thallium	10	2.07	-3.8	<10
Tin	50	1.03		
Vanadium	50	.58	0.57	<50
Zinc	20	.36	17.8	<20

Associated samples MP4015: F11691-2A, F11691-3A, F11691-4A, F11691-5A, F11691-8A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4015
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/11/01 | 12/11/01

Metal	F11727-1 Original	MS	Spikelot MPFLICP	% Rec	QC Limits	F11727-1 Original	MSD	Spikelot MPFLICP	% Rec	QC Limits
Aluminum	230	32400	29000	110.9	70-122	230	32400	29000	110.9	70-122
Antimony	0.0	1000	1000	100.0	66-120	0.0	1020	1000	102.0	66-120
Arsenic	0.0	4190	4000	104.8	75-120	0.0	4280	4000	107.0	75-120
Barium	372	4310	4000	98.5	72-120	372	4320	4000	98.7	72-120
Beryllium	0.0	101	100	101.0	73-120	0.0	103	100	103.0	73-120
Cadmium	0.0	91.4	100	91.4	72-120	0.0	94.1	100	94.1	72-120
Calcium	504000	528000	25000	96.0	37-150	504000	542000	25000	152.0(a)	37-150
Chromium	453	842	400	97.3	69-122	453	862	400	102.3	69-122
Cobalt	4.3	952	1000	94.8	69-120	4.3	975	1000	97.1	69-120
Copper	32.4	565	500	106.5	70-120	32.4	565	500	106.5	70-120
Iron	92.1	28500	27000	105.2	72-122	92.1	29200	27000	107.8	72-122
Lead	48.4	1010	1000	96.2	70-126	48.4	1030	1000	98.2	70-126
Magnesium	70.9	26000	25000	103.7	73-127	70.9	26500	25000	105.7	73-127
Manganese	3.0	991	1000	98.8	74-122	3.0	1010	1000	100.7	74-122
Molybdenum										
Nickel	10.5	956	1000	94.6	69-120	10.5	979	1000	96.9	69-120
Potassium	184000	217000	25000	132.0(a)	61-122	184000	210000	25000	104.0	61-122
Selenium	0.0	4150	4000	103.8	74-120	0.0	4260	4000	106.5	74-120
Silver	0.0	103	100	103.0	52-126	0.0	104	100	104.0	52-126
Sodium	326000	371000	25000	180.0(a)	56-130	326000	369000	25000	172.0(a)	56-130
Thallium	17.2	3790	4000	94.3	80-122	17.2	3880	4000	96.6	80-122
Tin										
Vanadium	2.1	1020	1000	101.8	75-122	2.1	1040	1000	103.8	75-122
Zinc	10.5	990	1000	98.0	68-123	10.5	1030	1000	102.0	68-123

Associated samples MP4015: F11691-2A, F11691-3A, F11691-4A, F11691-5A, F11691-8A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4015
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/11/01

Metal	F11727-1 Original	DUP	RPD	QC Limits
Aluminum	230	239	3.8	0-23
Antimony	0.0	0.0	NC	0-20
Arsenic	0.0	0.0	NC	0-29
Barium	372	372	0.0	0-20
Beryllium	0.0	0.0	NC	0-25
Cadmium	0.0	0.0	NC	0-20
Calcium	504000	513000	1.8	0-20
Chromium	453	457	0.9	0-47
Cobalt	4.3	4.4	2.3	0-30
Copper	32.4	32.1	0.9	0-21
Iron	92.1	95.0	3.1	0-23
Lead	48.4	48.9	1.0	0-44
Magnesium	70.9	75.0	5.6	0-20
Manganese	3.0	3.4	12.5	0-30
Molybdenum	anr			
Nickel	10.5	10.5	0.0	0-56
Potassium	184000	185000	0.5	0-20
Selenium	0.0	0.0	NC	0-36
Silver	0.0	0.0	NC	0-20
Sodium	326000	329000	0.9	0-20
Thallium	17.2	13.9	21.2	0-26
Tin				
Vanadium	2.1	1.9	10.0	0-28
Zinc	10.5	10.6	0.9	0-54

Associated samples MP4015: F11691-2A, F11691-3A, F11691-4A, F11691-5A, F11691-8A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4015
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/11/01

Metal	BSP Result	Spikelot MPFLICP	% Rec	QC Limits
Aluminum	31300	29000	107.9	80-120
Antimony	1000	1000	100.0	80-120
Arsenic	4050	4000	101.3	80-120
Barium	3990	4000	99.8	80-120
Beryllium	101	100	101.0	80-120
Cadmium	97.0	100	97.0	80-120
Calcium	26900	25000	107.6	80-120
Chromium	403	400	100.8	80-120
Cobalt	991	1000	99.1	80-120
Copper	568	500	113.6	80-120
Iron	29400	27000	108.9	80-120
Lead	1010	1000	101.0	80-120
Magnesium	26700	25000	106.8	80-120
Manganese	1020	1000	102.0	80-120
Molybdenum				
Nickel	1000	1000	100.0	80-120
Potassium	26000	25000	104.0	80-120
Selenium	4130	4000	103.3	80-120
Silver	104	100	104.0	80-120
Sodium	26200	25000	104.8	80-120
Thallium	4000	4000	100.0	80-120
Tin				
Vanadium	1020	1000	102.0	80-120
Zinc	1020	1000	102.0	80-120

Associated samples MP4015: F11691-2A, F11691-3A, F11691-4A, F11691-5A, F11691-8A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4015
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 12/11/01

Metal	F11727-1 Original	SDL 1:5	RPD	QC Limits
Aluminum	230	382	66.5 (a)	0-10
Antimony	0.00	0.00	NC	0-10
Arsenic	0.00	0.00	NC	0-10
Barium	372	379	2.0	0-10
Beryllium	0.00	2.59		0-10
Cadmium	0.00	0.00	NC	0-10
Calcium	504000	560000	11.2*(b)	0-10
Chromium	453	472	4.1	0-10
Cobalt	4.31	3.27	24.1 (a)	0-10
Copper	32.4	29.9	7.7	0-10
Iron	92.1	144	56.6 (a)	0-10
Lead	48.4	60.5	25.0 (a)	0-10
Magnesium	70.9	0.00	100.0(a)	0-10
Manganese	2.97	3.28	10.4 (a)	0-10
Molybdenum	anr			
Nickel	10.5	10.4	1.7	0-10
Potassium	184000	195000	5.8	0-10
Selenium	0.00	0.00	NC	0-10
Silver	0.00	0.00	NC	0-10
Sodium	326000	274000	15.9*(b)	0-10
Thallium	17.2	0.00	100.0(a)	0-10
Tin				
Vanadium	2.07	3.10	49.8 (a)	0-10
Zinc	10.5	8.36	20.3 (a)	0-10

Associated samples MP4015: F11691-2A, F11691-3A, F11691-4A, F11691-5A, F11691-8A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
(b) Serial dilution indicates possible matrix interference.

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01

Metal	RL	IDL	MB raw	final
Mercury	1.0	.06	-0.19	<1.0

Associated samples MP4042: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01 12/17/01

Metal	F11612-19 Original	DUP	RPD	QC Limits	F11612-19 Original	MS	Spikelot HGFLWS	% Rec	QC Limits
Mercury	0.0	0.0	NC	0-20	0.0	3.2	3	106.7	62-131

Associated samples MP4042: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01

Metal	F11612-19 Original	MSD	Spikelot HGFLWS	% Rec	QC Limits
Mercury	0.0	3.2	3	106.7	62-131

Associated samples MP4042: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4042
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/17/01

Metal	BSP Result	Spikelot HGFLWS	% Rec	QC Limits
Mercury	3.1	3	103.3	80-120

Associated samples MP4042: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4052
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/20/01

Metal	RL	IDL	MB raw	final
Mercury	1.0	.06	-0.15	<1.0

Associated samples MP4052: F11691-6, F11691-8, F11691-2A, F11691-3A, F11691-4A, F11691-5A, F11691-8A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4052
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/20/01 12/20/01

Metal	F11643-12 Original	DUP	RPD	QC Limits	F11643-12 Original	MS	Spikelot HGFLWS	% Rec	QC Limits
Mercury	0.0	0.0	NC	0-20	0.0	3.2	3	106.7	62-131

Associated samples MP4052: F11691-6, F11691-8, F11691-2A, F11691-3A, F11691-4A, F11691-5A, F11691-8A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4052
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/20/01

Metal	F11643-12 Original	MSD	Spikelot HGFLWS	% Rec	QC Limits
Mercury	0.0	3.2	3	106.7	62-131

Associated samples MP4052: F11691-6, F11691-8, F11691-2A, F11691-3A, F11691-4A, F11691-5A, F11691-8A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

QC Batch ID: MP4052
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 12/20/01

Metal	BSP Result	Spikelot HGFLWS	% Rec	QC Limits
Mercury	3.2	3	106.7	80-120

Associated samples MP4052: F11691-6, F11691-8, F11691-2A, F11691-3A, F11691-4A, F11691-5A, F11691-8A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

Method Blank Summary

Job Number: F11691
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP633-MB	GG03017.D	1	12/11/01	JH	12/07/01	OP633	GGG109

The QC reported here applies to the following samples: **Method:** SW846 8151

F11691-1, F11691-6

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	1.0	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	ug/l	
93-76-5	2,4,5-T	ND	0.20	ug/l	

CAS No.	Surrogate Recoveries		Limits
19719-28-9	2,4-DCAA	80%	10-150%

Method Blank Summary

Job Number: F11691
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP633-MB2	GG02999.D	1	12/10/01	JH	12/08/01	OP633	GGG109

The QC reported here applies to the following samples: **Method:** SW846 8151

F11691-2, F11691-3, F11691-4, F11691-5, F11691-8

CAS No.	Compound	Result	RL	Units	Q
94-75-7	2,4-D	ND	1.0	ug/l	
93-72-1	2,4,5-TP (Silvex)	ND	0.20	ug/l	
93-76-5	2,4,5-T	ND	0.20	ug/l	

CAS No.	Surrogate Recoveries		Limits
19719-28-9	2,4-DCAA	70%	10-150%

Blank Spike Summary

Job Number: F11691
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP633-BS2	GG02998.D	1	12/10/01	JH	12/08/01	OP633	GGG109

The QC reported here applies to the following samples: **Method:** SW846 8151

F11691-2, F11691-3, F11691-4, F11691-5, F11691-8

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
94-75-7	2,4-D	2	1.9	95	50-150 [a]
93-72-1	2,4,5-TP (Silvex)	0.4	0.30	75	50-150 [a]
93-76-5	2,4,5-T	0.4	0.28	70	50-150 [a]

CAS No.	Surrogate Recoveries	BSP	Limits
19719-28-9	2,4-DCAA	80%	10-150%

(a) Advisory control limits.

Blank Spike Summary

Job Number: F11691
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP633-BS1	GG03016.D	1	12/11/01	JH	12/07/01	OP633	GGG109

The QC reported here applies to the following samples: **Method:** SW846 8151

F11691-1, F11691-6

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
94-75-7	2,4-D	2	1.6	80	50-150 [a]
93-72-1	2,4,5-TP (Silvex)	0.4	0.25	63	50-150 [a]
93-76-5	2,4,5-T	0.4	0.25	63	50-150 [a]

CAS No.	Surrogate Recoveries	BSP	Limits
19719-28-9	2,4-DCAA	78%	10-150%

(a) Advisory control limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F11691
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP633-MS	GG03044.D	1	12/11/01	JH	12/07/01	OP633	GGG109
OP633-MSD	GG03045.D	1	12/11/01	JH	12/07/01	OP633	GGG109
F11691-1	GG03043.D	1	12/11/01	JH	12/07/01	OP633	GGG109

The QC reported here applies to the following samples: **Method:** SW846 8151

F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

CAS No.	Compound	F11691-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
94-75-7	2,4-D	ND		4	4.3	108	4.4	110	2	50-150/30 [a]
93-72-1	2,4,5-TP (Silvex)	ND		0.8	0.59	74	0.56	70	5	50-150/30 [a]
93-76-5	2,4,5-T	ND		0.8	0.56	70	0.53	66	6	50-150/30 [a]

CAS No.	Surrogate Recoveries	MS	MSD	F11691-1	Limits
19719-28-9	2,4-DCAA	93%	94%	65%	10-150%

(a) Advisory control limits.

Semivolatile Surrogate Recovery Summary

Job Number: F11691
Account: ALSE Accutest Labs S. E.
Project: KFSSCSIM: Omni-Oak Hammock

Method: SW846 8151 **Matrix:** AQ

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1 [a]
F11691-1	GG03043.D	65.0
F11691-2	GG03029.D	49.0
F11691-3	GG03030.D	81.0
F11691-4	GG03031.D	79.0
F11691-5	GG03032.D	42.0
F11691-6	GG03046.D	59.0
F11691-8	GG03033.D	27.0
OP633-BS1	GG03016.D	78.0
OP633-BS2	GG02998.D	80.0
OP633-MB	GG03017.D	80.0
OP633-MB2	GG02999.D	70.0
OP633-MS	GG03044.D	93.0
OP633-MSD	GG03045.D	94.0

Surrogate Compounds	Recovery Limits
S1 = 2,4-DCAA	10-150%

(a) Recovery from GC signal #1

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

Analyte	Batch ID	RL	MB Result	Units	BSP %Recov	QC Limits
Nitrogen, Nitrate	GP2788/GN8542	0.10	<0.10	mg/l	94.0	90-110%

Associated Samples:
Batch GP2788: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Nitrogen, Nitrate	GP2788/GN8542	F11691-1	mg/l	<0.10	1	0.92	92.0	80-120%
Nitrogen, Nitrate	GP2788/GN8542	F11691-1	mg/l	<0.10	1	0.95	95.0	80-120%

Associated Samples:
Batch GP2788: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: F11691
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3014 - Omni-Oak Hammock

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Nitrogen, Nitrate	GP2788/GN8542	F11691-1	mg/l	<0.10	<0.10	0.0	0-20%

Associated Samples:
Batch GP2788: F11691-1, F11691-2, F11691-3, F11691-4, F11691-5, F11691-6, F11691-8

4 COOLERS

ACCUTEST

CHAIN OF CUSTODY

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #: F11691
ACCUTEST QUOTE #: 112601A-JF

CLIENT INFORMATION

KUBAL-FURR + ASSOCIATES
NAME
PO BOX 80247
ADDRESS
CITY, SIMPSONVILLE STATE SC ZIP 29650
SEND REPORT TO: DIANE ROSSETER
PHONE # (864) 962-9490

FACILITY INFORMATION

OMNI- OAK HAMMOCK
PROJECT NAME
HOLOPAW, FL
LOCATION
PROJECT NO. 480H01
FAX # (864) 962-5309

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	DATE	TIME	SAMPLED BY:	MATRIX	# OF BOTTLES	HCl	NaOH	HNO3	H2SO4	NONE	TCL VOCs	TCL SVOCs	TCL PESTICIDES	TAL METALS (TOTAL)	HERBICIDES	NITRATE	TAL METALS (DISSOLVED)	LAB USE ONLY
1)	DP-19	12/4/01	1615	GK	GW	11	✓		✓		✓	✓	✓	✓	✓	✓	✓		
2)	DP-11	12/4/01	1405	GK	GW	12	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	
3)	DP-12	12/4/01	1240	GK	GW	12	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	
4)	DP-23	12/4/01	1040	GK	GW	12	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	
5)	DP-9	12/4/01	0905	GK	GW	12	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	
6)	BLIND DUPLICATE	12/4/01		GK	GW	11	✓		✓		✓	✓	✓	✓	✓	✓	✓	~~✓~~ GK	
7)	TRIP BLANK						✓					✓							
8)	DP-18	12/5/01	0835	GK	GW	12	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	

DATA TURNAROUND INFORMATION

☒ STANDARD
☐ 48 HOUR RUSH
☐ 24 HOUR EMERGENCY
☐ OTHER
APPROVED BY:
EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

☐ STANDARD
☐ COMMERCIAL "B"
☐ DISK DELIVERABLE
☐ STATE FORMS
☐ OTHER (SPECIFY)

COMMENTS/REMARKS

EXTENDED TCL LIST AS IN OLM04.2
SEE TASK ORDER 480H01 ADDENDUM
METALS (TOTAL) NOT FIELD FILTERED
PLEASE FAX CHAIN TO SIMPSONVILLE

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY	DATE TIME	RECEIVED BY	RELINQUISHED BY	DATE TIME	RECEIVED BY
1. [signature] (SAMPLER)	12/5/01 1110	1. SECURE AREA	2.		2. [signature] 12/11/01-0800
3.		3.	4.		4.
5.		5.	SEAL #	PRESERVE WHERE APPLICABLE ☐ ON ICE ☐	TEMPERATURE C

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No. 48OH01
Site Location Oak Hammock
Field Personnel G. Kinsman/S. Nix
Well / Sample ID DP-1
Weather Condition SUNNY - 70's

Sample Date 12/3/01 Arrival Time 0950 Sample Time 1130

Description of Measuring Point (MP): TOC | Casing Type: PVC | Locking Cap: ✓ | Casing Diameter: 2 inches

Purge Method: PERISTALTIC | Sampling Method: SAME

Purge Start Time: 1021 | Purge Stop Time: 1126 | Purge Rate: ~~~300~~ ml/min GTK 250ml/min

Water-Level Measurements / Field Parameters

Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (~~°F~~ °C)	Specific Conductance (~~µmhos/cm~~ mS/cm)	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	5.62	0	0	—	—	—	—	—	—
1	5	5.66	1	5	24.0	0.079	4.91	281.0	0.22	93
2	10	5.66	2	10	24.0	0.075	4.90	340.0	0.33	84
3	15	5.66	3	15	24.1	0.071	4.90	430.0	0.42	78
4	20	5.66	4	20	24.0	0.069	4.87	239	0.08	75
5	25	5.66	5	25	24.0	0.069	4.87	294	0.11	74
6	30	5.66	6	30	23.9	0.068	4.86	* 999.0	0.09	72
7	35	5.66	7	35	23.9	0.067	4.87	*999.0	0.00	71
8	40	5.66	8	40	24.0	0.067	4.88	*999.0	0.00	71
9	45	5.66	9	45	24.0	0.067	4.88	837	0.00	71
10	50	5.66	10	50	24.0	0.067	4.89	787	0.04	71
11	55	5.66	11	55	24.3	0.067	4.88	621	0.07	71
12	60	5.66	12	60	24.3	0.067	4.89	633	0.10	71
13	65	5.66	13	65	24.1	0.067	4.87	677	0.09	70
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOC - 8260	3x 40ml VOA	HCl
SVOC - 8270	2x 1L AMBER JAR	NONE
METALS	1 x 1L PLASTIC BOTTLE	HNO_3
ANIONS	1 x 500ml PLASTIC BOTTLE	NONE
PEST. - 8081	2x 1L AMBER JAR	NONE
HERB. - 8151	2x 1L AMBER JAR	NONE
DISS. METALS	1x 1L PLASTIC BOTTLE	NONE

Remarks * FLASHING READING OF 999.0 - IN MANUAL EXPLAINATION IS SENSOR NEEDS CLEANING + CALIBRATION, - WILL RE-CALIBRATE BEFORE NEXT WELL. (READING MIGHT BEEN OUT OF RANGE) - TURBID WATER

TOTAL PURGED ~ 5G

(cont)

Parameter Conditions: pH +/- 0.1 standard unit; COND +/- 3%; DO +/- 10%; Turbidity +/- 10% above 10 NTU, +/- 1 NTU below 10 NTU; ORP +/- 10mV

Total purge: ≈ 5 gallons

~~OUCC - Augusta Chemical Ground Water Sampling Log~~ GTK

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No. 48OH01
Site Location Oak Hammock
Field Personnel G. Kinsman/S. Nix
Well / Sample ID DP-2
Weather Condition SUNNY- 80
Sample Date 12/3/01 Arrival Time 0950 Sample Time 1340

Description of Measuring Point (MP) TOC | Casing Type PVC | Locking Cap ✓ | Casing Diameter 2 inches

Purge Method PERISTALTIC | Sampling Method SAME

Purge Start Time 1227 | Purge Stop Time 1335 | Purge Rate ~250 ml/min

Water-Level Measurements | Field Parameters

Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (°C)	Specific Conductance ~~(umhos/cm)~~ mS/cm	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	5.35	0	0	—	—	—	—	—	—
1	5	5.47	1	5	24.3	0.071	4.71	65.7	0.70	62
2	10	5.48	2	10	24.3	0.070	4.70	30.0	0.46	56
3	15	5.48	3	15	24.4	0.071	4.71	17.1	~~0.07~~ → 0.28	51
4	20	5.48	4	20	24.4	0.070	4.73	10.8	0.46	47
5	25	5.48	5	25	24.5	0.070	4.73	18.3	0.24	43
6	30	5.48	6	30	24.4	0.070	4.73	10.1	0.18	42
7	35	5.48	7	35	24.3	0.070	4.74	-9.2	0.23	39
8	40	5.48	8	40	24.3	0.070	4.75	-5.0	0.23	37
9	45	5.48	9	45	24.3	0.070	4.77	65.1	0.24	34
10	50	5.48	10	50	24.3	0.070	4.77	79.2	0.17	34
11	55	5.48	11	55	24.2	0.070	4.78	35.8	0.14	33
12	60	5.48	12	60	24.2	0.070	4.77	41.1	0.12	33
13	65	5.48	13	65	24.3	0.069	4.78	41.9	0.13	31
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOCs 8260	3 x 40ml	HCl
SVOCs 8270	2 x 1L AMBER JAR	NONE
METALS	1 x 1L PLASTIC BOTTLE	HNO_3
ANIONS	1 x 500ml PLASTIC BOTTLE	NONE
PEST- 8081	2 x 1L AMBER JAR	NONE
HERB - 8151	2x 1L AMBER JAR	NONE
~~DISS. METALS~~ GTK	~~1x 1L PLASTIC BOTTLE~~ GTK	~~NONE~~ GTK

Remarks NO DISSOLVED METALS SAMPLED - TURBIDITY WAS LOW - LESS THAN 50 NTU
TOTAL PURGED ~5G

Parameter Conditions: pH +/- 0.1 standard unit COND +/- 3% DO +/- 10%
Turbidity +/- 10% above 10 NTU +/- 1 NTU below 10 NTU ORP +/- 10mV

GTK ~~DUCC - Augusta Chemical Ground-Water Sampling Log~~

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No. 48OH01
Site Location Oak Hammock
Field Personnel G. Kinsman/S. Nix
Well / Sample ID DP-10
Weather Condition SUNNY - 80's
Sample Date 12/3/01 Arrival Time 1423 Sample Time 1512

Description of Measuring Point (MP) TOC | Casing Type PVC | Locking Cap ✓ | Casing Diameter 2 inches
Purge Method PERISTALTIC | Sampling Method SAME
Purge Start Time 1433 | Purge Stop Time 1520 | Purge Rate ~250 ml/min

Water-Level Measurements / Field Parameters

Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (°C)	Specific Conductance (~~µmhos/cm~~ mS/cm)	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	5.08	0	0	—	—	—	—	—	—
1	5	5.21	1	5	24.0	0.129	5.35	*999.0	1.16	-2
2	10	5.19	2	10	24.0	0.135	5.46	*999.0	2.04	-20
3	15	5.19	3	15	24.1	0.134	5.47	*999.0	0.86	-26
4	20	5.19	4	20	24.1	0.134	5.45	*999.0	0.38	-27
5	25	5.20	5	25	24.1	0.134	5.47	*999.0	0.64	-29
6	30	5.21	6	30	24.1	0.134	5.46	*999.0	0.63	-29
7	35	5.21	7	35	24.0	0.133	5.45	*999.0	1.20	-29
8	40	5.21	8	40	24.0	0.132	5.44	*999.0	1.16	-27
9	45	5.20	9	45	24.0	0.130	5.43	*999.0	1.08	-25
10			10							
11			11							
12			12							
13			13							
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOCs 8260	3x40ml VOA	HCl
SVOCs 8270	2x1L AMBER JAR	NONE
METALS	1x1L PLASTIC BOTTLE	HNO3
ANIONS	1x500ml PLASTIC BOTTLE	NONE
PEST. - 8081	2x1L AMBER JAR	NONE
HERB. - 8151	2x1L AMBER JAR	NONE
DISS. METALS	1x1L PLASTIC BOTTLE	NONE

Remarks *FLASHING 999.0 - READING OUT OF RANGE - WILL RE-CALIBRATE BEFORE NEXT WELL - TURBID WATER

TOTAL PURGED ~4G

CONT

Parameter Conditions: pH +/- 0.1 standard unit COND +/- 3% DO +/- 10%
Turbidity +/- 10% above 10 NTU +/- 1 NTU below 10 NTU ORP +/- 10mV

GTK
~~BUCC Augusta Chemical Ground Water Sampling Log~~
OMNI WASTE - OAK HAMMOCK

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No. 48OH01
Site Location Oak Hammock
Field Personnel G. Kinsman/S. Nix
Well / Sample ID DP-22
Weather Condition SUNNY-80

Sample Date 12/3/01 Arrival Time 1609 Sample Time 1650

Description of Measuring Point (MP) TOC | Casing Type PVC | Locking Cap ✓ | Casing Diameter 2 inches

Purge Method PERISTALTIC | Sampling Method SAME

Purge Start Time 1613 | Purge Stop Time 1640 | Purge Rate ~250 ml/min

Water-Level Measurements			Field Parameters							
Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (°C)	Specific Conductance ~~(umhos/cm)~~ mS/cm	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	4.57	0	0	—	—	—	—	—	—
1	5	4.78	1	5	23.7	0.102	5.23	672.0	0.28	23
2	10	4.74	2	10	23.7	0.101	5.22	638.0	0.14	19
3	15	4.74	3	15	23.7	0.101	5.26	652	0.07	14
4	20	4.75	4	20	23.7	0.101	5.25	645	0.05	12
5	25	4.75	5	25	23.7	0.101	5.26	682	0.05	10
6	30	4.75	6	30	23.7	0.101	5.26	6[illegible]	0.04	9
7			7							
8			8							
9			9							
10			10							
11			11							
12			12							
13			13							
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOCs - 8260	3 x 40ml VOA	HCl
SVOCs - 8270	2 x 1L AMBER JAR	NONE
METALS	1 x 1L PLASTIC BOTTLE	HNO_3
ANIONS (NITRATE)	1 x 500ml PLASTIC BOTTLE	NONE
PEST. - 8081	2 x 1L AMBER JAR	NONE
HERB. - 8151	2 x 1L AMBER JAR	NONE
DISS. METALS	1 x 1L PLASTIC BOTTLE	NONE

(con't)

Remarks TURBID WATER

TOTAL PURGED ~ 2.5G

Parameter Conditions: pH +/- 0.1 standard unit COND +/- 3% DO +/- 10%
Turbidity +/- 10% above 10 NTU +/- 1 NTU below 10 NTU ORP +/- 10mV

~~BUCC - Augusta Chemical Ground-Water Sampling Log~~

OMNI WASTE - OAK HAMMOCK

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No. 48OH01
Site Location Oak Hammock
Field Personnel G. Kinsman/S. Nix
Well / Sample ID DP-9
Weather Condition SUNNY-70s

Sample Date 12/4/01 Arrival Time 0725 Sample Time 0905

Description of Measuring Point (MP) TOC | Casing Type PVC | Locking Cap ✓ | Casing Diameter 2 inches

Purge Method PERISTALTIC | Sampling Method SAME

Purge Start Time 0753 | Purge Stop Time 0859 | Purge Rate ~250 ml/min

Water-Level Measurements / Field Parameters

Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (°C)	Specific Conductance (~~µmhos/cm~~ mS/cm)	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	4.96	0	0	—	—	—	—	—	—
1	5	5.05	1	5	22.6	0.364	6.40	17.3	0.39	-47
2	10	5.05	2	10	22.6	0.351	6.40	31.8	0.31	-56
3	15	5.05	3	15	22.7	0.312	6.28	114.0	0.81	-52
4	20	5.06	4	20	22.7	0.241	6.01	225.0	0.81	-33
5	25	5.06	5	25	22.8	0.223	5.88	301.0	0.72	-27
6	30	5.06	6	30	22.9	0.218	5.85	421.0	0.70	-27
7	35	5.08	7	35	23.1	0.212	5.80	*999.0	0.64	-23
8	40	5.09	8	40	23.2	0.218	5.80	*999.0	0.56	-18
9	45	5.08	9	45	23.3	0.217	5.79	*999.0	0.49	-17
10	50	5.08	10	50	23.4	0.216	5.79	*999.0	0.44	-17
11	55	5.09	11	55	23.5	0.215	5.78	*999.0	0.11	-16
12	60	5.09	12	60	23.5	0.211	5.77	*999.0	0.05	-16
13	65	5.09	13	65	23.6	0.209	5.75	*999.0	0.13	-16
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOCs - 8260	3x40ml	HCl
SVOCs - 8270	2x1L AMBER JAR	NONE
METALS (TOTAL)	1x1L PLASTIC BOTTLE	HNO_3
ANIONS (NITRATE)	1x500ml PLASTIC BOTTLE	NONE
PEST. - 8081	2x1L AMBER JAR	NONE
HERB - 8151	2x1L AMBER JAR	NONE
DISS. METALS	1x1L PLASTIC BOTTLE	NONE

Remarks: * FLASHING 999.0 ON METER - READING OUT OF RANGE. WATER HAS GOTTEN MORE TURBID AS PUMPING CONTINUED. - TURBID WATER
DO FLUCTUATING - DECIDED TO SAMPLE TOTAL PURGED ~5G

Parameter Conditions: pH +/- 0.1 standard unit COND +/- 3% DO +/- 10%
Turbidity +/- 10% above 10 NTU +/- 1 NTU below 10 NTU ORP +/- 10mV

~~BUGC - Augusta Chemical Ground Water Sampling Log~~
OMNI WASTE - OAK HAMMOCK

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No. 48OH01
Site Location Oak Hammock
Field Personnel G. Kinsman/S. Nix
Well / Sample ID DP-23
Weather Condition SUNNY 80
Sample Date 12/4/01 Arrival Time 0952 Sample Time 1040

Description of Measuring Point (MP) TOC | Casing Type PVC | Locking Cap ✓ | Casing Diameter 2 inches

Purge Method PERISTALTIC | Sampling Method SAME

Purge Start Time 1002 | Purge Stop Time 1035 | Purge Rate ~250 ml/min

Water-Level Measurements / Field Parameters

Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (°C)	Specific Conductance (mS/cm)	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	4.27	0	0	—	—	—	—	—	—
1	5	4.41	1	5	23.8	0.203	5.86	901.0	0.57	-11
2	10	4.42	2	10	23.8	0.195	5.82	983.0	0.25	-13
3	15	4.41	3	15	23.8	0.180	5.73	*999.0	0.11	-6
4	20	4.42	4	20	23.8	0.176	5.69	*999.0	0.07	-5
5	25	4.42	5	25	23.8	0.175	5.68	*999.0	0.08	-7
6	30	4.41	6	30	23.8	0.174	5.66	*999.0	0.08	-8
7			7							
8			8							
9			9							
10			10							
11			11							
12			12							
13			13							
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOCs 8260	3x40ml	HCl
SVOCs 8270	2x1L AMBER JAR	NONE
METALS (TOTAL)	1x1L PLASTIC BOTTLE	HNO3
ANIONS (NITRATE)	1x500ml PLASTIC BOTTLE	NONE
PEST. -8081	2x1L AMBER JAR	NONE
HERB - 8151	2x1L AMBER JAR	NONE
DISS. METALS	1x1L PLASTIC BOTTLE	NONE

Remarks *FLASHING 999.0 ON HORIBA - TURBIDITY OUT OF RANGE - TURBID WATER

TOTAL GALLONS PURGED ~3 6

(con't)

Parameter Conditions: pH +/- 0.1 standard unit COND +/- 3% DO +/- 10%
Turbidity +/- 10% above 10 NTU +/- 1 NTU below 10 NTU ORP +/- 10mV

~~SUCC - Augusta Chemical Ground-Water Sampling Log~~
OMNI WASTE - OAK HAMMOCK

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No. 48OH01
Site Location: Oak Hammock
Field Personnel: G. Kinsman/S. Nix
Well / Sample ID: DP-12
Weather Condition: SUNNY - 80's

Sample Date: 12/4/01 Arrival Time: 1142 Sample Time: 1240

Description of Measuring Point (MP): TOC Casing Type: PVC Locking Cap: ✓ Casing Diameter: 2 inches

Purge Method: PERISTALTIC Sampling Method: SAME

Purge Start Time: 1146 Purge Stop Time: 1236 Purge Rate: ~250 ml/min

Water-Level Measurements			Field Parameters							
Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (°C)	Specific Conductance (~~umhos/cm~~ mS/cm)	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	5.45	0	0	—	—	—	—	—	—
1	5	5.53	1	5	24.3	0.186	5.55	473.0	2.34	-40
2	10	5.52	2	10	24.4	0.182	5.52	442.0	1.89	-41
3	15	5.52	3	15	24.4	0.180	5.52	443.0	1.80	-43
4	20	5.52	4	20	24.4	0.174	5.49	388.0	1.51	-42
5	25	5.52	5	25	24.4	0.172	5.46	368.0	1.26	-41
6	30	5.52	6	30	24.4	0.167	5.44	330.0	0.97	-40
7	35	5.53	7	35	24.3	0.168	5.44	326.0	0.79	-41
8	40	5.52	8	40	24.4	0.160	5.39	301.6	0.63	-39
9	45	5.52	9	45	24.4	0.159	5.38	290.0	0.57	-39
10	50	5.53	10	50	24.3	0.158	5.39	285.0	0.56	-39
11			11							
12			12							
13			13							
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOCs - 8260	3x40ml	HCl
SVOCs - 8270	2x1L AMBER JAR	NONE
METALS (TOTAL)	1x 1L PLASTIC BOTTLE	HNO3
ANIONS (NITRATE)	1x500ml PLASTIC BOTTLE	NONE
PEST. - 8081	2x1L AMBER JAR	NONE
HERB. - 8151	2x1L AMBER JAR	NONE
DISS. METALS	1x 1L PLASTIC BOTTLE	NONE

Remarks: TURBID WATER

TOTAL PURGED ~4G

(CONT)

Parameter Conditions: pH +/- 0.1 standard unit COND +/- 3% DO +/- 10%
Turbidity +/- 10% above 10 NTU +/- 1 NTU below 10 NTU ORP +/- 10mV

~~BUCC - Augusta Chemical Ground-Water Sampling Log~~

OMNI WASTE - OAK HAMMOCK

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No. 48OH01
Site Location Oak Hammock
Field Personnel G. Kinsman/S. Nix
Well / Sample ID DP-11
Weather Condition PARTLY SUNNY - 80's

Sample Date 12/4/01 Arrival Time 1142 Sample Time 1405

Description of Measuring Point (MP): TOC | Casing Type: PVC | Locking Cap: ✓ | Casing Diameter: 2 inches

Purge Method: PERISTALTIC | Sampling Method: SAME

Purge Start Time: 1328 | Purge Stop Time: 1359 | Purge Rate: ~250 ml/min

Water-Level Measurements / Field Parameters

Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (°C)	Specific Conductance (mS/cm)	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	5.58	0	0	—	—	—	—	—	—
1	5	5.67	1	5	24.2	0.131	5.59	*999.0	0.90	-9
2	10	5.66	2	10	24.3	0.131	5.59	*999.0	0.47	-11
3	15	5.66	3	15	24.2	0.129	5.56	*999.0	0.42	-11
4	20	5.67	4	20	24.0	0.130	5.56	*999.0	0.20	-15
5	25	5.67	5	25	24.0	0.130	5.56	*999.0	0.23	-16
6	30	5.67	6	30	23.9	0.131	5.56	*999.0	0.21	-18
7			7							
8			8							
9			9							
10			10							
11			11							
12			12							
13			13							
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOCs - 8260	3x 40ml vot	HCl
SVOCs - 8270	2x 1L AMBER JAR	NONE
METALS (TOTAL)	1x 1L PLASTIC BOTTLE	HNO3
ANIONS (NITRATE)	1x 500ml PLASTIC BOTTLE	NONE
PEST. - 8081	2x 1L AMBER JAR	NONE
HERB. - 8151	2x 1L AMBER JAR	NONE
DISS. METALS	1x 1L PLASTIC BOTTLE	NONE

Remarks: * FLASHING 999.0 ON METER - TURBIDITY OUT OF RANGE - TURBID WATER

TOTAL PURGED ~ 2G

CONT

Parameter Conditions: pH +/- 0.1 standard unit; COND +/- 3%; DO +/- 10%; Turbidity +/- 10% above 10 NTU, +/- 1 NTU below 10 NTU; ORP +/- 10mV

~~BUCC - Augusta Chemical Ground Water Sampling Log~~
OMNI WASTE - OAK HAMMOCK

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No. 48OH01
Site Location Oak Hammock
Field Personnel G. Kinsman/S. Nix
Well / Sample ID DP-19
Weather Condition PARTLY SUNNY - 80's

Sample Date 12/4/01 Arrival Time 1505 Sample Time 1615

Description of Measuring Point (MP) TOC | Casing Type PVC | Locking Cap ✓ | Casing Diameter 2 inches

Purge Method PERISTALTIC | Sampling Method SAME

Purge Start Time 1511 | Purge Stop Time 1611 | Purge Rate ~250 ml/min

Water-Level Measurements			Field Parameters							
Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (~~°F~~ °C)	Specific Conductance (~~µmhos/cm~~ mS/cm)	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	5.10	0	0	—	—	—	—	—	—
1	5	5.29	1	5	23.8	0.207	5.78	36.5	0.41	-25
2	10	5.26	2	10	23.8	0.226	5.85	34.5	0.33	-41
3	15	5.27	3	15	23.7	0.239	5.89	27.4	0.29	-53
4	20	5.27	4	20	23.7	0.253	5.94	18.9	0.27	-62
5	25	5.27	5	25	23.7	0.244	5.91	16.2	0.25	-62
6	30	5.27	6	30	23.7	0.241	5.91	12.3	0.24	-65
7	35	5.27	7	35	23.7	0.233	5.88	14.4	0.22	-65
8	40	5.27	8	40	23.7	0.236	5.89	10.0	0.21	-66
9	45	5.28	9	45	23.7	0.226	5.86	7.9	0.20	-65
10	50	5.27	10	50	23.6	0.222	5.86	11.6	0.19	-66
11	55	5.28	11	55	23.6	0.216	5.83	11.3	0.20	-65
12	60	5.28	12	60	23.6	0.217	5.84	11.3	0.19	-64
13			13							
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOCs - 8260	3x40ml VOA	HCl
SVOCs 8270	2x1L AMBER JAR	NONE
METALS (TOTAL)	1x1L PLASTIC BOTTLE	HNO3
ANIONS (NITRATE)	1x500ml PLASTIC BOTTLE	NONE
PEST. - 8081	2x 1L AMBER JAR	NONE
HERB. - 8151	2x1L AMBER JAR	NONE

Remarks SAMPLED DUPLICATE - BLIND DUPLICATE
SINCE SAMPLE WAS CLEAR DID NOT SAMPLE DISSOLVED METALS
TOTAL PURGED ~4G

Parameter Conditions: pH +/- 0.1 standard unit COND +/- 3% DO +/- 10%
Turbidity +/- 10% above 10 NTU +/- 1 NTU below 10 NTU ORP +/- 10mV

Purged Well Sampling Log

Kubal-Furr & Associates
—Environmental Consultants—

Project No.	48OH01
Site Location	Oak Hammock
Field Personnel	G. Kinsman/S. Nix
Well / Sample ID	DP-18
Weather Condition	PARTLY SUNNY - 70s
Sample Time	0835

Sample Date 12/5/01 Arrival Time 0735

Description of Measuring Point (MP) TOC | Casing Type PVC | Locking Cap ✓ | Casing Diameter 2 inches

Purge Method PERISTALTIC | Sampling Method SAME

Purge Start Time 0748 | Purge Stop Time 0830 | Purge Rate ~250 ml/min

Water-Level Measurements / Field Parameters

Interval	Elapse Time (mins)	DTW (feet)	Interval	Elapse Time (mins)	Temperature (°C)	Specific Conductance ~~(umhos/cm)~~ mS/cm	pH (su)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
0	0	5.08	0	0	—	—	—	—	—	—
1	5	5.51	1	5	21.8	0.200	5.86	*999.0	0.63	9
2	10	5.55	2	10	22.8	0.241	6.15	*999.0	0.03	-36
3	15	5.57	3	15	23.0	0.341	6.44	*999.0	0.00	-68
4	20	5.57	4	20	23.1	0.359	6.49	*999.0	0.00	-75
5	25	5.58	5	25	23.2	0.377	6.54	*999.0	0.00	-82
6	30	5.59	6	30	23.2	0.389	6.55	*999.0	0.00	-86
7	35	5.60	7	35	23.3	0.396	6.56	*999.0	0.00	-90
8	40	5.61	8	40	23.4	0.398	6.56	*999.0	0.00	-93
9			9							
10			10							
11			11							
12			12							
13			13							
14			14							
15			15							
16			16							
17			17							
18			18							
19			19							
20			20							

Samples Collected	Container Description	Preservative
VOCs 8260	3x40ml	HCl
SVOC, 8270	2x1L AMBER JAR	NONE
METALS (TOTAL)	1x1L PLASTIC BOTTLE	HNO3
ANIONS (NITRATE)	1x500ml ~~AMBER~~ PLASTIC BOTTLE	NONE
PEST, -8081	2x1L AMBER JAR	NONE

Remarks *FLASHING 999.0 ON METER - TURBIDITY OUT OF RANGE - WATER IS TURBID

TOTAL PURGED ~ 3G

Parameter Conditions: pH +/- 0.1 standard unit; COND +/- 3%; DO +/- 10%; Turbidity +/- 10% above 10 NTU, +/- 1 NTU below 10 NTU; ORP +/- 10mV

(con't)

HERB. -8151	2x1L AMBER JAR	NONE
DISS. METALS	1x1L PLASTIC BOTTLE	NONE

~~BUCC - Augusta Chemical Ground Water Sampling Log~~

OMNI WASTE - OAK HAMMOCK

DATA ASSESSMENT SUMMARY CHECKLIST AND REPORT – LEVEL III

Client ID: Omni – Oak Hammock
Project Number: TFO48OH01
Project Description: Surfacewater

Prepared By: Diane M. Rosseter
Date: 2/22/02

Sample Delivery Group (SDG) Description:

Surfacewater samples were collected from designated sampling sites on or near the Omni – Oak Hammock landfill site in Holopaw, FL. The samples were collected by Kubal-Furr and Associates for Appendix I volatiles and metals, as well as various other analyses as specified by Florida DEP 62-701.510(8)(b). The samples were analyzed by AccuTest Laboratories Southeast of Orlando, FL, in accordance with FLADEP approved methodology. Fecal coliform and chlorophyll A analyses were subcontracted to Tri-Tech Analytical Laboratories of Orlando.

CONTENTS	LEVEL III	COMMENTS
Sample Results	√	All data **Class A** except as noted in the discussion section.
Chain(s) of Custody (COCs)	√	O.K.
Master Tracking List	√	O.K.
Case Narrative	√	O.K.
Sample Prep	√	O.K.
Standards Prep		
Instrument Quality Control Data	√	O.K.
Batch Quality Control Report	√	Metals and total phosphorus batch QC issues. Details given in discussion section.
Surrogate Recovery Report	√	O.K.
Trip/Field/Equipment Blank Report	√	O.K.
Field Notes/Logbook	√	O.K.
CLP Forms		
All Raw Data		
Electronic Deliverables	√	O.K.

Discussion:

ICP Metals

1) The prep blank and instrument calibration blanks associated with these samples contained trace levels of several metals between the instrument detection limit (IDL) and laboratory-reporting limit (RL). Results for these metals were either reported as not detected in the samples or were greater than five times the amount found in the prep blank, with the exception of lead in SURFACEWATER-4. Results for lead in SURFACEWATER-4 were flagged with "U" and the reporting limit raised to sample concentration.

2) The serial dilution associated with these samples was outside acceptance limits for iron. Results for iron were positively identified in all of the samples and were, therefore, qualified with "J".

3) The relative percent difference between results for total iron in the field duplicates SURFACEWATER-1 and SURFACEWATER-1 (DUP) was greater than 20%, a general guideline used for the comparison of duplicate results in aqueous samples. Results for iron in SURFACEWATER-1 and SURFACEWATER-1 (DUP) were flagged with "J".

4) It should be noted that results are reported in ug/L on the instrument blank results summary, however, the units are given as mg/L. In addition, that the true values given on the instrument calibration data are in mg/L, with the recovered results reported in ug/L. This issue has been addressed with the laboratory and is due to a glitch in the QC report-generation software.

5) It should also be noted that a reporting limit of 4.0 ug/L for beryllium is given on the analytical results. The reporting limit for beryllium given on the QC summary data is 5.0 ug/L, however this is the default laboratory-reporting limit used by the QC report-generation software. The lower reporting limit of 4.0 ug/L is valid, based on instrument calibration.

General Chemistry

1) The relative percent difference between results for the parameters listed below was greater than 20% in SURFACEWATER-1 and SURFACEWATER-1 (DUP). Results for these compounds were flagged with "J" in SURFACEWATER-1 and SURFACEWATER-1 (DUP).
   - total kjeldahl nitrogen, total ammonia nitrogen, unionized ammonia nitrogen, total nitrogen, total organic nitrogen, total suspended solids, total phosphorus, BOD-5 day, and chlorophyll A

2) The total phosphorus matrix spike recovered below the laboratory-established lower control limit. Positive results for total phosphorus were flagged with "J" and non-detects with "UJ" as indicated below:
   - flag results for total phosphorus with "J" in SURFACEWATER-1, SURFACEWATER-1 (DUP), SURFACEWATER-3, and SURFACEWATER-4
   - flag results for total phosphorus with "UJ" in SURFACEWATER-2

3) Fecal coliform results in SURFACEWATER-2 and SURFACEWATER-3 were flagged by the laboratory as "approximate numbers" due to the high colony count. A "J" flag was assigned to these results.

J = positively identified, however concentration should be considered as estimated
UJ = not detected above the associated quantitation limit, however results should be as Estimated
U = not detected above the associated sample quantitation limit

Class A = quantitative **Class B = qualitative** **Class C = unusable**

Southeast
ACCUTEST

02/19/02

Technical Report for

Kubal-Furr & Associates

Omni-Oak Hammock(2)

48OH01 HOLOPAW,FL

Accutest Job Number: F12247

Report to:

Kubal-Furr & Associates
P.O. Box 80247
Simpsonville, SC 29680

ATTN: Diane Rosseter

Total number of pages in report: 67

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Sample Summary

Kubal-Furr & Associates

Job No: F12247

Omni-Oak Hammock(2)
Project No: 48OH01 HOLOPAW,FL

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
F12247-1	02/07/02	11:00	GK	02/07/02	AQ	Ground Water	SURFACE WATER-1
F12247-2	02/07/02	11:00	GK	02/07/02	AQ	Ground Water	DUP SURFACE WATER 1
F12247-3	02/07/02	11:45	GK	02/07/02	AQ	Ground Water	SURFACE WATER-2
F12247-4	02/07/02	12:15	GK	02/07/02	AQ	Ground Water	SURFACE WATER-3
F12247-5	02/07/02	13:00	GK	02/07/02	AQ	Ground Water	SURFACE WATER-4
F12247-6	02/07/02	00:00	GK	02/07/02	AQ	Trip Blank Water	TRIP BLANK

Report of Analysis

Client Sample ID:	SURFACE WATER-1		
Lab Sample ID:	F12247-1	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0008118.D	1	02/08/02	JG	n/a	n/a	VC377
Run #2							

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
107-13-1	Acrylonitrile	ND	10	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
74-97-5	Bromochloromethane	ND	2.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
74-88-4	Methyl iodide	ND	10	ug/l	
74-95-3	Methylene bromide	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SURFACE WATER-1			
Lab Sample ID:	F12247-1		Date Sampled:	02/07/02
Matrix:	AQ - Ground Water		Date Received:	02/07/02
Method:	SW846 8260B		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)			

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
110-57-6	Trans-1,4-Dichloro-2-Butene	ND	10	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
108-05-4	Vinyl Acetate	ND	10	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	110%		80-120%
17060-07-0	1,2-Dichloroethane-D4	109%		80-120%
2037-26-5	Toluene-D8	90%		80-120%
460-00-4	4-Bromofluorobenzene	92%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	SURFACE WATER-1		
Lab Sample ID:	F12247-1	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Arsenic	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Barium	< 200	200	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Beryllium	< 4.0	4.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cadmium	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Chromium	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cobalt	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Copper	< 25	25	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Iron	1670	300	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Lead	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	ug/l	1	02/11/02	02/13/02	LIR	SW846 7470A	EPA 245.1
Nickel	< 40	40	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Selenium	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Silver	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Thallium	< 1.0	1.0	ug/l	1	02/12/02	02/13/02	ATX	EPA 279.2	EPA 200.9
Vanadium	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Zinc	< 20	20	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	SURFACE WATER-1		
Lab Sample ID:	F12247-1	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
BOD, 5 Day	5.6	2.0	mg/l	1	02/14/02	YA	EPA 405.1
Chemical Oxygen Demand	52.8	20	mg/l	1	02/11/02	LL	EPA 410.1
Hardness, Total	27.5	4.0	mg/l	1	02/18/02	EP	SW846 6010B/SM 2340B
Nitrogen, Ammonia	0.55	0.20	mg/l	1	02/14/02	LIR	EPA 350.1
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	02/08/02	LL	EPA 300/SW846 9056
Nitrogen, Total Kjeldahl	1.9	0.20	mg/l	1	02/14/02	LIR	EPA 351.3
Nitrogen, Total Organic [a]	1.4	0.40	mg/l	1	02/14/02	LIR	SM18 4500N
Phosphorus, Total	0.13	0.10	mg/l	1	02/08/02	LL	EPA 365.3
Solids, Total Dissolved	122	20	mg/l	2	02/09/02	YA	EPA 160.1
Solids, Total Suspended	17.0	4.0	mg/l	1	02/08/02	YA	EPA 160.2
Total Organic Carbon	21.5	1.0	mg/l	1	02/14/02	ANJ	415.1/9060 M/5310B M

(a) Calculated as: (Nitrogen, Total Kjeldahl) - (Nitrogen, Ammonia)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	DUP SURFACE WATER 1		
Lab Sample ID:	F12247-2	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0008119.D	1	02/08/02	JG	n/a	n/a	VC377
Run #2							

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
107-13-1	Acrylonitrile	ND	10	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
74-97-5	Bromochloromethane	ND	2.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
74-88-4	Methyl iodide	ND	10	ug/l	
74-95-3	Methylene bromide	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DUP SURFACE WATER 1		
Lab Sample ID:	F12247-2	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
110-57-6	Trans-1,4-Dichloro-2-Butene	ND	10	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
108-05-4	Vinyl Acetate	ND	10	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%		80-120%
17060-07-0	1,2-Dichloroethane-D4	106%		80-120%
2037-26-5	Toluene-D8	89%		80-120%
460-00-4	4-Bromofluorobenzene	91%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	DUP SURFACE WATER 1		
Lab Sample ID:	F12247-2	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Arsenic	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Barium	< 200	200	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Beryllium	< 4.0	4.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cadmium	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Chromium	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cobalt	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Copper	< 25	25	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Iron	2870	300	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Lead	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	ug/l	1	02/11/02	02/13/02	LIR	SW846 7470A	EPA 245.1
Nickel	< 40	40	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Selenium	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Silver	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Thallium	< 1.0	1.0	ug/l	1	02/12/02	02/13/02	ATX	EPA 279.2	EPA 200.9
Vanadium	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Zinc	< 20	20	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	DUP SURFACE WATER 1		
Lab Sample ID:	F12247-2	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
BOD, 5 Day	3.8	2.0	mg/l	1	02/14/02	YA	EPA 405.1
Chemical Oxygen Demand	58.8	20	mg/l	1	02/11/02	LL	EPA 410.1
Hardness, Total	28.7	4.0	mg/l	1	02/18/02	EP	SW846 6010B/SM 2340B
Nitrogen, Ammonia	0.37	0.20	mg/l	1	02/14/02	LIR	EPA 350.1
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	02/08/02	LL	EPA 300/SW846 9056
Nitrogen, Total Kjeldahl	4.6	0.20	mg/l	1	02/14/02	LIR	EPA 351.3
Nitrogen, Total Organic [a]	4.2	0.40	mg/l	1	02/14/02	LIR	SM18 4500N
Phosphorus, Total	2.2	0.50	mg/l	5	02/08/02	LL	EPA 365.3
Solids, Total Dissolved	132	20	mg/l	2	02/09/02	YA	EPA 160.1
Solids, Total Suspended	13.0	4.0	mg/l	1	02/08/02	YA	EPA 160.2
Total Organic Carbon	20.8	1.0	mg/l	1	02/14/02	ANJ	415.1/9060 M/5310B M

(a) Calculated as: (Nitrogen, Total Kjeldahl) - (Nitrogen, Ammonia)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SURFACE WATER-2		
Lab Sample ID:	F12247-3	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0008120.D	1	02/08/02	JG	n/a	n/a	VC377
Run #2							

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
107-13-1	Acrylonitrile	ND	10	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
74-97-5	Bromochloromethane	ND	2.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
74-88-4	Methyl iodide	ND	10	ug/l	
74-95-3	Methylene bromide	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SURFACE WATER-2		
Lab Sample ID:	F12247-3	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	1.2	2.0	ug/l	J
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
110-57-6	Trans-1,4-Dichloro-2-Butene	ND	10	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
108-05-4	Vinyl Acetate	ND	10	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	109%		80-120%
17060-07-0	1,2-Dichloroethane-D4	107%		80-120%
2037-26-5	Toluene-D8	91%		80-120%
460-00-4	4-Bromofluorobenzene	93%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	SURFACE WATER-2		
Lab Sample ID:	F12247-3	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Arsenic	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Barium	652	200	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Beryllium	< 4.0	4.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cadmium	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Chromium	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cobalt	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Copper	< 25	25	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Iron	2200	300	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Lead	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	ug/l	1	02/11/02	02/13/02	LIR	SW846 7470A	EPA 245.1
Nickel	< 40	40	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Selenium	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Silver	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Thallium	< 1.0	1.0	ug/l	1	02/12/02	02/13/02	ATX	EPA 279.2	EPA 200.9
Vanadium	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Zinc	< 20	20	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SURFACE WATER-2		
Lab Sample ID:	F12247-3	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
BOD, 5 Day	55.1	2.0	mg/l	1	02/14/02	YA	EPA 405.1
Chemical Oxygen Demand	132	20	mg/l	1	02/11/02	LL	EPA 410.1
Hardness, Total	22.2	4.0	mg/l	1	02/18/02	EP	SW846 6010B/SM 2340B
Nitrogen, Ammonia	0.43	0.20	mg/l	1	02/14/02	LIR	EPA 350.1
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	02/08/02	LL	EPA 300/SW846 9056
Nitrogen, Total Kjeldahl	2.2	0.20	mg/l	1	02/14/02	LIR	EPA 351.3
Nitrogen, Total Organic [a]	1.8	0.40	mg/l	1	02/14/02	LIR	SM18 4500N
Phosphorus, Total	< 0.10	0.10	mg/l	1	02/08/02	LL	EPA 365.3
Solids, Total Dissolved	208	20	mg/l	2	02/09/02	YA	EPA 160.1
Solids, Total Suspended	14.0	4.0	mg/l	1	02/08/02	YA	EPA 160.2
Total Organic Carbon	31.1	2.0	mg/l	2	02/14/02	ANJ	415.1/9060 M/5310B M

(a) Calculated as: (Nitrogen, Total Kjeldahl) - (Nitrogen, Ammonia)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SURFACE WATER-3		
Lab Sample ID:	F12247-4	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0008121.D	1	02/08/02	JG	n/a	n/a	VC377
Run #2							

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
107-13-1	Acrylonitrile	ND	10	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
74-97-5	Bromochloromethane	ND	2.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
74-88-4	Methyl iodide	ND	10	ug/l	
74-95-3	Methylene bromide	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SURFACE WATER-3		
Lab Sample ID:	F12247-4	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
110-57-6	Trans-1,4-Dichloro-2-Butene	ND	10	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
108-05-4	Vinyl Acetate	ND	10	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	107%		80-120%
17060-07-0	1,2-Dichloroethane-D4	106%		80-120%
2037-26-5	Toluene-D8	91%		80-120%
460-00-4	4-Bromofluorobenzene	91%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	SURFACE WATER-3			
Lab Sample ID:	F12247-4		Date Sampled:	02/07/02
Matrix:	AQ - Ground Water		Date Received:	02/07/02
			Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)			

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Arsenic	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Barium	< 200	200	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Beryllium	< 4.0	4.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cadmium	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Chromium	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cobalt	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Copper	< 25	25	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Iron	2930	300	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Lead	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	ug/l	1	02/11/02	02/13/02	LIR	SW846 7470A	EPA 245.1
Nickel	< 40	40	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Selenium	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Silver	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Thallium	< 1.0	1.0	ug/l	1	02/12/02	02/13/02	ATX	EPA 279.2	EPA 200.9
Vanadium	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Zinc	< 20	20	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SURFACE WATER-3		
Lab Sample ID:	F12247-4	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
BOD, 5 Day	5.3	2.0	mg/l	1	02/14/02	YA	EPA 405.1
Chemical Oxygen Demand	84.5	20	mg/l	1	02/11/02	LL	EPA 410.1
Hardness, Total	40.5	4.0	mg/l	1	02/18/02	EP	SW846 6010B/SM 2340B
Nitrogen, Ammonia	0.44	0.20	mg/l	1	02/14/02	LIR	EPA 350.1
Nitrogen, Nitrate	0.10	0.10	mg/l	1	02/08/02	LL	EPA 300/SW846 9056
Nitrogen, Total Kjeldahl	2.5	0.20	mg/l	1	02/14/02	LIR	EPA 351.3
Nitrogen, Total Organic [a]	2.1	0.40	mg/l	1	02/14/02	LIR	SM18 4500N
Phosphorus, Total	0.16	0.10	mg/l	1	02/08/02	LL	EPA 365.3
Solids, Total Dissolved	190	20	mg/l	2	02/09/02	YA	EPA 160.1
Solids, Total Suspended	5.0	4.0	mg/l	1	02/08/02	YA	EPA 160.2
Total Organic Carbon	28.8	2.0	mg/l	2	02/14/02	ANJ	415.1/9060 M/5310B M

(a) Calculated as: (Nitrogen, Total Kjeldahl) - (Nitrogen, Ammonia)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SURFACE WATER-4		
Lab Sample ID:	F12247-5	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0008122.D	1	02/08/02	JG	n/a	n/a	VC377
Run #2							

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
107-13-1	Acrylonitrile	ND	10	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
74-97-5	Bromochloromethane	ND	2.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
74-88-4	Methyl iodide	ND	10	ug/l	
74-95-3	Methylene bromide	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SURFACE WATER-4		
Lab Sample ID:	F12247-5	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	16.4	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
110-57-6	Trans-1,4-Dichloro-2-Butene	ND	10	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
108-05-4	Vinyl Acetate	ND	10	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	110%		80-120%
17060-07-0	1,2-Dichloroethane-D4	107%		80-120%
2037-26-5	Toluene-D8	91%		80-120%
460-00-4	4-Bromofluorobenzene	91%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SURFACE WATER-4		
Lab Sample ID:	F12247-5	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Arsenic	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Barium	< 200	200	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Beryllium	< 4.0	4.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cadmium	< 5.0	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Chromium	11.1	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Cobalt	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Copper	< 25	25	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Iron	14100	300	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Lead	16.3	5.0	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Mercury	< 1.0	1.0	ug/l	1	02/11/02	02/13/02	LIR	SW846 7470A	EPA 245.1
Nickel	< 40	40	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Selenium	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Silver	< 10	10	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Thallium	< 1.0	1.0	ug/l	1	02/12/02	02/13/02	ATX	EPA 279.2	EPA 200.9
Vanadium	< 50	50	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A
Zinc	57.6	20	ug/l	1	02/08/02	02/11/02	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SURFACE WATER-4		
Lab Sample ID:	F12247-5	Date Sampled:	02/07/02
Matrix:	AQ - Ground Water	Date Received:	02/07/02
		Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
BOD, 5 Day	45.8	2.0	mg/l	1	02/14/02	YA	EPA 405.1
Chemical Oxygen Demand	151	20	mg/l	1	02/11/02	LL	EPA 410.1
Hardness, Total	69.0	4.0	mg/l	1	02/18/02	EP	SW846 6010B/SM 2340B
Nitrogen, Ammonia	1.7	0.20	mg/l	1	02/14/02	LIR	EPA 350.1
Nitrogen, Nitrate	< 0.10	0.10	mg/l	1	02/08/02	LL	EPA 300/SW846 9056
Nitrogen, Total Kjeldahl	36.9	4.0	mg/l	20	02/14/02	LIR	EPA 351.3
Nitrogen, Total Organic [a]	35.2	4.2	mg/l	1	02/14/02	LIR	SM18 4500N
Phosphorus, Total	1.8	0.50	mg/l	5	02/08/02	LL	EPA 365.3
Solids, Total Dissolved	188	20	mg/l	2	02/09/02	YA	EPA 160.1
Solids, Total Suspended	270	4.0	mg/l	2	02/08/02	YA	EPA 160.2
Total Organic Carbon	86.4	10	mg/l	10	02/14/02	ANJ	415.1/9060 M/5310B M

(a) Calculated as: (Nitrogen, Total Kjeldahl) - (Nitrogen, Ammonia)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	F12247-6	Date Sampled:	02/07/02
Matrix:	AQ - Trip Blank Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	C0008117.D	1	02/08/02	JG	n/a	n/a	VC377
Run #2							

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
107-13-1	Acrylonitrile	ND	10	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
74-97-5	Bromochloromethane	ND	2.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
74-88-4	Methyl iodide	ND	10	ug/l	
74-95-3	Methylene bromide	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TRIP BLANK		
Lab Sample ID:	F12247-6	Date Sampled:	02/07/02
Matrix:	AQ - Trip Blank Water	Date Received:	02/07/02
Method:	SW846 8260B	Percent Solids:	n/a
Project:	Omni-Oak Hammock(2)		

VOA Appendix I 40 CFR Part 258

CAS No.	Compound	Result	RL	Units	Q
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
110-57-6	Trans-1,4-Dichloro-2-Butene	ND	10	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
108-05-4	Vinyl Acetate	ND	10	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%		80-120%
17060-07-0	1,2-Dichloroethane-D4	106%		80-120%
2037-26-5	Toluene-D8	91%		80-120%
460-00-4	4-Bromofluorobenzene	90%		80-120%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Tri-Tech Analytical Laboratories, Inc.

P.O. Box 140966 • Orlando, FL 32814-0966 • (407) 275-8463

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Accutests Laboratories, S.E
4405 Vineland Rd #C-15
Orlando, Florida 32811
Attention: Mr. Harry Behzadi

PROJECT NAME:
F12247

TTA Contact: L. Trytek

DATE REC	WORK ORDER	DATE/TIME SAMPLED	PARAMETER SAMPLE ID	METHOD	RESULT	UNITS	DATE/TIME ANALYZED	TECH
02/07/02	02-02-243-1	02/07/02 1100	Fecal **F12247-1**	9222 D	**30**	cfu's/ 100mls	02/07/02 1645	SB
02/07/02	02-02-243-2	02/07/02 1100	Fecal **F12247-2**	9222 D	**32**	cfu's/ 100mls	02/07/02 1645	SB
02/07/02	02-02-243-3	02/07/02 1145	Fecal **F12247-3**	9222 D	*** 392**	cfu's/ 100mls	02/07/02 1645	SB
02/07/02	02-02-243-4	02/07/02 1215	Fecal **F12247-4**	9222 D	*** 1050**	cfu's/ 100mls	02/07/02 1645	SB
02/07/02	02-02-243-5	02/07/02 1300	Fecal **F12247-5**	9222 D	**20**	cfu's/ 100mls	02/07/02 1645	SB
02/07/02	02-02-243	02/07/02	Fecal **QC Control**	9222 D	**1 U**	cfu's/ 100mls	02/07/02 1645	SB

* Approxiamate Number Due To High Count.
U - Material was analyzed for but not detected;
The value reported iS the minimum detection limit.

Reviewed By : [signature]
Title : Quality Control Director
Date Reviewed : February 19, 2002

"HELP SAFEGUARD YOUR FUTURE AND YOUR HEALTH" CALL TTA TODAY!
DOH #E83294
DEP #900405G
AIHA #169077

Accutests Laboratories, S.E
4405 Vineland Rd #C-15
Orlando, Florida 32811
Attention: Mr. Harry Behzadi

PROJECT NAME:
F11757

TTA Contact: L. Trytek

DATE REC	WORK ORDER	DATE/TIME SAMPLED	PARAMETER SAMPLE ID	METHOD	RESULT	DATE/TIME ANALYZED	TECH
02/07/02	02-02-243-1	02/07/02 1100	Chlorophyll a F12247-1	SM 10200H	2.74	02/16/02 0900-1300	LT
02/07/02	02-02-243-2	02/07/02 1100	Chlorophyll a F12247-2	SM 10200H	5.12	02/16/02 0900-1300	LT
02/07/02	02-02-243-3	02/07/02 1145	Chlorophyll a F12247-3	SM 10200H	6.07	02/16/02 0900-1300	LT
02/07/02	02-02-243-4	02/07/02 1215	Chlorophyll a F12247-4	SM 10200H	7.26	02/16/02 0900-1300	LT
02/07/02	02-02-243-5	02/07/02 1300	Chlorophyll a F12247-5	SM 10200H	10.24	02/16/02 0900-1300	LT

Reviewed By : Sumaru Lal
Title : Quality Control Director
Date Reviewed : February 19, 2002

NOTE: Not Certefied For The Above Referenced Parameter.

"HELP SAFEGUARD YOUR FUTURE AND YOUR HEALTH" CALL TTA TODAY!
DOH #E83294
DEP #900405G
AIHA #169077

Unionized Ammonia Calculator v1.2;
after original by Dr. Landon Ross
Florida Department of Environmental Protection

Omni - Oak Hammock SW-1

pH (SU)	6.39
Temperature (°C)	23.6
Salinity (ppt)	
Total ammonia (mg/L as N)	0.55

Unionized Ammonia (mg/L as NH3)	**0.00084**

Omni - Oak Hammock SW-1 DUP

pH (SU)	6.39
Temperature (°C)	23.6
Salinity (ppt)	
Total ammonia (mg/L as N)	0.37

Unionized Ammonia (mg/L as NH3)	**0.00057**

Omni - Oak Hammock SW-2

pH (SU)	4.65
Temperature (°C)	25.3
Salinity (ppt)	
Total ammonia (mg/L as N)	0.43

Unionized Ammonia (mg/L as NH3)	**0.000014**

Omni - Oak Hammock SW-3

pH (SU)	5.86
Temperature (°C)	23.9
Salinity (ppt)	
Total ammonia (mg/L as N)	0.44

Unionized Ammonia (mg/L as NH3)	**0.00020**

Omni - Oak Hammock SW-4

pH (SU)	5.4
Temperature (°C)	24.8
Salinity (ppt)	
Total ammonia (mg/L as N)	1.7

Unionized Ammonia (mg/L as NH3)	**0.00029**

ACCUTEST®

CHAIN OF CUSTODY

4405 VINELAND ROAD • SUITE C-15
ORLANDO, FL 32811
TEL: 407-425-6700 • FAX: 407-425-0707

ACCUTEST JOB #: F12247

ACCUTEST QUOTE #: 11802A-JF AND 11802A2-JF

CLIENT INFORMATION

KUBAL-FURR + ASSOCIATES
NAME
PO Box 80247
ADDRESS
SIMPSONVILLE, SC 29680
CITY, STATE ZIP

SEND REPORT TO: DUANE ROSSETER
PHONE # (864) 962-9490

FACILITY INFORMATION

OMNI - OAK HAMMOCK
PROJECT NAME
HOLOPAW, FL
LOCATION
480H01
PROJECT NO.

FAX # (864) 962-5309

MATRIX CODES

DW - DRINKING WATER
GW - GROUND WATER
WW - WASTE WATER
SO - SOIL
SL - SLUDGE
OI - OIL
LIQ - OTHER LIQUID
SOL - OTHER SOLID

ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	COLLECTION DATE	COLLECTION TIME	SAMPLED BY:	MATRIX	# OF BOTTLES	PRESERVATION HCl	NaOH	HNO3	H2SO4	NONE	APP. I VOCs	APP. I METALS	NH_3-N	TOTAL HARDNESS	BOD-05	IRON, MERCURY, NITRATE	TOTAL DISSOLVED SOLIDS, TOTAL SUSPENDED SOLIDS	TOC, COD	FECAL COLIFORM	TOTAL PHOSPHATES, TOTAL ORGANIC NITROGEN	CHLOROPHYLL A	LAB USE ONLY
1	SURFACE WATER-1	2/7/02	1100	GK	GW	10	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2	DUP, SURFACE WATER-1		1100	GK	GW	10	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3	SURFACE WATER-2		1145	GK	GW	10	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
4	SURFACE WATER-3		1215	GK	GW	10	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
5	SURFACE WATER-4		1300	GK	GW	10	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
6	TRIP BLANK	2/6/02	1125	DV		2	✓					✓											

DATA TURNAROUND INFORMATION

☐ STANDARD
☐ 48 HOUR RUSH
☐ 24 HOUR EMERGENCY
☒ OTHER 7 DAY TAT

APPROVED BY:

EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED

DATA DELIVERABLE INFORMATION

☐ STANDARD
☐ COMMERCIAL "B"
☐ DISK DELIVERABLE
☐ STATE FORMS
☐ OTHER (SPECIFY)

COMMENTS/REMARKS

SEE TASK ORDER # 480H01 SW
TI BY GFAA TO ACHIEVE REPORTING LIMIT OF AT LEAST 2.0 ug/L
RL OF 4.0 ug/L REQUIRED FOR BERYLLIUM, OK'D PER H. BEHZADI
"J" FLAGGED VOLATILE RESULTS

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESION, INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE TIME:	RECEIVED BY:	RELINQUISHED BY:	DATE TIME:	RECEIVED BY:
1. [signature]	2/7/02	1.	2.		2. [signature] 02/07/02 1500
RELINQUISHED BY: 3.	DATE TIME:	RECEIVED BY: 3.	RELINQUISHED BY: 4.	DATE TIME:	RECEIVED BY: 4.
RELINQUISHED BY: 5.	DATE TIME:	RECEIVED BY: 5.	SEAL #	PRESERVE WHERE APPLICABLE ☐	ON ICE ☐ TEMPERATURE 2.4, 3.0, 2.6

GC/MS Volatiles

QC Data Summaries

Blank Spike Summary

Job Number: F12247
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock(2)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC377-BS	C0008105.D	1	02/08/02	JG	n/a	n/a	VC377

The QC reported here applies to the following samples: Method: SW846 8260B

F12247-1, F12247-2, F12247-3, F12247-4, F12247-5, F12247-6

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	119	95	67-125
107-13-1	Acrylonitrile	125	102	82	58-126
71-43-2	Benzene	25	25.0	100	75-125
74-97-5	Bromochloromethane	25	27.5	110	75-137
75-27-4	Bromodichloromethane	25	27.1	108	75-125
75-25-2	Bromoform	25	27.7	111	72-125
108-90-7	Chlorobenzene	25	24.1	96	75-125
75-00-3	Chloroethane	25	22.2	89	58-136
67-66-3	Chloroform	25	26.8	107	75-125
75-15-0	Carbon disulfide	125	132	106	48-142
56-23-5	Carbon tetrachloride	25	29.8	119	75-136
75-34-3	1,1-Dichloroethane	25	25.8	103	75-125
75-35-4	1,1-Dichloroethylene	25	26.8	107	67-138
96-12-8	1,2-Dibromo-3-chloropropane	25	21.3	85	64-125
106-93-4	1,2-Dibromoethane	25	23.7	95	75-125
107-06-2	1,2-Dichloroethane	25	26.6	106	75-125
78-87-5	1,2-Dichloropropane	25	25.9	104	75-125
124-48-1	Dibromochloromethane	25	25.6	102	75-125
156-59-2	cis-1,2-Dichloroethylene	25	26.2	105	75-129
10061-01-5	cis-1,3-Dichloropropene	25	23.7	95	75-125
95-50-1	o-Dichlorobenzene	25	23.9	96	75-125
106-46-7	p-Dichlorobenzene	25	24.6	98	75-125
156-60-5	trans-1,2-Dichloroethylene	25	25.0	100	73-125
10061-02-6	trans-1,3-Dichloropropene	25	21.6	86	75-125
100-41-4	Ethylbenzene	25	23.6	94	68-135
591-78-6	2-Hexanone	125	112	90	68-125
108-10-1	4-Methyl-2-pentanone	125	121	97	75-125
74-83-9	Methyl bromide	25	24.4	98	59-146
74-87-3	Methyl chloride	25	24.2	97	50-142
74-95-3	Methylene bromide	25	26.6	106	75-125
75-09-2	Methylene chloride	25	25.6	102	69-125
78-93-3	Methyl ethyl ketone	125	118	94	70-125
100-42-5	Styrene	25	23.4	94	75-125
630-20-6	1,1,1,2-Tetrachloroethane	25	26.2	105	75-125
71-55-6	1,1,1-Trichloroethane	25	29.2	117	75-132
79-34-5	1,1,2,2-Tetrachloroethane	25	21.2	85	75-125

Blank Spike Summary

Job Number: F12247
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock(2)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC377-BS	C0008105.D	1	02/08/02	JG	n/a	n/a	VC377

The QC reported here applies to the following samples: Method: SW846 8260B

F12247-1, F12247-2, F12247-3, F12247-4, F12247-5, F12247-6

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
79-00-5	1,1,2-Trichloroethane	25	23.4	94	75-125
96-18-4	1,2,3-Trichloropropane	25	22.3	89	75-125
127-18-4	Tetrachloroethylene	25	29.3	117	75-126
108-88-3	Toluene	25	23.3	93	75-125
79-01-6	Trichloroethylene	25	26.0	104	75-125
75-69-4	Trichlorofluoromethane	25	29.2	117	55-162
75-01-4	Vinyl chloride	25	23.8	95	60-147
108-05-4	Vinyl Acetate	125	143	114	47-125
1330-20-7	Xylene (total)	75	72.0	96	75-125

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	111%	80-120%
17060-07-0	1,2-Dichloroethane-D4	113%	80-120%
2037-26-5	Toluene-D8	93%	80-120%
460-00-4	4-Bromofluorobenzene	93%	80-120%

Method Blank Summary

Job Number: F12247
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock(2)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC377-MB	C0008106.D	1	02/08/02	JG	n/a	n/a	VC377

The QC reported here applies to the following samples: Method: SW846 8260B

F12247-1, F12247-2, F12247-3, F12247-4, F12247-5, F12247-6

CAS No.	Compound	Result	RL	Units	Q
67-64-1	Acetone	ND	50	ug/l	
107-13-1	Acrylonitrile	ND	10	ug/l	
71-43-2	Benzene	ND	1.0	ug/l	
74-97-5	Bromochloromethane	ND	2.0	ug/l	
75-27-4	Bromodichloromethane	ND	2.0	ug/l	
75-25-2	Bromoform	ND	2.0	ug/l	
108-90-7	Chlorobenzene	ND	2.0	ug/l	
75-00-3	Chloroethane	ND	5.0	ug/l	
67-66-3	Chloroform	ND	2.0	ug/l	
75-15-0	Carbon disulfide	ND	10	ug/l	
56-23-5	Carbon tetrachloride	ND	2.0	ug/l	
75-34-3	1,1-Dichloroethane	ND	2.0	ug/l	
75-35-4	1,1-Dichloroethylene	ND	2.0	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	ug/l	
106-93-4	1,2-Dibromoethane	ND	2.0	ug/l	
107-06-2	1,2-Dichloroethane	ND	2.0	ug/l	
78-87-5	1,2-Dichloropropane	ND	2.0	ug/l	
124-48-1	Dibromochloromethane	ND	2.0	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	2.0	ug/l	
95-50-1	o-Dichlorobenzene	ND	2.0	ug/l	
106-46-7	p-Dichlorobenzene	ND	2.0	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	2.0	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	2.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	ug/l	
591-78-6	2-Hexanone	ND	10	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	ug/l	
74-83-9	Methyl bromide	ND	5.0	ug/l	
74-87-3	Methyl chloride	ND	5.0	ug/l	
74-88-4	Methyl iodide	ND	10	ug/l	
74-95-3	Methylene bromide	ND	2.0	ug/l	
75-09-2	Methylene chloride	ND	5.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	ug/l	
100-42-5	Styrene	ND	2.0	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	2.0	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	2.0	ug/l	

Method Blank Summary

Job Number: F12247
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock(2)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VC377-MB	C0008106.D	1	02/08/02	JG	n/a	n/a	VC377

The QC reported here applies to the following samples:

Method: SW846 8260B

F12247-1, F12247-2, F12247-3, F12247-4, F12247-5, F12247-6

CAS No.	Compound	Result	RL	Units	Q
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	2.0	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	ug/l	
127-18-4	Tetrachloroethylene	ND	2.0	ug/l	
108-88-3	Toluene	ND	2.0	ug/l	
79-01-6	Trichloroethylene	ND	2.0	ug/l	
75-69-4	Trichlorofluoromethane	ND	5.0	ug/l	
110-57-6	Trans-1,4-Dichloro-2-Butene	ND	10	ug/l	
75-01-4	Vinyl chloride	ND	1.0	ug/l	
108-05-4	Vinyl Acetate	ND	10	ug/l	
1330-20-7	Xylene (total)	ND	6.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	110%	80-120%
17060-07-0	1,2-Dichloroethane-D4	111%	80-120%
2037-26-5	Toluene-D8	91%	80-120%
460-00-4	4-Bromofluorobenzene	92%	80-120%

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F12247
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock(2)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F12163-1MS	C0008113.D	1	02/08/02	JG	n/a	n/a	VC377
F12163-1MSD	C0008114.D	1	02/08/02	JG	n/a	n/a	VC377
F12163-1	C0008108.D	1	02/08/02	JG	n/a	n/a	VC377

The QC reported here applies to the following samples: Method: SW846 8260B

F12247-1, F12247-2, F12247-3, F12247-4, F12247-5, F12247-6

CAS No.	Compound	F12163-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		125	117	94	117	94	0	61-125/15
107-13-1	Acrylonitrile	ND		125	99.9	80	101	81	1	69-125/15
71-43-2	Benzene	ND		25	25.7	103	25.7	103	0	75-125/15
74-97-5	Bromochloromethane	ND		25	26.7	107	26.6	106	0	75-134/15
75-27-4	Bromodichloromethane	ND		25	25.1	100	25.8	103	3	75-125/15
75-25-2	Bromoform	ND		25	22.4	90	21.2	85	6	66-125/15
108-90-7	Chlorobenzene	ND		25	24.0	96	24.1	96	0	75-125/15
75-00-3	Chloroethane	ND		25	22.8	91	22.7	91	0	53-125/15
67-66-3	Chloroform	ND		25	26.9	108	26.5	106	1	75-125/15
75-15-0	Carbon disulfide	ND		125	140	112	138	110	1	51-138/1[illegible]
56-23-5	Carbon tetrachloride	ND		25	27.2	109	27.6	110	1	74-131/1[illegible]
75-34-3	1,1-Dichloroethane	ND		25	25.5	102	25.2	101	1	75-125/15
75-35-4	1,1-Dichloroethylene	ND		25	26.9	108	27.2	109	1	66-140/15
96-12-8	1,2-Dibromo-3-chloropropane	ND		25	18.9	76	19.0	76	1	57-125/15
106-93-4	1,2-Dibromoethane	ND		25	23.8	95	23.7	95	0	75-125/15
107-06-2	1,2-Dichloroethane	ND		25	24.6	98	25.1	100	2	75-125/15
78-87-5	1,2-Dichloropropane	ND		25	25.8	103	25.9	104	0	75-125/15
124-48-1	Dibromochloromethane	ND		25	23.2	93	22.5	90	3	75-125/15
156-59-2	cis-1,2-Dichloroethylene	ND		25	26.0	104	26.3	105	1	75-136/15
10061-01-5	cis-1,3-Dichloropropene	ND		25	21.7	87	21.2	85	2	71-125/15
95-50-1	o-Dichlorobenzene	ND		25	24.9	100	24.5	98	2	75-125/15
106-46-7	p-Dichlorobenzene	ND		25	25.3	101	24.9	100	2	75-125/15
156-60-5	trans-1,2-Dichloroethylene	ND		25	25.8	103	25.3	101	2	73-125/15
10061-02-6	trans-1,3-Dichloropropene	ND		25	17.2	69	16.6	66	4	62-125/15
100-41-4	Ethylbenzene	ND		25	24.2	97	23.6	94	3	75-125/15
591-78-6	2-Hexanone	ND		125	114	91	115	92	1	71-125/15
108-10-1	4-Methyl-2-pentanone	ND		125	123	98	123	98	0	75-125/15
74-83-9	Methyl bromide	ND		25	26.2	105	25.4	102	3	67-146/15
74-87-3	Methyl chloride	ND		25	28.1	112	24.8	99	12	47-160/15
74-95-3	Methylene bromide	ND		25	25.1	100	25.3	101	1	75-125/15
75-09-2	Methylene chloride	ND		25	26.1	104	25.7	103	2	69-125/15
78-93-3	Methyl ethyl ketone	ND		125	114	91	114	91	0	70-125/15
100-42-5	Styrene	ND		25	23.7	95	23.1	92	3	69-126/15
630-20-6	1,1,1,2-Tetrachloroethane	ND		25	25.4	102	24.2	97	5	75-125/15
71-55-6	1,1,1-Trichloroethane	ND		25	28.3	113	28.9	116	2	75-131/15
79-34-5	1,1,2,2-Tetrachloroethane	ND		25	21.6	86	21.6	86	0	75-125/[illegible]

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: F12247
Account: KFSSCSIM Kubal-Furr & Associates
Project: Omni-Oak Hammock(2)

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
F12163-1MS	C0008113.D	1	02/08/02	JG	n/a	n/a	VC377
F12163-1MSD	C0008114.D	1	02/08/02	JG	n/a	n/a	VC377
F12163-1	C0008108.D	1	02/08/02	JG	n/a	n/a	VC377

The QC reported here applies to the following samples: Method: SW846 8260B

F12247-1, F12247-2, F12247-3, F12247-4, F12247-5, F12247-6

CAS No.	Compound	F12163-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
79-00-5	1,1,2-Trichloroethane	ND		25	23.5	94	23.7	95	1	75-125/15
96-18-4	1,2,3-Trichloropropane	ND		25	21.6	86	21.8	87	1	72-125/15
127-18-4	Tetrachloroethylene	ND		25	28.2	113	29.2	117	3	75-125/15
108-88-3	Toluene	ND		25	23.9	96	23.8	95	0	75-125/15
79-01-6	Trichloroethylene	ND		25	26.5	106	26.2	105	1	75-125/15
75-69-4	Trichlorofluoromethane	ND		25	30.7	123	30.3	121	1	60-139/30
75-01-4	Vinyl chloride	ND		25	27.1	108	25.7	103	5	52-169/15
108-05-4	Vinyl Acetate	ND		125	133	106	132	106	1	40-125/18
1330-20-7	Xylene (total)	ND		75	73.1	97	71.5	95	2	75-125/15

CAS No.	Surrogate Recoveries	MS	MSD	F12163-1	Limits
1868-53-7	Dibromofluoromethane	110%	110%	110%	80-120%
17060-07-0	1,2-Dichloroethane-D4	107%	107%	106%	80-120%
2037-26-5	Toluene-D8	92%	94%	92%	80-120%
460-00-4	4-Bromofluorobenzene	91%	92%	91%	80-120%

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

QC Batch ID: MP4149
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 02/08/02

Metal	RL	IDL	MB raw	final
Aluminum	200	9.44		
Antimony	5.0	2.56	2.7	<5.0
Arsenic	10	3.15	1.6	<10
Barium	200	.94	-0.27	<200
Beryllium	5.0	.22	-0.57	<5.0
Cadmium	5.0	.27	-0.50	<5.0
Calcium	1000	10.2		
Chromium	10	.35	0.19	<10
Cobalt	50	.55	-0.11	<50
Copper	25	.71	1.0	<25
Iron	300	9.02	6.2	<300
Lead	5.0	1.16	2.5	<5.0
Magnesium	5000	25.5		
Manganese	15	.26		
Molybdenum	50	1.01		
Nickel	40	.8	-0.50	<40
Potassium	5000	49		
Selenium	10	2.5	3.2	<10
Silver	10	.59	0.79	<10
Sodium	5000	173		
Thallium	10	2.07	anr	
Tin	50	1.03		
Vanadium	50	.58	-0.11	<50
Zinc	20	.36	1.1	<20

Associated samples MP4149: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

QC Batch ID: MP4149
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 02/08/02 02/08/02

Metal	F12240-7 Original	MS	Spikelot MPFLICP	% Rec	QC Limits	F12240-7 Original	MSD	Spikelot MPFLICP	% Rec	QC Limits
Aluminum										
Antimony	0.0	868	1000	86.8	66-120	0.0	889	1000	88.9	66-120
Arsenic	13.7	4080	4000	101.7	75-120	13.7	4150	4000	103.4	75-120
Barium	5.5	3730	4000	93.1	72-120	5.5	3780	4000	94.4	72-120
Beryllium	0.0	101	100	101.0	73-120	0.0	103	100	103.0	73-120
Cadmium	0.0	93.5	100	93.5	72-120	0.0	96.0	100	96.0	72-120
Calcium										
Chromium	0.56	402	400	100.4	69-122	0.56	410	400	102.4	69-122
Cobalt	0.0	960	1000	96.0	69-120	0.0	979	1000	97.9	69-120
Copper	0.0	495	500	99.0	70-120	0.0	502	500	100.4	70-120
Iron	1430	28000	27000	98.4	72-122	1430	28700	27000	101.0	72-122
Lead	0.0	968	1000	96.8	70-126	0.0	987	1000	98.7	70-126
Magnesium										
Manganese										
Molybdenum										
Nickel	0.0	954	1000	95.4	69-120	0.0	976	1000	97.6	69-120
Potassium										
Selenium	8.3	4090	4000	102.0	74-120	8.3	4160	4000	103.8	74-120
Silver	0.0	103	100	103.0	52-126	0.0	104	100	104.0	52-126
Sodium										
Thallium	anr									
Tin										
Vanadium	3.6	1040	1000	103.6	75-122	3.6	1060	1000	105.6	75-122
Zinc	2.7	1020	1000	101.7	68-123	2.7	1050	1000	104.7	68-123

Associated samples MP4149: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

QC Batch ID: MP4149
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 02/08/02

Metal	F12240-7 Original	DUP	RPD	QC Limits
Aluminum				
Antimony	0.0	0.0	NC	0-20
Arsenic	13.7	12.5	9.2	0-29
Barium	5.5	5.1	7.5	0-20
Beryllium	0.0	0.0	NC	0-25
Cadmium	0.0	0.0	NC	0-20
Calcium				
Chromium	0.56	0.90	46.6	0-47
Cobalt	0.0	0.67	200.0(a)	0-30
Copper	0.0	0.0	NC	0-21
Iron	1430	1510	5.4	0-23
Lead	0.0	0.0	NC	0-44
Magnesium				
Manganese				
Molybdenum				
Nickel	0.0	1.3	200.0(a)	0-56
Potassium				
Selenium	8.3	9.8	16.6	0-36
Silver	0.0	0.0	NC	0-20
Sodium				
Thallium	anr			
Tin				
Vanadium	3.6	3.8	5.4	0-28
Zinc	2.7	3.3	20.0	0-54

Associated samples MP4149: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) RPD acceptable due to low duplicate and sample concentrations.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

QC Batch ID: MP4149
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 02/08/02

Metal	BSP Result	Spikelot MPFLICP	% Rec	QC Limits
Aluminum				
Antimony	850	1000	85.0	80-120
Arsenic	3800	4000	95.0	80-120
Barium	4000	4000	100.0	80-120
Beryllium	102	100	102.0	80-120
Cadmium	94.7	100	94.7	80-120
Calcium				
Chromium	408	400	102.0	80-120
Cobalt	999	1000	99.9	80-120
Copper	523	500	104.6	80-120
Iron	27300	27000	101.1	80-120
Lead	1010	1000	101.0	80-120
Magnesium				
Manganese				
Molybdenum				
Nickel	1010	1000	101.0	80-120
Potassium				
Selenium	3940	4000	98.5	80-120
Silver	101	100	101.0	80-120
Sodium				
Thallium	anr			
Tin				
Vanadium	1050	1000	105.0	80-120
Zinc	989	1000	98.9	80-120

Associated samples MP4149: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

QC Batch ID: MP4149
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 02/08/02

Metal	F12240-7 Original	SDL 1:5	RPD	QC Limits
Aluminum				
Antimony	0.00	21.9		0-10
Arsenic	13.7	31.8	132.1(a)	0-10
Barium	5.49	0.00	100.0(a)	0-10
Beryllium	0.00	0.00	NC	0-10
Cadmium	0.00	0.00	NC	0-10
Calcium				
Chromium	0.560	5.41	866.1(a)	0-10
Cobalt	0.00	3.65		0-10
Copper	0.00	0.00	NC	0-10
Iron	1430	2590	80.9*(b)	0-10
Lead	0.00	8.39		0-10
Magnesium				
Manganese				
Molybdenum				
Nickel	0.00	5.02		0-10
Potassium				
Selenium	8.28	18.7	125.4(a)	0-10
Silver	0.00	8.44		0-10
Sodium				
Thallium	anr			
Tin				
Vanadium	3.59	11.5	219.5(a)	0-10
Zinc	2.70	8.12	200.7(a)	0-10

Associated samples MP4149: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
(b) Serial dilution indicates possible matrix interference.

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

QC Batch ID: MP4152
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 02/11/02

Metal	RL	IDL	MB raw	final
Mercury	1.0	.06	-0.20	<1.0

Associated samples MP4152: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

QC Batch ID: MP4152
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 02/11/02 02/11/02

Metal	F12247-1 Original	DUP	RPD	QC Limits	F12247-1 Original	MS	Spikelot HGFLWS	% Rec	QC Limits
Mercury	0.0	0.085	200.0(a)	0-20	0.0	3.2	3	106.7	62-131

Associated samples MP4152: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) RPD acceptable due to low duplicate and sample concentrations.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

QC Batch ID: MP4152
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 02/11/02

Metal	F12247-1 Original	MSD	Spikelot HGFLWS	% Rec	QC Limits
Mercury	0.0	3.3	3	110.0	62-131

Associated samples MP4152: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

QC Batch ID: MP4152
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 02/11/02

Metal	BSP Result	Spikelot HGFLWS	% Rec	QC Limits
Mercury	3.2	3	106.7	80-120

Associated samples MP4152: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F12247
Account: ALSE - Accutest Labs S. E.
Project: ALSE395 - KFSSCSIM: Omni-Oak Hammock

QC Batch ID: MP779
Matrix Type: AQUEOUS

Methods: EPA 279.2
Units: ug/l

Prep Date: 02/12/02

Metal	RL	IDL	MB raw	final
Thallium	1.0	.1	-0.20	<1.0

Associated samples MP779: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F12247
Account: ALSE - Accutest Labs S. E.
Project: ALSE395 - KFSSCSIM: Omni-Oak Hammock

QC Batch ID: MP779
Matrix Type: AQUEOUS

Methods: EPA 279.2
Units: ug/l

Prep Date: 02/12/02 02/12/02

Metal	F12247-1 Original	DUP	RPD	QC Limits	F12247-1 Original	MS	Spikelot MPTFR1	% Rec	QC Limits
Thallium	0.0	0.0	NC	0-20	0.0	40.0	40	100.0	75-125

Associated samples MP779: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: F12247
Account: ALSE - Accutest Labs S. E.
Project: ALSE395 - KFSSCSIM: Omni-Oak Hammock

QC Batch ID: MP779
Matrix Type: AQUEOUS

Methods: EPA 279.2
Units: ug/l

Prep Date: 02/12/02

Metal	F12247-1 Original	MSD	Spikelot MPTFR1	% Rec	QC Limits
Thallium	0.0	39.0	40	97.5	75-125

Associated samples MP779: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: F12247
Account: ALSE - Accutest Labs S. E.
Project: ALSE395 - KFSSCSIM: Omni-Oak Hammock

QC Batch ID: MP779
Matrix Type: AQUEOUS

Methods: EPA 279.2
Units: ug/l

Prep Date: 02/12/02

Metal	BSP Result	Spikelot MPTFR1	% Rec	QC Limits
Thallium	37.2	40	93.0	80-120

Associated samples MP779: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: F12247
Account: ALSE - Accutest Labs S. E.
Project: ALSE395 - KFSSCSIM: Omni-Oak Hammock

QC Batch ID: MP779
Matrix Type: AQUEOUS

Methods: EPA 279.2
Units: ug/l

Prep Date: 02/12/02

Metal	F12247-1 Original	SDL 1:5	RPD	QC Limits
Thallium	0.00	0.00	NC	0-10

Associated samples MP779: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

General Chemistry

QC Data Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

Analyte	Batch ID	RL	MB Result	Units	BSP %Recov	QC Limits
BOD, 5 Day	GP2937/GN8892	2.0	<2.0	mg/l	108.0	78-124%
BOD, 5 Day	GP2937/GN8892	2.0	0.0	mg/l		
Chemical Oxygen Demand	GP2941/GN8904	20	<20	mg/l	106.0	80-120%
Nitrogen, Ammonia	GP2960/GN8932	0.20	<0.20	mg/l	98.5	80-120%
Nitrogen, Ammonia	GP2960/GN8932	0.20	<0.20	mg/l	97.4	80-120%
Nitrogen, Nitrate	GP2928/GN8891	0.10	<0.10	mg/l	91.0	90-110%
Nitrogen, Nitrite	GP2928/GN8891	0.10	<0.10	mg/l	94.0	90-110%
Nitrogen, Total Kjeldahl	GP2942/GN8905	0.20	<0.20	mg/l	102.4	80-120%
Phosphorus, Total	GP2930/GN8890	0.10	<0.10	mg/l	98.4	80-120%
Solids, Total Dissolved	GN8884	10	<10	mg/l		
Solids, Total Suspended	GN8886	4.0	<4.0	mg/l		

Associated Samples:
Batch GN8884: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GN8886: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2928: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2930: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2937: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2941: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2942: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2960: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
BOD, 5 Day	GP2937/GN8892	M23344-1	mg/l	2740	2660	3.0	0-50%
Chemical Oxygen Demand	GP2941/GN8904	F12260-1	mg/l	<20	<20	0.0	0-10%
Nitrogen, Ammonia	GP2960/GN8932	F12247-1	mg/l	0.55	0.55	0.0	0-20%
Nitrogen, Nitrate	GP2928/GN8891	F12243-4	mg/l	<0.10	<0.10	0.0	0-20%
Nitrogen, Nitrite	GP2928/GN8891	F12243-4	mg/l	<0.010	<0.010	0.0	0-20%
Nitrogen, Total Kjeldahl	GP2942/GN8905	F12247-1	mg/l	1.9	1.9	0.6	0-20%
Phosphorus, Total	GP2930/GN8890	F12232-1	mg/l	0.34	0.34	0.0	0-20%
Solids, Total Dissolved	GN8884	F12247-1	mg/l	122	136	10.8	0-11%
Solids, Total Suspended	GN8886	F12247-1	mg/l	17.0	18.0	5.7	0-34%

Associated Samples:
Batch GN8884: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GN8886: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2928: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2930: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2937: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2941: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2942: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2960: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
BOD, 5 Day	GP2937/GN8892	M23344-1	mg/l	2740	198	2940	99.0	62-135%
Chemical Oxygen Demand	GP2941/GN8904	F12260-1	mg/l	<20	50	68.6	111.0	80-120%
Nitrogen, Ammonia	GP2960/GN8932	F12247-1	mg/l	0.55	0.50	1.0	97.3	75-125%
Nitrogen, Nitrate	GP2928/GN8891	F12243-4	mg/l	<0.10	1	0.93	93.0	80-120%
Nitrogen, Nitrate	GP2928/GN8891	F12243-4	mg/l	<0.10	1	0.94	94.0	80-120%
Nitrogen, Nitrite	GP2928/GN8891	F12243-4	mg/l	<0.010	1	0.99	99.0	80-120%
Nitrogen, Nitrite	GP2928/GN8891	F12243-4	mg/l	<0.010	1	0.93	93.0	80-120%
Nitrogen, Total Kjeldahl	GP2942/GN8905	F12247-1	mg/l	1.9	1.00	3.0	111.1	70-131%
Phosphorus, Total	GP2930/GN8890	F12232-1	mg/l	0.34	.300	0.55	71.5*	75-125%

Associated Samples:
Batch GP2928: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2930: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2937: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2941: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2942: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5
Batch GP2960: F12247-1, F12247-2, F12247-3, F12247-4, F12247-5

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: F12247
Account: KFSSCSIM - Kubal-Furr & Associates
Project: KFSSCSIM3203 - Omni-Oak Hammock(2)

File ID: 02020801.IC   Date Analyzed: 02/08/02   Methods: EPA 300/SW846 9056
Analyst: LL   Run ID: GN8891
Parameters: Nitrogen, Nitrate

Time	Sample Description	Dilution Factor	PS Recov	Comments
08:36	GN8891-ICV1	1		
08:50	GN8891-ICB1	1		
09:05	GN8891-CCV1	1		
09:19	GN8891-CCB1	1		
09:34	GP2928-MB1	1		
09:48	GP2928-B1	1		
10:03	GP2928-S1	1		
10:18	GP2928-S2	1		
10:32	GP2928-D1	1		
10:47	F12243-4	1		(sample used for QC only; not part of login F12247)
11:01	ZZZZZZ	1		
11:16	ZZZZZZ	1		
11:30	GN8891-CCV2	1		
11:45	GN8891-CCB2	1		
11:59	F12247-1	1		
12:14	F12247-2	1		
12:28	F12247-3	1		
12:43	F12247-4	1		
12:57	F12247-5	1		
----------->	Last reportable sample/prep for job F12247			
13:32	ZZZZZZ	1		
13:47	ZZZZZZ	1		
14:01	ZZZZZZ	1		
14:16	GN8891-CCV3	1		
14:30	GN8891-CCB3	1		
----------->	Last reportable CCB for job F12247			
14:45	ZZZZZZ	1		
14:59	ZZZZZZ	1		
15:14	ZZZZZZ	1		
15:28	GN8891-CCV4	1		
15:43	GN8891-CCB4	1		

Refer to raw data for calibration curve and standards.

4
3

Grab Sampling Log—Water

Project No. 480H01 Site Location: OMNI - OAK HAMMOCK

Sample Date: 2/7/02 Arrival Time: 1013 Sample Time: 1100

Sample ID: SURFACE WATER - 1 Duplicate: (Y) / N Field Personnel: SS/GK

Weather Cond. PARTLY SUNNY BREEZY Locking Cap: ~~Y / N~~ Well Pad Cond. —

Sample Temp. 23.6°C Spec. Conductivity: 133.5 µS pH: 6.39

Sampling Method: GRAB

Method(s)	Container Desription	Preservative
VARIOUS	VARIOUS	VARIOUS

Remarks: DUPLICATE - DUP SURFACE WATER - 1, SMALL FLOW - DEEP WATER IN CREEK

TURBIDITY = 3.40, ORP = 50 mV, DO = 4.57 mg/L

NO NOTABLE SHEEN/FILM ON WATER, COLOR OF WATER CLEAR TO SLIGHTLY BROWN - TANNIC ACID?

Sample Date: 2/7/02 Arrival Time: 1124 Sample Time: 1145

Sample ID: SURFACE WATER - 2 Duplicate: Y / (N) Field Personnel: SS/GK

Weather Cond. PARTLY CLOUDY Locking Cap: ~~Y / N~~ Well Pad Cond. —

Sample Temp. 25.3°C Spec. Conductivity: 173.9 µS pH: 4.65

Sampling Method: GRAB

Method(s)	Container Desription	Preservative
VARIOUS	VARIOUS	VARIOUS

ORT

Remarks: WATER LOW IN CREEK - NO FLOW - APPEARS STAGNANT

TURBIDITY = 1.06, ORP = 130 mV, DO = 7.30 mg/L

NO NOTABLE SHEEN/FILM ON WATER, COLOR OF WATER CLEAR TO SLIGHTLY BROWN - TANNIC ACID?

Grab Sampling Log—Water

Project No. 480H01 Site Location: OMNI - OAK HAMMOCK

Sample Date: 2/7/02 Arrival Time: 1158 Sample Time: 1215

Sample ID: SURFACE WATER - 3 Duplicate: Y / (N) Field Personnel: SS/GK

Weather Cond. PARTLY CLOUDY + BREEZY Locking Cap: ~~Y~~ / N Well Pad Cond. —

Sample Temp. 23.9°C Spec. Conductivity: 187.2μS pH: 5.86

Sampling Method: GRAB

Method(s)	Container Desription	Preservative
VARIOUS	VARIOUS	VARIOUS

Remarks: SLIGHT FLOW IN CREEK - WATER LOW

TURBIDITY = 4.23, ORP = 115mV, DO = 4.20

NO NOTABLE SHEEN/FILM ON WATER, COLOR OF WATER CLEAR TO SLIGHTLY BROWN → TANNIC ACID?

Sample Date: 2/7/02 Arrival Time: 1244 Sample Time: 1300

Sample ID: SURFACE WATER - 4 Duplicate: Y / (N) Field Personnel: SS/GK

Weather Cond. PARTLY CLOUDY + BREEZY Locking Cap: Y / ~~N~~ Well Pad Cond. —

Sample Temp. 24.8°C Spec. Conductivity: 170.5μS pH: 5.40

Sampling Method: GRAB

Method(s)	Container Desription	Preservative
VARIOUS	VARIOUS	VARIOUS

Remarks: CREEK FULL - GOOD WATER LEVEL - NOT FLOWING - STAGNANT - GREEN ALGAE ON TOP OF WATER

TURBIDITY = 16.4 ORP = 132mV DO = 4.01mg/L

NO NOTABLE SHEEN/FILM ON WATER → ALGAE, COLOR OF WATER CLEAR TO SLIGHTLY BROWN → TANNIC ACID?

Calibration Log

Project No. 480H01 | Date: 2-7-02
Client: Omni Waste | Site Location: Hdopaw

Conductivity Meter:

Meter Make/Model:	Oakton	*Meter Serial No.*	82200
Battery:	ok	*Time:*	10:19 am
Temperature (° F):	23.7	*Standard µS:*	1386
		Standard Reading:	1386

pH Meter:

Meter Make/Model:	Oakton	*Meter Serial No.*	82200
Battery:	ok	*Time:*	10:19 am
7.0 Buffer:	7.01	*4.0 Buffer:*	4.00
		10.0 Buffer:	10.06

GEOTECHNICAL INVESTIGATION REPORT

FIGURES

1. INTRODUCTION

The site chosen for the development of the Oak Hammock Disposal (OHD) facility is located in eastern Osceola County, west of highway U.S. 441, approximately 5 miles south of Holopaw. A geotechnical site characterization program was carried out to evaluate the OHD site. Results of the geotechnical investigation are used to evaluate slope stability and other geotechnical design aspects of the proposed landfill.

2. PURPOSE OF ANALYSIS

The purpose of this calculation package is to present, interpret, and summarize the geotechnical site characterization program performed for the OHD facility. In addition, geotechnical material properties of soils are evaluated using results of in-situ and laboratory tests and empirical relationships. Soil borings, soil sampling, in-situ testing, and laboratory testing are presented and discussed. The scope of this calculation package is limited to site characterization activities as related to the geotechnical investigation. Issues related to the hydrogeological investigation are presented in a separate document entitled "Hydrogeologic Investigation Report and Water Quality Monitoring Plan", prepared by Kubal-Furr & Associates (KFA) as an appendix to the permit application.

3. GENERAL

A site characterization program was carried out to evaluate geological and geotechnical properties of subsurface soils at the proposed OHD facility. Fifteen mud rotary borings were performed by U.S. Drilling under the supervision of GeoSyntec Consultants (GeoSyntec). In addition, three rotosonic borings were performed by Boart Longyear under the supervision of KFA. Figure 1 shows the location of soil borings. Split-spoon, Shelby tube and sonic core samples were obtained during the soil borings. Standard Penetration Tests (SPT) were also performed. Geotechnical laboratory testing of soil samples was performed by Excel Geotechnical Testing.

4. METHOD OF ANALYSIS

4.1 Soil Borings

Mud rotary and rotosonic drilling techniques were both used in the investigations. With mud rotary drilling, the boring was advanced with a tricone drill bit and bentonite drilling mud. With rotosonic drilling, ultra sonic waves were used to advance the boring and core sampler. The boring was supported with casing and water; therefore, no drilling mud was introduced into the borehole. Rotosonic drilling allows continuous core samples to be obtained without the use of drilling mud. Samples collected by this method can be considered as undisturbed samples for the purpose of grain size distribution, visual analysis, and mineralogy. The rotosonic borings are discussed in more detail in the

"Hydrogeologic Investigation Report and Water Quality Monitoring Plan" by KFA, which is presented as an appendix to the permit application.

The depth of mud rotary borings varied between 30 ft and 90 ft below ground surface. Rotosonic borings were advanced approximately 10 ft to 15 ft into the upper portion of the Hawthorn Group. The total depth of rotosonic borings varied between 145 ft and 175 ft below ground surface.

Three deep borings, which were drilled and documented by the Florida Geological Survey (FGS) in the vicinity of the OHD site, were also reviewed as a part of this site characterization program. The location of these deep borings relative to OHD site is shown in Figure 2. These borings were advanced to depths more than 300 ft below ground surface and into the Ocala Group. Data from these borings were used to evaluate the properties of Hawthorn Group soils at the site.

4.2 Standard Penetration Test (SPT)

The standard Penetration Test (SPT) is one of the most widely used in-situ tests. The test is performed by dropping a free falling hammer, weighing 140 lbs, on to the drill string from a height of 30 inches. The number of blows (N) necessary to achieve a penetration of 12 inches (below a seating drive of 6 inches) of standard sample tube, is termed the penetration resistance, or SPT N-value. Details of the SPT procedure and standard sampler are given in ASTM D 1586. Blows were delivered by a safety hammer hoisted by a rope and cathead.

4.3 Soil Sampling

Split-spoon sampling was performed as part of SPT tests in accordance with ASTM D 1586. A soil sample obtained using split-spoon sampler experiences large deformations. Therefore, a disturbed sample is obtained which is only suitable for visual identification, index tests, and reconstituted samples. Split-spoon samples were visually examined, classified, and stored in sealed bags.

Shelby tube samples were collected by pushing Shelby tubes during rotosonic and mud rotary drillings. Shelby tube sampling was used to obtain relatively undisturbed samples of cohesive fine-grained soils. Shelby tube samples were capped and stored for extrusion and laboratory testing.

Vibro-sonic core samples were obtained during the rotosonic borings. As the rotosonic boring is advanced into the ground, soil from the boring zone is stored in the core barrel. Some damage to the soil structure occurs due to the vibratory nature of the operation. Therefore, the core samples obtained are considered to be disturbed. However, the samples were considered to be representative for the purposes of soil classification because drilling mud is not used with this boring technique. Core barrel samples were stored in wooden boxes upon extrusion.

4.4 Laboratory Testing

Basic soil properties are used to make preliminary assessments regarding the behavior and response of soils. Basic soil properties are also used to develop empirical relationships. As part of the geotechnical site characterization program, laboratory testing was performed. The laboratory testing program included grain size distribution, specific gravity determination, and minimum and maximum index density determination.

Grain size distribution was performed according to ASTM D 421. No analysis was performed on materials passing the No. 200 sieve. Specific gravity testing was performed according to ASTM D 854 on a composite sample made by mixing soils from selected split-spoon samples obtained at depths between 5 ft and 50 ft from representative borings across the site. Minimum and maximum index density tests were performed using the same composite sample according to ASTM D 4254 and ASTM D 4253, respectively.

5. TEST RESULTS AND ANALYSES

The results of in-situ and laboratory tests are presented and discussed herein. The presentation of test results include soil stratigraphy, basic geotechnical properties (grain size distribution, specific gravity, minimum and maximum index density), SPT results and interpretation, and elastic soil modulus. Also, the drained friction angle of cohesionless soils and the modified compression index of the cohesive soils were evaluated.

5.1 Subsurface Soil Stratigraphy

Detailed boring logs for the 15 mud rotary borings and 3 the rotosonic borings are presented in Attachments 1 and 2, respectively. Based on an evaluation of these boring logs and the deep borings performed by FGS, the general subsurface stratigraphy of the OHD facility can be described as follow:

(A) Pleistocene to Recent Deposits of the Post-Hawthorn Undifferentiated Formation:

In this area, Scott (1988) stated that soils above the Hawthorn Group belong to the Post-Hawthorn Undifferentiated formation. According to Scott (1988), the Hawthorn Group belongs to the Miocene Epoch of the Tertiary Period. Therefore the Post-Hawthorn Undifferentiated Layer belongs to the Pliocene Epoch of the Tertiary Period and the Pleistocene and Holocene Epochs of the Quaternary Period.

- Upper Sand / Silty Sand Layer: This layer is the upper portion of this formation and consists of sub-layers, from top to bottom, silty fine to medium sand, coarse sand, silty fine to medium sand, and silty sand/sandy silt. The thickness of the upper sand / silty sand layer varied between 55 ft and 65 ft.

- Clayey Sand / Sandy Clay / Sandy Shelly Clay Layer: This layer consists of sub-layers of clayey sand, sandy clay, and sandy shelly clay, from top to bottom. All three sub-layers were not present in every boring and the percentage of sand content in clay varied significantly. The plastic nature of this layer was considered a clear indication for the termination of the upper sand / silty sand layer. The thickness of this layer varied between 10 ft and 20 ft.

- Shell Hash Layer: This layer was clearly encountered during the three rotosonic borings. This layer consists of shell fragments with minor sand, silt, and clay size particles. The thickness of shell hash layer was between 5 ft and 20 ft. The transition from sandy shelly clay to shell hash layer was not pronounced in the mud rotary borings making it difficult to identify the top of this sub-layer. The difficulty in identifying the transition may be due to the level of disturbance in the split-spoon sampling.

- Lower Interbedded Silty Sand / Clayey Sand / Shelly Silty Sand Layer: This layer is the lower portion of the undifferentiated formation. This layer predominantly consists of silty sand and clayey sand. The difference between this layer and the upper sand / silty sand layer is the presence of shells, limestone and phosphate nodules (fragments).

The thickness of the Post-Hawthorn undifferentiated formation varied between 125 ft and 170 ft. The lower boundary of this layer was recognized by the presence of a dark olive green clayey sub-layer, which is usually present at the top of the Hawthorn Group.

(B) Hawthorn Group:

Scott (1988) studied the Hawthorn Group in Florida. Results presented by Scott (1988) indicate that the OHD site is located in the vicinity of a geological feature called the Osceola Low. The geology of Osceola County is part of the Florida Geological Section G-G' as shown by Scott (1988). Review of Geological Section G-G' shows that the Hawthorn Group in the OHD site area consists of the Peace River formation underlain by the Arcadia formation. The geology and soil stratigraphy of the Peace River formation and the Arcadia formation in this area can be described using lithologic logs for Well No. 13942, Well No. 11685, and Well No. 11954, performed and documented by the FGS. The location of these wells relative to the OHD facility is shown in Figure 2. The average thickness of the Post-Hawthorn Undifferentiated Formation is 155 ft. The average thickness of the Hawthorn Group is 145 ft. Based on a review of the lithologic logs, the following can be concluded about the Hawthorn Group:

- Peace River formation: In this area, this formation predominantly consists of very fine to medium sand in clay matrix with phosphate, and fossil fragments. There is indication of cementation by dolomite. Sand is composed of quartz sand and phosphatic sand. This formation composes more than 50 percent of the Hawthorn Formation in this area. Clays, sandy clays, and phosphatic clays are present as distinct sublayers but their thickness are less than 8 ft (10 percent by volume).

- Arcadia formation: In this area, this formation predominantly consists of dolomite (cemented) with quartz sand, phosphatic sand, phosphatic gravel, and fossils. The thickness of this formation is less than 50 percent of the thickness of the Hawthorn Group. Clays are present as distinct sublayers but their thickness is less than 3.5 ft (5 percent by volume).

(C) Ocala Group:

Bedrock at the site belongs to the Ocala Group and is approximately 300 ft deep. This mostly consists of limestone rock and is considered incompressible.

5.2 Standard Penetration Test (SPT)

The SPT was performed as part of the mud rotary borings. SPT N-values are reported on the boring logs presented in Attachment 1. A summary of SPT N-values reported in the boring logs is shown in Figure 3. SPT N-values are used to evaluate soil properties. Evaluations range from simple assessments such as soil relative density, to much more complicated assessments such as settlement potential of cohesionless soils. SPT N-Values, as measured on site must be corrected for the actual energy that is delivered to rods and effective overburden pressure. Robertson and Ghionna (1987) stated that measured energies delivered to the rod from the hammer and anvil system vary between 30 percent to 90 percent of the theoretical value. Robertson and Ghionna (1987) added that the average standard energy delivered to the rods from the hammer and anvil is accepted to be 60 percent of the theoretical value. SPT N-value corrected for energy is called N_{60}. The actual energy delivered to the rods not only differs from the theoretical value but also depends on the kind of hammer used, split-spoon sampler used, length of rod, and borehole diameter. Robertson and Ghionna (1987) stated that the following relationship can be used for estimating N_{60}:

$$N_{60} = N_{SPT} \times \frac{ER}{60} \times C_s \times C_r \times C_d \qquad \text{(Equation 1)}$$

in which:

N_{SPT} = SPT N-value

ER/60 = ratio of average energy delivered by hammer used to standard assumed average energy of 60 percent (0.92 for safety hammer as used in this investigation)

C_s = 1.2 (for split-spoon sampler without membrane)

C_r = rod length (RL) correction as follows:

C_r = 1.00 for RL >32.75 ft

C_r = 0.95 for 19.75 ft < RL < 32.75 ft

C_r = 0.85 for 13.25 ft < RL <19.75 ft

C_r = 0.75 for 10 ft < RL < 13.25 ft)

C_d = borehole diameter (d) correction (C_d = 1 for d <4.5 inches)

In addition, Robertson and Ghionna (1987) stated that the SPT N-Value is influenced by the effective vertical stress. SPT N-Value, normalized with respect to effective vertical stress, is called N_1 and is equal to:

$$N_1 = C_N \times N_{SPT} \qquad \text{(Equation 2)}$$

in which:

N_{SPT} = SPT N-Value

C_N = correction factor for the effect of vertical stress

According to Robertson and Ghionna (1987), based on calibration chamber studies, C_N can be estimated using the equation below:

$$C_N = \left(\sigma_v'\right)^{-0.5} \qquad \text{(Equation 3)}$$

in which, σ_v' is the effective vertical stress in bars (1 bar = 2088.6 psf).

SPT N-Value corrected for both energy and effective vertical stress is called $(N_1)_{60}$ and can be estimated using the equation below by combing Equations 1 and 2:

$$(N_1)_{60} = C_N \times N_{SPT} \times \frac{ER}{60} \times C_s \times C_r \times C_d \qquad \text{(Equation 4)}$$

Values of the corrected blow counts, $(N_1)_{60}$, are presented in Figure 4 and will be used in this evaluation.

Skempton (1986) showed that $(N_1)_{60}$ could be correlated with relative density, DR(%) in cohesionless soils. Figure 5 shows the relationship between $(N_1)_{60}$ and relative density, DR(%). The relative density of the subsurface soils was estimated using this correlation and tests performed at the OHD site. Figure 6 shows the variation of relative density, DR (%), with depth. Results indicate that the upper sand/silty sand layer is predominantly medium density sand. Limited results available for the lower silty shelly sand layer indicate a similar trend in this sub-layer.

SPT N-values can also be used to estimate the drained friction angle of sandy soils. Robertson and Ghionna (1987) presented the relationship between drained peak friction angle, SPT N-value, and effective vertical stress, (after De Mello, 1971). This relationship is shown in Figure 7 in the form of contours of drained peak friction angle on a SPT N-value versus effective vertical stress chart. The SPT N-value versus effective vertical stress for the upper sand/silty sand layer at the site is shown in Figure 7. Due to the significant scatter of results shown, a conservative peak friction angle between 25° and 35° is recommended.

5.3 Basic Geotechnical Properties

Grain size analysis, specific gravity, and minimum and maximum index density tests were performed using a reconstituted composite sample prepared by mixing soils of the upper sand / silty sand layer obtained with the split-spoon sampler. In addition, grain size analyses were performed on 6 depth-specific reconstituted samples taken from the borrow areas. These samples were prepared by mixing soils from split-spoon samples obtained at 5 ft, 10 ft, 15 ft, 20 ft, 25 ft, and 30 ft deep below ground surface. The laboratory data sheets are presented in Attachment 3 and will be discussed here.

The upper sand/silty sand layer had an average fines content of 6.7 percent. The fines content varied between 3.5 percent and 10.4 percent with an overall trend of decreasing fines content with depth for samples obtained at depths between 10 ft and 30 ft. Specific gravity was 2.678, which is typical for quartz sand with fines containing mica minerals. Minimum and maximum index densities (dry) were 76.16 pcf (1.22 gr/cm^3) and 99.25 pcf (1.59 gr/cm^3), respectively. Minimum and maximum void ratio (e_{min} and e_{max}) for the upper sand/silty sand layer was estimated using the measured maximum and minimum index densities and the relationship below:

$$\gamma = \frac{(1+w)G_s\gamma_w}{1+e} \qquad \text{(Equation 5)}$$

in which:
γ = soil density;
w = water content;
G_s = specific gravity;
γ_w = density of water; and
e = void ratio.

The estimated values of e_{min} and e_{max} are 0.689 and 1.200, respectively. Values of e_{min}, e_{max} (from laboratory testing), and relative density from SPT, was used to estimate the in-situ void ratio from Equation 6. Then, the in-situ density was estimated using Equation 7, assuming that the soils were saturated.

$$DR = \frac{e_{max} - e}{e_{max} - e_{min}} \qquad \text{(Equation 6)}$$

$$\gamma_{sat} = \frac{(G_s + e)\gamma_w}{1+e} \qquad \text{(Equation 7)}$$

The estimated in-situ saturated density varied between 113 pcf and 118 pcf, which is typical for silty sands.

5.4 Elastic Soil Modulus

Upon construction of the landfill, subsurface soils will experience some deformation due to the loads induced by the landfill. The subsurface soils at the site are predominantly cohesionless. Therefore, the resulting deformation (settlement) is elastic rather than time dependent. The elastic soil modulus is necessary for estimating elastic deformation of cohesionless soil layers such as the compacted subgrade, Post-Hawthorn Undifferentiated Formation, and cohesionless portion of Hawthorn Group.

The elastic soil modulus (E) is a function of shear modulus (G) and Poisson's ratio (ν), as expressed in the equation below:

$$E = G[2(1+\nu)] \qquad \text{(Equation 8)}$$

Bowles (1988) stated that the Poisson's ratio of sands varies between 0.3 and 0.4. A conservative value of 0.3 is used in this calculation package. Shear modulus is a function of the magnitude of deformation and varies with shear strain. Its maximum value (G_{max}) occurs at small strain levels. The average shear modulus is approximately 1/3 of the small strain shear modulus (G_{max}), which can be estimated using empirical relationships.

The maximum shear modulus (G_{max}) of compacted subgrade is estimated using the equation proposed by Seed and Idriss (1970):

$$G_{max} = 1000 K_{2\,max} (\sigma'_m)^{0.5} \qquad \text{(Equation 9)}$$

in which:

σ'_m = mean principal effective stress ($\sigma'_m = (\sigma'_1 + \sigma'_2 + \sigma'_3)/3$) (assume $K_o = 0.5$); and

$K_{2\,max}$ = empirical coefficient as a function of relative density of soil, It varies between 34 and 70 for values of relative density between 30 percent and 90 percent, respectively. A relative density of 90 percent was assumed for the compacted subgrade, which corresponds to $K_{2\,max}$ of 70.

The maximum shear modulus (G_{max}) for the subsurface layers for which SPT data is available, is estimated using the following relationship, proposed by Ohta and Goto (1978):

$$V_s = 54.33\left((N_1)_{60}\right)^{0.173} f_A f_G \left(\frac{z}{0.303}\right)^{0.193} \qquad \text{(Equation 10)}$$

$$G_{max} = (V_s)^2 \frac{\gamma}{g} \qquad \text{(Equation 11)}$$

in which:

G_{max} = small strain shear modulus (kN/m^2)
V_s = shear wave velocity (m/s);
f_A = coefficient depending on age of deposit (conservatively assume 1, which corresponds to Holocene deposites);
f_G = coefficient depending on grain size (1.07 for medium sand);
Z = depth (m);
γ = soil density (kN/m^3); and
g = acceleration due to gravity (9.81 m/s^2).

An estimated elastic modulus is calculated for each SPT measurement using Equation 8, 10, and 11. Calculated values are presented in Figure 8. The average value at each depth is also shown. The linear variation of elastic modulus with depth, shown in Figure 8, is recommended for the top 90 ft of the subsurface soils.

The estimated value of the elastic modulus using Equation 8 and G_{max} obtained from Equation 9 is also presented in Figure 8. Coefficient K_{2max} in Equation 9 varies between 34 and 70 for values of relative density between 30 percent and 90 percent. The most conservative value of 34 for K_{2max} is used for the curve presented in Figure 8. Comparison of the results presented in Figure 8 for the top 90 ft of subsurface soils indicate consistency between the different conservative empirical approaches used. Estimates presented here are the lower boundary values using conservative assumptions stated in this calculation package. Therefore, it should result in a conservative assessment of settlement.

An examination of empirical Equations 9, 10, and 11 indicate that small strain shear modulus increases with depth. The increase of G_{max} with depth is conservatively ignored and a constant value of 1500 ksf, which is the estimated value at 90 ft below the ground surface is used throughout the lower silty shelly sand sub-layer of the Post-Hawthorn Undifferentiated formation. This assumption resulted in a conservative assessment of settlement of the foundation soils for the proposed landfill.

There is approximately 145 ft of soils in the Hawthorn Group between the Post-Hawthorn Undifferentiated formation and the Ocala Group bedrock that is considered incompressible. For coarse-grained soils in the Hawthorn Group, it is recommended that an elastic modulus estimated using G_{max} be obtained from Equation 9. Coefficient K_{2max} in Equation 9 varies between 34 and 70 for values of relative density between 30 percent and

90 percent. The most conservative value of 34 for $K_{2\ max}$ is used. The estimated elastic modulus for Hawthorn Group is presented in Figure 8.

5.5 Modified compression index

Portions of the Peace River formation and the Arcadia formation of the Hawthorn Group are fine-grained cohesive soils. As stated before in this calculation package, it is estimated that the thickness of the fine-grained cohesive sub-layer in the Peace River formation and the Arcadia formation is 8 ft (10 percent by volume) and 3.5 ft (5 percent by volume), respectively. Fine-grained cohesive soils undergo time dependent consolidation. In order to evaluate the settlement in the fine-grained cohesive sub-layers, it is necessary to estimate the modified compression index. Holts and Kovacs (1981) recommended the relationship presented below between the modified compression index ($C_{c\varepsilon}$) and in-situ void ratio (e_o):

$$C_{c\varepsilon} = 0.156e_o + 0.0107 \qquad \text{(Equation 12)}$$

Modified compression index ($C_{c\varepsilon}$) is approximately 0.1 assuming a value of 0.6 for e_o, recommended by Das (1994) for stiff clays.

6. SUMMARY AND CONCLUSION

The site characterization program for the OHD facility consisted of soil stratigraphy and in-situ and laboratory testing. Geotechnical properties of the soils were estimated using results of in-situ and laboratory tests in conjunction with empirical relationships.

The subsurface geology primarily consists of the Post-Hawthorn Undifferentiated formation, the Hawthorn Group, and the Ocala Group. The undifferentiated formation consists of four sub-layers of upper sand/silty sand, clayey sand/sandy clay/sandy shelly clay, shell hash, and interbedded silty sand/clayey sand/shelly silty sand. The Hawthorn Group consists of the Peace River formation and the Arcadia formation. In the area of the facility, both formations of the Hawthorn Group appear to be predominantly composed of cohesionless quartz sand and phosphatic sand with dolomite cementation in clay matrix. Clay sublayers are present in small quantities.

SPT N-Values were presented and corrected for energy and effective vertical stress. Results indicate that the undifferentiated formation composed of medium density sand with drained peak friction angle varying between 25° and 35°.

The elastic modulus was estimated for subsurface soil layers using empirical relationships for small strain shear modulus (G_{max}). A consistent trend in the variation of G_{max} with depth was observed. The estimated elastic modulus as shown in Figure 8 will be used to estimate the settlement of the coarse-grained soils, which comprise most of the foundation soils for the proposed landfill. A value of 0.1 for the modified compression index ($C_{c\varepsilon}$) of stiff clays was presented. This value will be used to estimate the consolidation settlement of clay sublayers in the Hawthorn Group.

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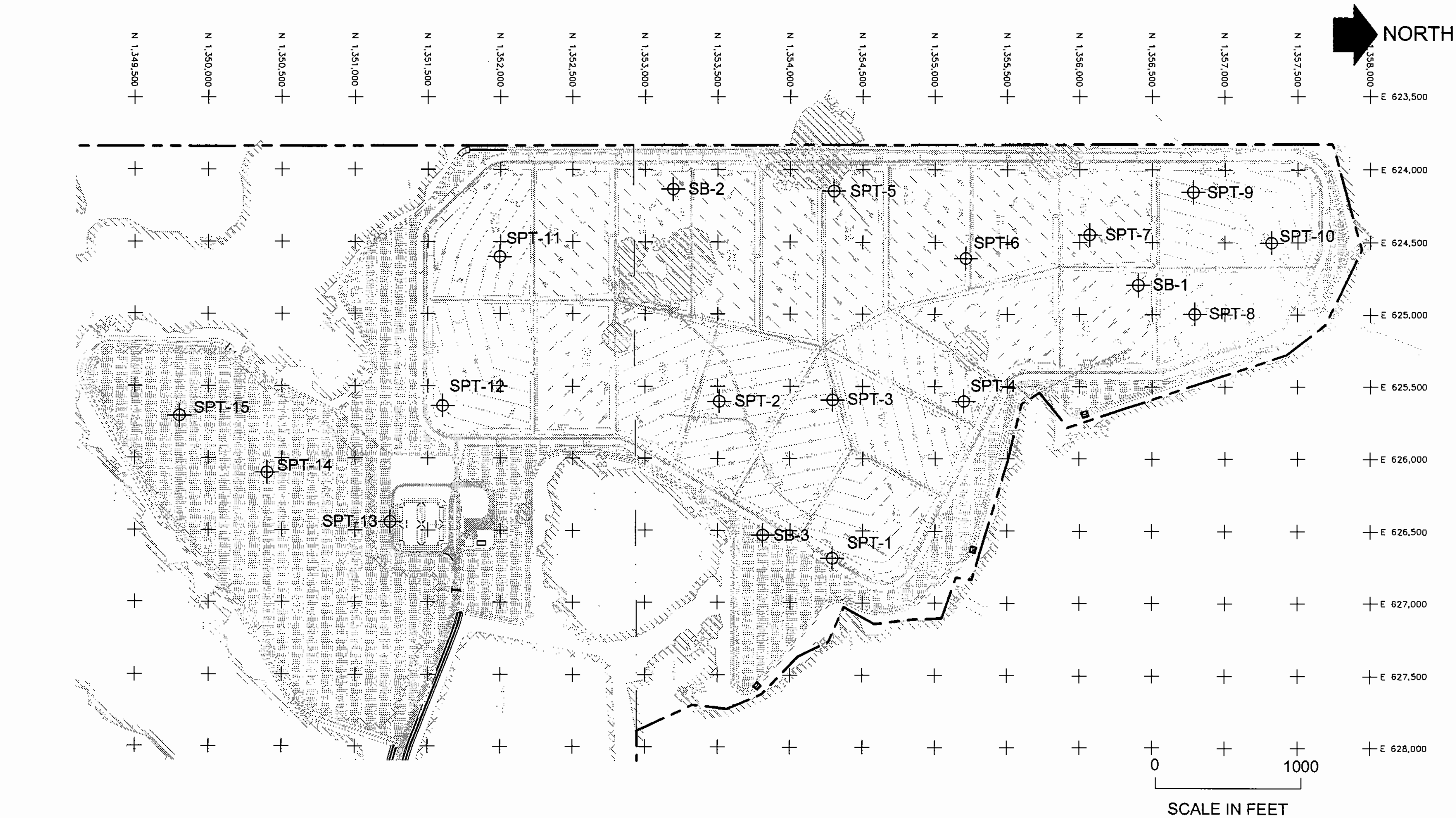

LEGEND

SB-1 ROTOSONIC BORING LOCATION

SPT-1 STANDARD PENETRATION TEST (SPT) BORING LOCATION

Project	OAK HAMMOCK DISPOSAL FACILITY PERMIT APPLICATION
Figure Title	**LOCATION OF MUD ROTARY AND ROTOSONIC BORINGS**

Project Number	Date	File No.	Figure No.
FW0400	MARCH 02	0400FA020	1

Consultant / Engineer

GEOSYNTEC CONSULTANTS
14055 RIVEREDGE DRIVE, SUITE 300 · TAMPA, FLORIDA 33637 USA
TEL: (813) 558-0990 · FAX: (813) 558-9726

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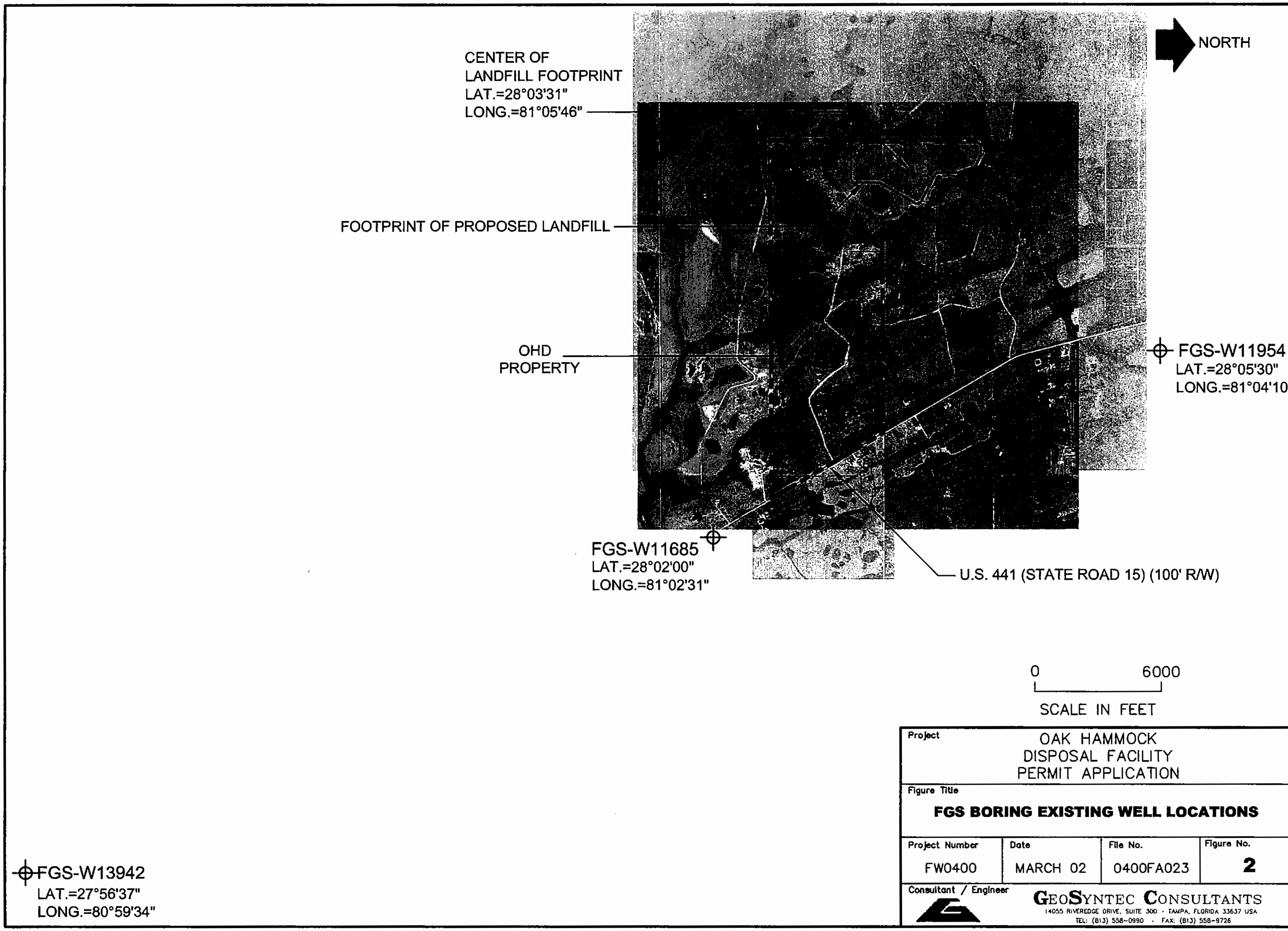
JSpeed, GeoSyntec Consultants, Tampa



Project: OAK HAMMOCK DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **FGS BORING EXISTING WELL LOCATIONS**			
Project Number: FW0400	Date: MARCH 02	File No.: 0400FA023	Figure No.: **2**
Consultant / Engineer: GEOSYNTEC CONSULTANTS, 14055 RIVEREDGE DRIVE, SUITE 300 · TAMPA, FLORIDA 33637 USA, TEL: (813) 558-0990 · FAX: (813) 558-9726			

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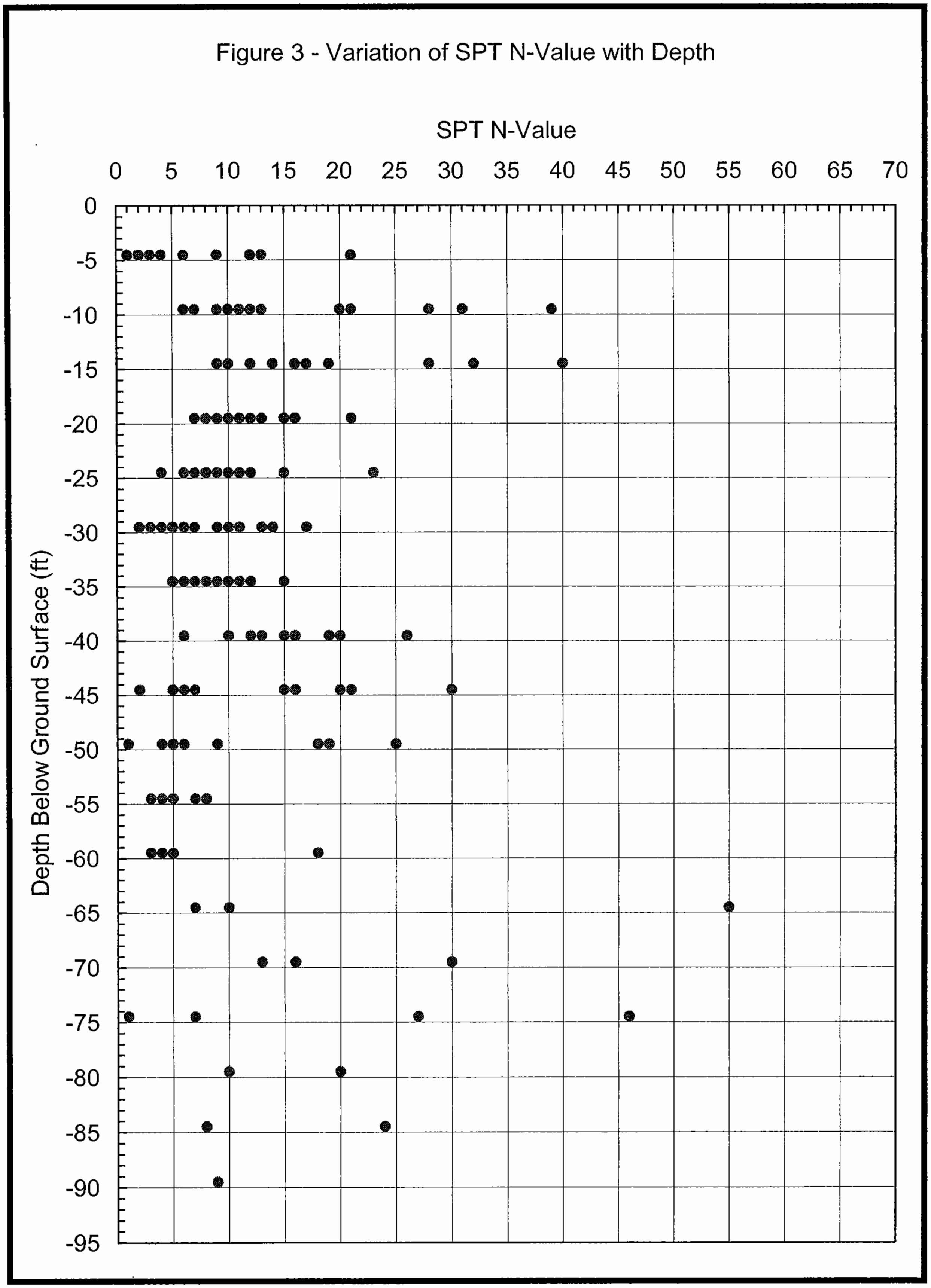


Figure 3 - Variation of SPT N-Value with Depth
SPT N-Value
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Depth Below Ground Surface (ft)
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
-75
-80
-85
-90
-95

Figure 4 - Variation of Corrected SPT $(N_1)_{60}$ with Depth

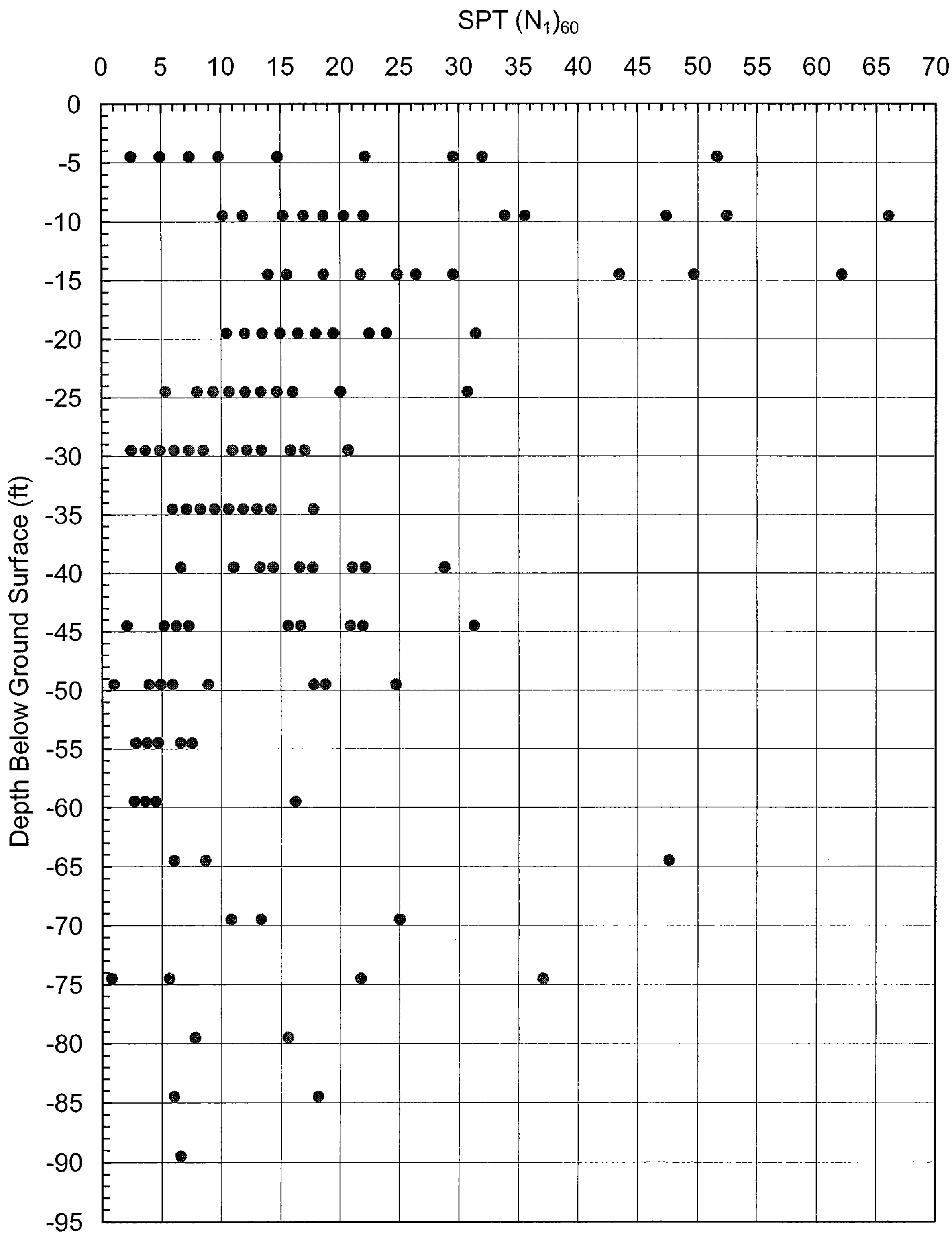
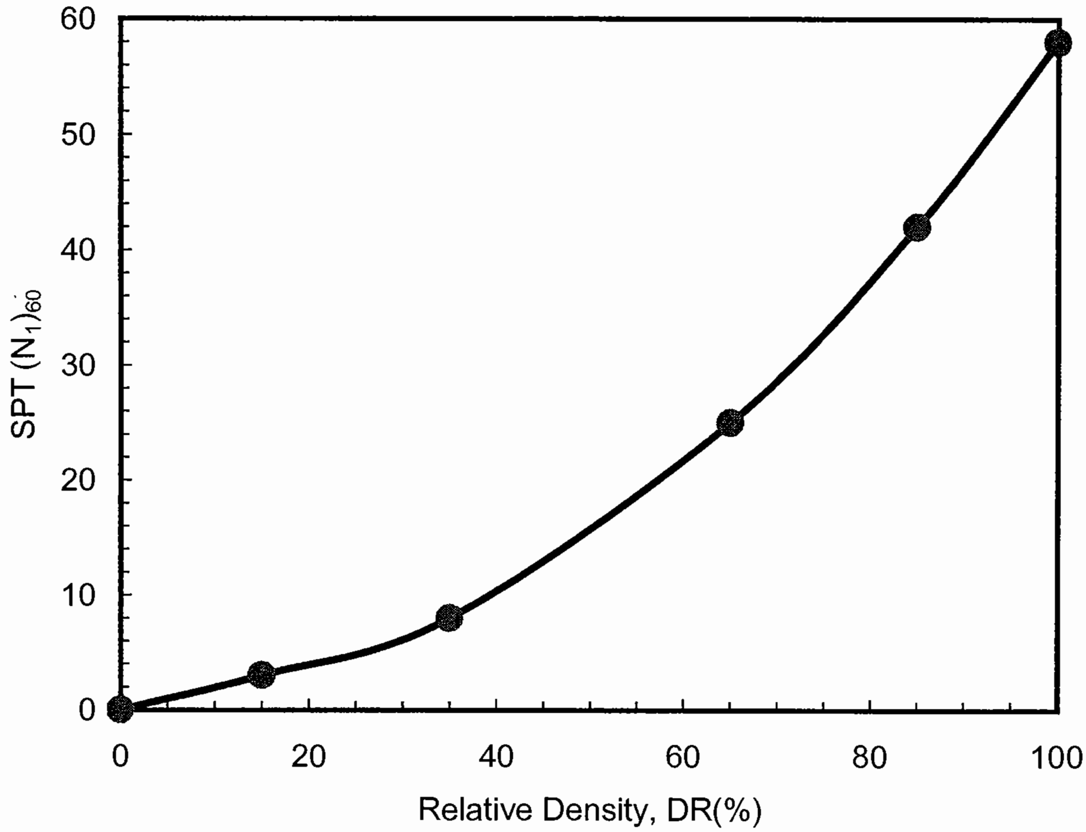


Figure 5 - Correlation of SPT and Relative Density
(after Skempton, 1986)



State of Sand:

0 < DR(%) < 15	Very Loose
15 < DR(%) < 35	Loose
35 < DR(%) < 65	Medium
65 < DR(%) < 85	Dense
85 < DR(%) < 100	Very Dense

Figure 6 - Relative Density of Subsurface Soils

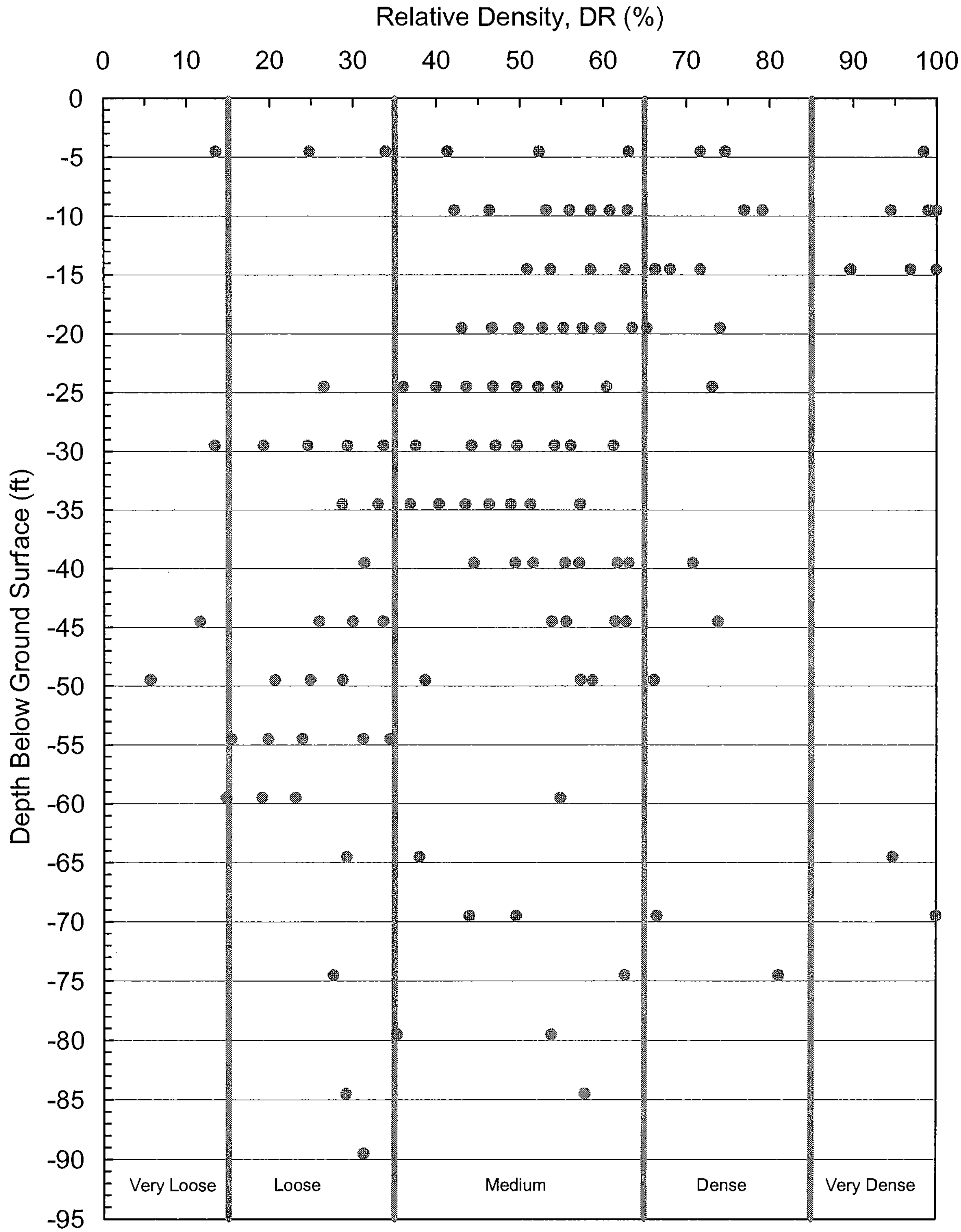


Figure 7 - Relationship between Peak Drained Friction Angle and SPT N-Value for Normally Consolidated, Unaged, Uncemented Silica Sands (after De Mello, 1971)

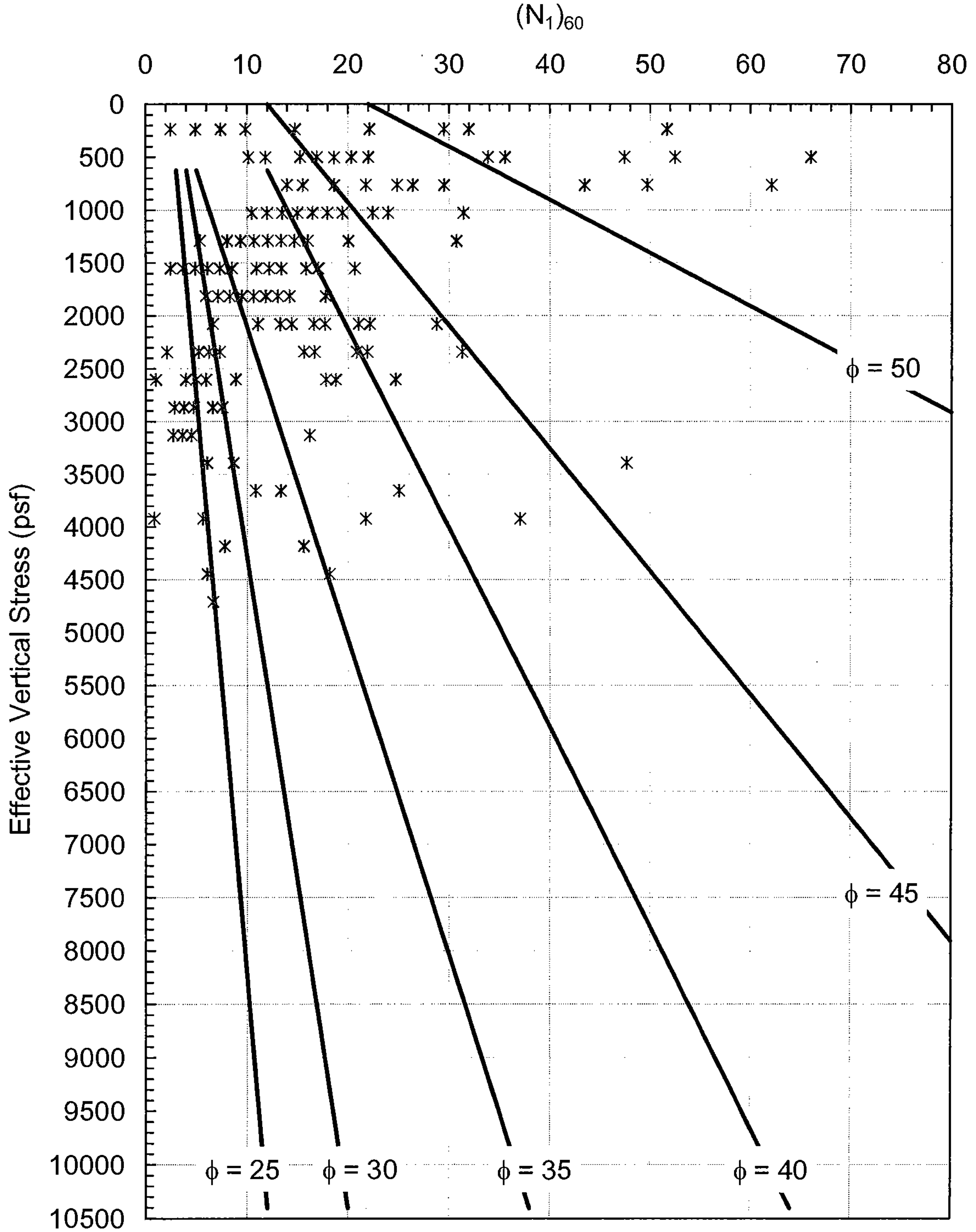
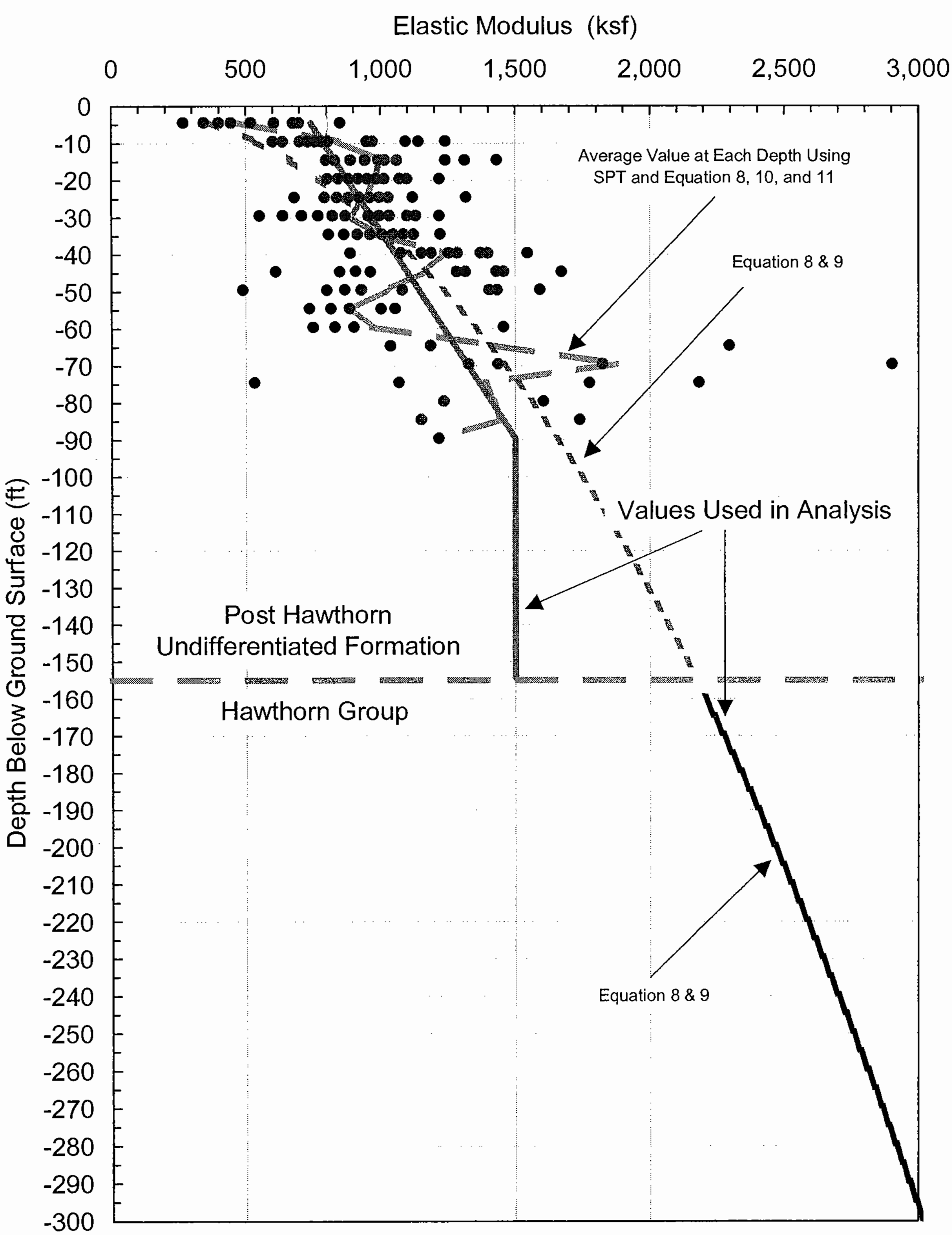


Figure 8 - Variation of Elastic Modulus with Depth



Attachment 1

Mud Rotary Boring Logs

(SPT-1 through SPT-15)

Geosyntec Consultants **Boring Log**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-1
Date: 5-Dec-2001

Coordinates:
1354289 North
626692 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Iravani
Reviewer: S. Dapp

Ground Elevation:
(m) 24.2 (ft.) 79.3

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0				brown						23.3	76.3
1.2	4.0	2		A	silty						23.0	75.3
1.5	5.0				medium sand						22.6	74.3
1.8	6.0										22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0				white						21.7	71.3
2.7	9.0	9		B	silty						21.4	70.3
3.0	10.0				coarse sand						21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0				white						20.2	66.3
4.3	14.0	14		C	silty						19.9	65.3
4.6	15.0				medium to coarse						19.6	64.3
4.9	16.0				sand						19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	8		D							18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0				brown						17.2	56.3
7.3	24.0	9		E	silty						16.9	55.3
7.6	25.0				medium sand						16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0										15.9	52.3
8.5	28.0										15.6	51.3
8.8	29.0	4		F							15.3	50.3
9.1	30.0										15.0	49.3

Geosyntec Consultants **Boring Log**

Project No.: **FW0400**
Project Name: **Oak Hammok Disposal Facility**

Location: **SPT-1**
Date: **5-Dec-2001**

Coordinates:
1354289 North
626692 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Iravani
Reviewer: S. Dapp

Ground Elevation:
(m) 24.2
(ft.) 79.3

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0										14.4	47.3
10.1	33.0										14.1	46.3
10.4	34.0	7		G							13.8	45.3
10.7	35.0										13.5	44.3
11.0	36.0				white & brown silty medium to coarse sand						13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0	13		H							12.3	40.3
12.2	40.0										12.0	39.3
12.5	41.0										11.7	38.3
12.8	42.0										11.4	37.3
13.1	43.0										11.1	36.3
13.4	44.0	16		I							10.8	35.3
13.7	45.0										10.5	34.3
14.0	46.0				dark olive silty medium sand						10.1	33.3
14.3	47.0										9.8	32.3
14.6	48.0										9.5	31.3
14.9	49.0	18		J							9.2	30.3
15.2	50.0										8.9	29.3
15.5	51.0										8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0				dark olive silty medium sand to sandy silt						8.0	26.3
16.5	54.0	4		K							7.7	25.3
16.8	55.0										7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0				dark olive silty medium sand						6.8	22.3
17.7	58.0										6.5	21.3
18.0	59.0	5		L							6.2	20.3
18.3	60.0										5.9	19.3

Geosyntec Consultants **Boring Log**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-2
Date: 5-Dec-2001

Coordinates:
1353510 North
625606 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:
(m) 24.2 (ft.) 79.4

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0										23.3	76.3
1.2	4.0	4		A	white silty medium sand						23.0	75.3
1.5	5.0										22.6	74.3
1.8	6.0										22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0										21.7	71.3
2.7	9.0	6		B	dark brown silty medium sand						21.4	70.3
3.0	10.0										21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	17		C	white silty medium sand						19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0										19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	13		D	white silty medium to coarse sand						18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0										17.2	56.3
7.3	24.0	11		E	white silty medium to coarse sand						16.9	55.3
7.6	25.0										16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0										15.9	52.3
8.5	28.0										15.6	51.3
8.8	29.0	6		F	dark brown silty medium to coarse sand						15.3	50.3
9.1	30.0										15.0	49.3

Geosyntec Consultants **Boring Log**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-2
Date: 5-Dec-2001

Coordinates:
1353510 North
625606 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:
(m) 24.2
(ft.) 79.4

Depth (m)	Depth (ft.)	Un-Corr-ected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	Lab Tests w (%)	Lab Tests LL (%)	Lab Tests PI	Lab Tests G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0										14.4	47.3
10.1	33.0				dark brown						14.1	46.3
10.4	34.0	8		G	silty						13.8	45.3
10.7	35.0				medium to coarse						13.5	44.3
11.0	36.0				sand						13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0	12		H							12.3	40.3
12.2	40.0										12.0	39.3
12.5	41.0										11.7	38.3
12.8	42.0										11.4	37.3
13.1	43.0				white						11.1	36.3
13.4	44.0	2		I	silty						10.8	35.3
13.7	45.0				medium to coarse						10.5	34.3
14.0	46.0				sand						10.1	33.3
14.3	47.0										9.8	32.3
14.6	48.0										9.5	31.3
14.9	49.0	1		J							9.2	30.3
15.2	50.0										8.9	29.3
15.5	51.0										8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0				dark olive						8.0	26.3
16.5	54.0			K	silty						7.7	25.3
16.8	55.0				medium to coarse						7.4	24.3
17.1	56.0				sand						7.1	23.3
17.4	57.0										6.8	22.3
17.7	58.0										6.5	21.3
18.0	59.0			L	SHELBY SAMPLE						6.2	20.3
18.3	60.0										5.9	19.3

Geosyntec Consultants **Boring Log**

Project No.: **FW0400**
Project Name: **Oak Hammok Disposal Facility**
Location: **SPT-2**
Date: **5-Dec-2001**

Coordinates:
1353510 North
625606 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:
(m) 24.2 (ft.) 79.4

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
18.6	61.0										5.6	18.3
18.9	62.0										5.3	17.3
19.2	63.0										5.0	16.3
19.5	64.0	10		M							4.7	15.3
19.8	65.0										4.4	14.3
20.1	66.0										4.1	13.3
20.4	67.0										3.7	12.3
20.7	68.0				light grey						3.4	11.3
21.0	69.0	30		N	silty shelly sand						3.1	10.3
21.3	70.0										2.8	9.3
21.6	71.0										2.5	8.3
21.9	72.0										2.2	7.3
22.3	73.0										1.9	6.3
22.6	74.0	27		O							1.6	5.3
22.9	75.0										1.3	4.3
23.2	76.0										1.0	3.3
23.5	77.0										0.7	2.3
23.8	78.0										0.4	1.3
24.1	79.0										0.1	0.3
24.4	80.0										-0.2	-0.7
24.7	81.0										-0.5	-1.7
25.0	82.0										-0.8	-2.7
25.3	83.0										-1.1	-3.7
25.6	84.0										-1.4	-4.7
25.9	85.0										-1.7	-5.7
26.2	86.0										-2.0	-6.7
26.5	87.0										-2.3	-7.7
26.8	88.0										-2.7	-8.7
27.1	89.0										-3.0	-9.7
27.4	90.0										-3.3	-10.7

Project No.:	**FW0400**	**Location:**	**SPT-3**
Project Name:	**Oak Hammok Disposal Facility**	**Date:**	**5-Dec-2001**
Drilling Co.(Rig):	U.S. Drilling (CME-55)	Driller:	J.C. Maffffett
Method:	Bentonite Circulation	Logger:	S. Dapp
tooling:	2.5 in. Diam. tri-cone	Reviewer:	S. Dapp

Coordinates:
1354291 North
625595 East

Ground Elevation:

(m)	(ft.)
24.4	80.1

Depth		Un-Corrected SPT	Graphic Log		Soil Description	Lab Tests					Boring Elevation	
(m)	(ft.)	"N" (blows/ ft)		Sampl		-200 US (%)	w (%)	LL (%)	PI	G	(m)	(ft.)
0.3	1.0										23.9	78.3
0.6	2.0				black						23.6	77.3
0.9	3.0				silty						23.3	76.3
1.2	4.0	2		A	medium to coarse						23.0	75.3
1.5	5.0				sand						22.6	74.3
1.8	6.0										22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0										21.7	71.3
2.7	9.0	12		B							21.4	70.3
3.0	10.0										21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	12		C							19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0				white						19.3	63.3
5.2	17.0				silty						19.0	62.3
5.5	18.0				medium to coarse						18.7	61.3
5.8	19.0	15		D	sand						18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0										17.2	56.3
7.3	24.0	10		E							16.9	55.3
7.6	25.0										16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0				dark olive						15.9	52.3
8.5	28.0				silty						15.6	51.3
8.8	29.0	3		F	medium to coarse						15.3	50.3
9.1	30.0				sand						15.0	49.3

Geosyntec Consultants **Boring Log**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-3
Date: 5-Dec-2001

Coordinates:
1354291 North
625595 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:

(m)	(ft.)
24.4	80.1

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	-200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0				dark olive						14.4	47.3
10.1	33.0				silty						14.1	46.3
10.4	34.0				medium to coarse						13.8	45.3
10.7	35.0	11		G	sand						13.5	44.3
11.0	36.0										13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0										12.3	40.3
12.2	40.0	19		H							12.0	39.3
12.5	41.0				white						11.7	38.3
12.8	42.0				silty						11.4	37.3
13.1	43.0				medium to coarse						11.1	36.3
13.4	44.0				sand						10.8	35.3
13.7	45.0	30		I							10.5	34.3
14.0	46.0										10.1	33.3
14.3	47.0										9.8	32.3
14.6	48.0										9.5	31.3
14.9	49.0										9.2	30.3
15.2	50.0	5		J							8.9	29.3
15.5	51.0				dark olive						8.6	28.3
15.8	52.0				silty						8.3	27.3
16.2	53.0				medium to coarse						8.0	26.3
16.5	54.0				sand						7.7	25.3
16.8	55.0			K							7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0										6.8	22.3
17.7	58.0										6.5	21.3
18.0	59.0										6.2	20.3
18.3	60.0			L	SHELBY TUBE						5.9	19.3

Geosyntec Consultants **Boring Log** **Page 3 of 3**

Project No.: **FW0400**
Project Name: **Oak Hammok Disposal Facility**

Location: **SPT-3**
Date: **5-Dec-2001**

Coordinates:
1354291 North
625595 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:

(m)	(ft.)
24.4	80.1

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
18.6	61.0										5.6	18.3
18.9	62.0										5.3	17.3
19.2	63.0										5.0	16.3
19.5	64.0	10		M							4.7	15.3
19.8	65.0										4.4	14.3
20.1	66.0										4.1	13.3
20.4	67.0										3.7	12.3
20.7	68.0										3.4	11.3
21.0	69.0	16		N							3.1	10.3
21.3	70.0										2.8	9.3
21.6	71.0										2.5	8.3
21.9	72.0										2.2	7.3
22.3	73.0										1.9	6.3
22.6	74.0	46		O							1.6	5.3
22.9	75.0				light grey						1.3	4.3
23.2	76.0				silty shelly sand						1.0	3.3
23.5	77.0										0.7	2.3
23.8	78.0										0.4	1.3
24.1	79.0	20		P							0.1	0.3
24.4	80.0										-0.2	-0.7
24.7	81.0										-0.5	-1.7
25.0	82.0										-0.8	-2.7
25.3	83.0										-1.1	-3.7
25.6	84.0	24		Q							-1.4	-4.7
25.9	85.0										-1.7	-5.7
26.2	86.0										-2.0	-6.7
26.5	87.0										-2.3	-7.7
26.8	88.0										-2.7	-8.7
27.1	89.0	9		R							-3.0	-9.7
27.4	90.0										-3.3	-10.7

Geosyntec Consultants **Boring Log**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-4
Date: 5-Dec-2001

Coordinates:
1355198 North
625604 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Iravani
Reviewer: S. Dapp

Ground Elevation:
(m) 24.4 (ft.) 80.2

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0										23.3	76.3
1.2	4.0	2		A							23.0	75.3
1.5	5.0										22.6	74.3
1.8	6.0										22.3	73.3
2.1	7.0				brown silty medium to coarse sand						22.0	72.3
2.4	8.0										21.7	71.3
2.7	9.0	13		B							21.4	70.3
3.0	10.0										21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	19		C	white medium to coarse sand						19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0										19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	15		D	brown medium to coarse sand						18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0										17.2	56.3
7.3	24.0	10		E							16.9	55.3
7.6	25.0										16.6	54.3
7.9	26.0				brown silty coarse sand						16.2	53.3
8.2	27.0										15.9	52.3
8.5	28.0										15.6	51.3
8.8	29.0	7		F							15.3	50.3
9.1	30.0										15.0	49.3

Geosyntec Consultants **Boring Log** **Page 2 of 2**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-4
Date: 5-Dec-2001

Coordinates:
1355198 North
625604 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Iravani
Reviewer: S. Dapp

Ground Elevation: (m) 24.4 (ft.) 80.2

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0										14.4	47.3
10.1	33.0										14.1	46.3
10.4	34.0	5		G							13.8	45.3
10.7	35.0										13.5	44.3
11.0	36.0				brown silty coarse sand						13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0	26		H							12.3	40.3
12.2	40.0										12.0	39.3
12.5	41.0										11.7	38.3
12.8	42.0										11.4	37.3
13.1	43.0				dark olive silty medium to coarse sand						11.1	36.3
13.4	44.0	21		I							10.8	35.3
13.7	45.0										10.5	34.3
14.0	46.0										10.1	33.3
14.3	47.0				dark olive silty medium sand						9.8	32.3
14.6	48.0										9.5	31.3
14.9	49.0	25		J							9.2	30.3
15.2	50.0										8.9	29.3
15.5	51.0										8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0										8.0	26.3
16.5	54.0										7.7	25.3
16.8	55.0										7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0										6.8	22.3
17.7	58.0										6.5	21.3
18.0	59.0										6.2	20.3
18.3	60.0										5.9	19.3

Geosyntec Consultants **Boring Log**

Project No.: **FW0400**
Project Name: **Oak Hammok Disposal Facility**

Location: **SPT-5**
Date: **5-Dec-2001**

Coordinates:
1354300 North
624151 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:
(m) 25.1 (ft.) 82.3

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0				black						23.6	77.3
0.9	3.0				silty						23.3	76.3
1.2	4.0	4		A	medium to coarse						23.0	75.3
1.5	5.0				sand						22.6	74.3
1.8	6.0										22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0										21.7	71.3
2.7	9.0	6		B							21.4	70.3
3.0	10.0										21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0				white						20.2	66.3
4.3	14.0	16		C	silty						19.9	65.3
4.6	15.0				coarse						19.6	64.3
4.9	16.0				sand						19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	16		D							18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0										17.2	56.3
7.3	24.0	10		E							16.9	55.3
7.6	25.0				dark olive						16.6	54.3
7.9	26.0				silty						16.2	53.3
8.2	27.0				coarse						15.9	52.3
8.5	28.0				sand						15.6	51.3
8.8	29.0	13		F							15.3	50.3
9.1	30.0										15.0	49.3

Geosyntec Consultants **Boring Log** **Page 2 of 2**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility

Location: SPT-5
Date: 5-Dec-2001

Coordinates:
1354300 North
624151 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:
(m) 25.1
(ft.) 82.3

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0										14.4	47.3
10.1	33.0				dark olive						14.1	46.3
10.4	34.0				silty						13.8	45.3
10.7	35.0	9		G	coarse						13.5	44.3
11.0	36.0				sand						13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0										12.3	40.3
12.2	40.0	20		H							12.0	39.3
12.5	41.0										11.7	38.3
12.8	42.0										11.4	37.3
13.1	43.0				white						11.1	36.3
13.4	44.0				silty						10.8	35.3
13.7	45.0	5		I	coarse						10.5	34.3
14.0	46.0				sand						10.1	33.3
14.3	47.0										9.8	32.3
14.6	48.0										9.5	31.3
14.9	49.0										9.2	30.3
15.2	50.0	5		J							8.9	29.3
15.5	51.0										8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0				dark olive						8.0	26.3
16.5	54.0				sandy						7.7	25.3
16.8	55.0	3		K	clay						7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0										6.8	22.3
17.7	58.0										6.5	21.3
18.0	59.0										6.2	20.3
18.3	60.0										5.9	19.3

Geosyntec Consultants **Boring Log**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-6
Date: 5-Dec-2001

Coordinates:
1355211 North
624613 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Iravani
Reviewer: S. Dapp

Ground Elevation:

(m)	(ft.)
24.6	80.8

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0				white						23.6	77.3
0.9	3.0				medium						23.3	76.3
1.2	4.0	3		A	sand						23.0	75.3
1.5	5.0										22.6	74.3
1.8	6.0										22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0				brown						21.7	71.3
2.7	9.0				silty						21.4	70.3
3.0	10.0	11		B	medium						21.1	69.3
3.4	11.0				sand						20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	10		C							19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0										19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	9		D							18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0				white						17.8	58.3
6.7	22.0				medium to coarse						17.5	57.3
7.0	23.0				sand						17.2	56.3
7.3	24.0	6		E							16.9	55.3
7.6	25.0										16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0										15.9	52.3
8.5	28.0										15.6	51.3
8.8	29.0	9		F							15.3	50.3
9.1	30.0										15.0	49.3

Geosyntec Consultants | **Boring Log** |

Project No.: FW0400 | **Location:** SPT-6 | Coordinates: 1355211 North, 624613 East

Project Name: Oak Hammok Disposal Facility | **Date:** 5-Dec-2001

Drilling Co.(Rig): U.S. Drilling (CME-45) | Driller: K. Claprood | Ground Elevation:

Method: Bentonite Circulation | Logger: S. Iravani | (m) 24.6 | (ft.) 80.8

tooling: 2.5 in. Diam. tri-cone | Reviewer: S. Dapp

Depth (m)	Depth (ft.)	Un-Corr-ected SPT "N" (blows/ ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0										14.4	47.3
10.1	33.0				white						14.1	46.3
10.4	34.0	12		G	medium to coarse						13.8	45.3
10.7	35.0				sand						13.5	44.3
11.0	36.0										13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0	10		H							12.3	40.3
12.2	40.0										12.0	39.3
12.5	41.0										11.7	38.3
12.8	42.0										11.4	37.3
13.1	43.0										11.1	36.3
13.4	44.0	7		I							10.8	35.3
13.7	45.0										10.5	34.3
14.0	46.0				dark olive						10.1	33.3
14.3	47.0				silty						9.8	32.3
14.6	48.0				medium						9.5	31.3
14.9	49.0	6		J	sand						9.2	30.3
15.2	50.0										8.9	29.3
15.5	51.0										8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0										8.0	26.3
16.5	54.0	5		K							7.7	25.3
16.8	55.0										7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0										6.8	22.3
17.7	58.0				dark olive						6.5	21.3
18.0	59.0	5		L	silty and sandy						6.2	20.3
18.3	60.0				clay						5.9	19.3

Geosyntec Consultants **Boring Log**

Project No.: **FW0400**
Project Name: **Oak Hammok Disposal Facility**
Location: **SPT-7**
Date: **4-Dec-2001**

Coordinates:
1356067 North
624448 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:

(m)	(ft.)
24.5	80.4

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0				dark brown						23.3	76.3
1.2	4.0	3		A	silty						23.0	75.3
1.5	5.0				medium to coarse						22.6	74.3
1.8	6.0				sand						22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0										21.7	71.3
2.7	9.0	9		B							21.4	70.3
3.0	10.0										21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	10		C							19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0				white						19.3	63.3
5.2	17.0				silty						19.0	62.3
5.5	18.0				medium to coarse						18.7	61.3
5.8	19.0	7		D	sand						18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0										17.2	56.3
7.3	24.0	4		E							16.9	55.3
7.6	25.0										16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0				dark brown						15.9	52.3
8.5	28.0				silty						15.6	51.3
8.8	29.0	2		F	medium to coarse						15.3	50.3
9.1	30.0				sand						15.0	49.3

Project No.: **FW0400** **Location: SPT-7**
Project Name: **Oak Hammok Disposal Facility** **Date: 4-Dec-2001**

Coordinates:
1356067 North
624448 East

Drilling Co.(Rig): U.S. Drilling (CME-45) Driller: K. Claprood
Method: Bentonite Circulation Logger: S. Dapp
tooling: 2.5 in. Diam. tri-cone Reviewer: S. Dapp

Ground Elevation: (m) 24.5 (ft.) 80.4

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	-200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0										14.4	47.3
10.1	33.0				dark brown						14.1	46.3
10.4	34.0	6		G	silty						13.8	45.3
10.7	35.0				medium to coarse						13.5	44.3
11.0	36.0				sand						13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0	6		H							12.3	40.3
12.2	40.0										12.0	39.3
12.5	41.0										11.7	38.3
12.8	42.0										11.4	37.3
13.1	43.0				white						11.1	36.3
13.4	44.0	15		I	silty						10.8	35.3
13.7	45.0				medium to coarse						10.5	34.3
14.0	46.0				sand						10.1	33.3
14.3	47.0										9.8	32.3
14.6	48.0										9.5	31.3
14.9	49.0	4		J							9.2	30.3
15.2	50.0										8.9	29.3
15.5	51.0										8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0										8.0	26.3
16.5	54.0										7.7	25.3
16.8	55.0										7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0										6.8	22.3
17.7	58.0										6.5	21.3
18.0	59.0										6.2	20.3
18.3	60.0										5.9	19.3

Geosyntec Consultants **Boring Log** **Page 1 of 2**

Project No.: FW0400 **Location: SPT-8**
Project Name: Oak Hammok Disposal Facility **Date: 4-Dec-2001**

Coordinates:
1356792 North
624996 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation: (m) 24.4 (ft.) 80.1

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	-200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0				dark brown						23.3	76.3
1.2	4.0				silty						23.0	75.3
1.5	5.0	2		A	medium to coarse						22.6	74.3
1.8	6.0				sand						22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0										21.7	71.3
2.7	9.0										21.4	70.3
3.0	10.0	20		B							21.1	69.3
3.4	11.0				dark brown						20.8	68.3
3.7	12.0				silty						20.5	67.3
4.0	13.0				medium to coarse						20.2	66.3
4.3	14.0				sand						19.9	65.3
4.6	15.0	15		C							19.6	64.3
4.9	16.0										19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0										18.4	60.3
6.1	20.0	11		D							18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0				white						17.2	56.3
7.3	24.0				silty						16.9	55.3
7.6	25.0	23		E	medium						16.6	54.3
7.9	26.0				sand						16.2	53.3
8.2	27.0										15.9	52.3
8.5	28.0										15.6	51.3
8.8	29.0										15.3	50.3
9.1	30.0	5		F							15.0	49.3

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility

Location: SPT-8
Date: 4-Dec-2001

Coordinates:
1356792 North
624996 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation: (m) 24.4 (ft.) 80.1

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0										14.4	47.3
10.1	33.0										14.1	46.3
10.4	34.0	6		G							13.8	45.3
10.7	35.0										13.5	44.3
11.0	36.0										13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0	12		H							12.3	40.3
12.2	40.0										12.0	39.3
12.5	41.0				dark brown						11.7	38.3
12.8	42.0				silty						11.4	37.3
13.1	43.0				medium to coarse						11.1	36.3
13.4	44.0	21		I	sand						10.8	35.3
13.7	45.0										10.5	34.3
14.0	46.0										10.1	33.3
14.3	47.0										9.8	32.3
14.6	48.0										9.5	31.3
14.9	49.0	6		J							9.2	30.3
15.2	50.0										8.9	29.3
15.5	51.0										8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0										8.0	26.3
16.5	54.0	8		K							7.7	25.3
16.8	55.0										7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0				white						6.8	22.3
17.7	58.0				silty						6.5	21.3
18.0	59.0	4		L	medium to coarse						6.2	20.3
18.3	60.0				sand						5.9	19.3

Geosyntec Consultants | **Boring Log** |

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility

Location: SPT-9
Date: 4-Dec-2001

Coordinates:
1356781 North
624156 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:
(m) 24.8
(ft.) 81.5

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0				white silty medium sand						23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0										23.3	76.3
1.2	4.0	6		A							23.0	75.3
1.5	5.0										22.6	74.3
1.8	6.0										22.3	73.3
2.1	7.0				brown silty medium sand						22.0	72.3
2.4	8.0										21.7	71.3
2.7	9.0	31		B							21.4	70.3
3.0	10.0										21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	40		C							19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0										19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	11		D							18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0										17.2	56.3
7.3	24.0	4		E							16.9	55.3
7.6	25.0										16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0				dark brown silty medium to coarse sand						15.9	52.3
8.5	28.0										15.6	51.3
8.8	29.0	3		F							15.3	50.3
9.1	30.0										15.0	49.3

Geosyntec Consultants **Boring Log**

Project No.: FW0400 **Location:** SPT-9 Coordinates: 1356781 North
Project Name: Oak Hammok Disposal Facility **Date:** 4-Dec-2001 624156 East

Drilling Co.(Rig): U.S. Drilling (CME-45) Driller: K. Claprood Ground Elevation:
Method: Bentonite Circulation Logger: S. Dapp (m) 24.8 (ft.) 81.5
tooling: 2.5 in. Diam. tri-cone Reviewer: S. Dapp

Depth (m)	Depth (ft.)	Un-Corr-ected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0				dark brown						14.4	47.3
10.1	33.0				silty						14.1	46.3
10.4	34.0	10		G	medium to coarse						13.8	45.3
10.7	35.0				sand						13.5	44.3
11.0	36.0										13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0	16		H							12.3	40.3
12.2	40.0										12.0	39.3
12.5	41.0										11.7	38.3
12.8	42.0										11.4	37.3
13.1	43.0										11.1	36.3
13.4	44.0	6		I							10.8	35.3
13.7	45.0										10.5	34.3
14.0	46.0										10.1	33.3
14.3	47.0										9.8	32.3
14.6	48.0				brown						9.5	31.3
14.9	49.0	9		J	silty						9.2	30.3
15.2	50.0				medium to coarse						8.9	29.3
15.5	51.0				sand						8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0										8.0	26.3
16.5	54.0	5		K							7.7	25.3
16.8	55.0										7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0										6.8	22.3
17.7	58.0										6.5	21.3
18.0	59.0	3		L							6.2	20.3
18.3	60.0										5.9	19.3

Project No.:	**FW0400**	**Location:**	**SPT-9**
Project Name:	**Oak Hammok Disposal Facility**	**Date:**	**4-Dec-2001**
Drilling Co.(Rig):	U.S. Drilling (CME-45)	Driller:	K. Claprood
Method:	Bentonite Circulation	Logger:	S. Dapp
tooling:	2.5 in. Diam. tri-cone	Reviewer:	S. Dapp

Coordinates:
1356781 North
624156 East

Ground Elevation:

(m)	(ft.)
24.8	81.5

Depth (m)	Depth (ft.)	Un-Corr-ected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
18.6	61.0										5.6	18.3
18.9	62.0				dark olive						5.3	17.3
19.2	63.0				silty and sandy						5.0	16.3
19.5	64.0	7		M	clay						4.7	15.3
19.8	65.0										4.4	14.3
20.1	66.0										4.1	13.3
20.4	67.0										3.7	12.3
20.7	68.0										3.4	11.3
21.0	69.0	13		N							3.1	10.3
21.3	70.0				Light grey						2.8	9.3
21.6	71.0				silty shelly						2.5	8.3
21.9	72.0				medium to coarse						2.2	7.3
22.3	73.0				sand						1.9	6.3
22.6	74.0	7		O							1.6	5.3
22.9	75.0										1.3	4.3
23.2	76.0										1.0	3.3
23.5	77.0										0.7	2.3
23.8	78.0										0.4	1.3
24.1	79.0										0.1	0.3
24.4	80.0										-0.2	-0.7
24.7	81.0										-0.5	-1.7
25.0	82.0										-0.8	-2.7
25.3	83.0										-1.1	-3.7
25.6	84.0										-1.4	-4.7
25.9	85.0										-1.7	-5.7
26.2	86.0										-2.0	-6.7
26.5	87.0										-2.3	-7.7
26.8	88.0										-2.7	-8.7
27.1	89.0										-3.0	-9.7
27.4	90.0										-3.3	-10.7

Geosyntec Consultants **Boring Log**

Project No.: FW0400 **Location: SPT-10**
Project Name: Oak Hammok Disposal Facility **Date: 4-Dec-2001**

Coordinates:
1357317 North
624503 East

Drilling Co.(Rig): U.S. Drilling (CME-45) Driller: K. Claprood
Method: Bentonite Circulation Logger: S. Dapp
tooling: 2.5 in. Diam. tri-cone Reviewer: S. Dapp

Ground Elevation: (m) 24.7 (ft.) 81.0

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0				dark brown silty medium to coarse sand						23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0										23.3	76.3
1.2	4.0	18		A							23.0	75.3
1.5	5.0										22.6	74.3
1.8	6.0										22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0										21.7	71.3
2.7	9.0	20		B							21.4	70.3
3.0	10.0										21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0				dark brown silty medium to coarse sand						20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	26		C							19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0										19.3	63.3
5.2	17.0				white silty medium sand						19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	21		D							18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0										17.2	56.3
7.3	24.0	15		E							16.9	55.3
7.6	25.0										16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0				brown silty medium to coarse sand						15.9	52.3
8.5	28.0										15.6	51.3
8.8	29.0	5		F							15.3	50.3
9.1	30.0										15.0	49.3

Geosyntec Consultants **Boring Log**

Project No.: FW0400 **Location:** SPT-10
Project Name: Oak Hammok Disposal Facility **Date:** 4-Dec-2001

Coordinates:
1357317 North
624503 East

Drilling Co.(Rig): U.S. Drilling (CME-45) Driller: K. Claprood
Method: Bentonite Circulation Logger: S. Dapp
tooling: 2.5 in. Diam. tri-cone Reviewer: S. Dapp

Ground Elevation: (m) 24.7 (ft.) 81.0

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0				dark brown silty medium to coarse sand						14.7	48.3
9.8	32.0										14.4	47.3
10.1	33.0										14.1	46.3
10.4	34.0	8		G							13.8	45.3
10.7	35.0										13.5	44.3
11.0	36.0										13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0	16		H							12.3	40.3
12.2	40.0										12.0	39.3
12.5	41.0										11.7	38.3
12.8	42.0				brown silty medium sand						11.4	37.3
13.1	43.0										11.1	36.3
13.4	44.0	20		I							10.8	35.3
13.7	45.0										10.5	34.3
14.0	46.0										10.1	33.3
14.3	47.0										9.8	32.3
14.6	48.0										9.5	31.3
14.9	49.0	19		J							9.2	30.3
15.2	50.0										8.9	29.3
15.5	51.0										8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0										8.0	26.3
16.5	54.0	7		K							7.7	25.3
16.8	55.0										7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0										6.8	22.3
17.7	58.0										6.5	21.3
18.0	59.0	18		L							6.2	20.3
18.3	60.0										5.9	19.3

Geosyntec Consultants | Boring Log |

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-10
Date: 4-Dec-2001

Coordinates:
1357317 North
624503 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation: (m) 24.7 (ft.) 81.0

Depth (m)	Depth (ft.)	Un-Corr-ected SPT "N" (blows/ ft)	Graphic Log	Sample	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
18.6	61.0										5.6	18.3
18.9	62.0										5.3	17.3
19.2	63.0										5.0	16.3
19.5	64.0	55		M							4.7	15.3
19.8	65.0										4.4	14.3
20.1	66.0				brown siltv medium sand						4.1	13.3
20.4	67.0										3.7	12.3
20.7	68.0										3.4	11.3
21.0	69.0	50 for 4 inch		N							3.1	10.3
21.3	70.0										2.8	9.3
21.6	71.0										2.5	8.3
21.9	72.0										2.2	7.3
22.3	73.0				dark olive siltv and sandv clav						1.9	6.3
22.6	74.0	0		O							1.6	5.3
22.9	75.0										1.3	4.3
23.2	76.0										1.0	3.3
23.5	77.0										0.7	2.3
23.8	78.0										0.4	1.3
24.1	79.0	10		P							0.1	0.3
24.4	80.0				light grey silty shelly medium to coarse sand						-0.2	-0.7
24.7	81.0										-0.5	-1.7
25.0	82.0										-0.8	-2.7
25.3	83.0										-1.1	-3.7
25.6	84.0	0		Q							-1.4	-4.7
25.9	85.0										-1.7	-5.7
26.2	86.0										-2.0	-6.7
26.5	87.0										-2.3	-7.7
26.8	88.0										-2.7	-8.7
27.1	89.0										-3.0	-9.7
27.4	90.0										-3.3	-10.7

Geosyntec Consultants **Boring Log**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-11
Date: 6-Dec-2001

Coordinates:
1351994 North
624604 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Iravani
Reviewer: S. Dapp

Ground Elevation:
(m) 24.6
(ft.) 80.7

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0										23.3	76.3
1.2	4.0	1		A							23.0	75.3
1.5	5.0										22.6	74.3
1.8	6.0				brown silty medium to coarse sand						22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0										21.7	71.3
2.7	9.0	7		B							21.4	70.3
3.0	10.0										21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	9		C	light olive silty medium to coarse sand						19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0										19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	9		D	white silty medium to coarse sand						18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0										17.2	56.3
7.3	24.0	11		E							16.9	55.3
7.6	25.0				grey silty medium to coarse sand						16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0										15.9	52.3
8.5	28.0										15.6	51.3
8.8	29.0	17		F							15.3	50.3
9.1	30.0										15.0	49.3

Geosyntec Consultants **Boring Log** **Page 1 of 2**

Project No.: FW0400 **Location:** SPT-12 Coordinates: 1351602 North
Project Name: Oak Hammok Disposal Facility **Date:** 6-Dec-2001 625635 East

Drilling Co.(Rig): U.S. Drilling (CME-55) Driller: J.C. Maffett
Method: Bentonite Circulation Logger: S. Dapp
tooling: 2.5 in. Diam. tri-cone Reviewer: S. Dapp

Ground Elevation: (m) 24.5 (ft.) 80.4

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	-200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0				dark brown						23.3	76.3
1.2	4.0				silty						23.0	75.3
1.5	5.0	3		A	fine to medium						22.6	74.3
1.8	6.0				sand						22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0				brown						21.7	71.3
2.7	9.0				silty						21.4	70.3
3.0	10.0	21		B	fine to medium						21.1	69.3
3.4	11.0				sand						20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0				white						20.2	66.3
4.3	14.0	12		C	silty						19.9	65.3
4.6	15.0				fine to medium						19.6	64.3
4.9	16.0				sand						19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	8		D							18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0				dark olive						17.8	58.3
6.7	22.0				silty						17.5	57.3
7.0	23.0				fine to medium						17.2	56.3
7.3	24.0				sand						16.9	55.3
7.6	25.0	7		E							16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0				dark brown						15.9	52.3
8.5	28.0				silty						15.6	51.3
8.8	29.0				medium						15.3	50.3
9.1	30.0	11		F	sand						15.0	49.3

Geosyntec Consultants **Boring Log**

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-12
Date: 6-Dec-2001

Coordinates:
1351602 North
625635 East

Drilling Co.(Rig): U.S. Drilling (CME-55)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: J.C. Maffett
Logger: S. Dapp
Reviewer: S. Dapp

Ground Elevation:
(m) 24.5 (ft.) 80.4

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sample	Soil Description	-200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
9.4	31.0										14.7	48.3
9.8	32.0										14.4	47.3
10.1	33.0				brown						14.1	46.3
10.4	34.0			G	silty						13.8	45.3
10.7	35.0	13			medium						13.5	44.3
11.0	36.0				sand						13.2	43.3
11.3	37.0										12.9	42.3
11.6	38.0										12.6	41.3
11.9	39.0	15		H							12.3	40.3
12.2	40.0										12.0	39.3
12.5	41.0										11.7	38.3
12.8	42.0										11.4	37.3
13.1	43.0										11.1	36.3
13.4	44.0	5		I							10.8	35.3
13.7	45.0										10.5	34.3
14.0	46.0				light brown						10.1	33.3
14.3	47.0				silty						9.8	32.3
14.6	48.0				medium						9.5	31.3
14.9	49.0	5		J	sand						9.2	30.3
15.2	50.0										8.9	29.3
15.5	51.0										8.6	28.3
15.8	52.0										8.3	27.3
16.2	53.0										8.0	26.3
16.5	54.0	0		K							7.7	25.3
16.8	55.0										7.4	24.3
17.1	56.0										7.1	23.3
17.4	57.0										6.8	22.3
17.7	58.0										6.5	21.3
18.0	59.0										6.2	20.3
18.3	60.0										5.9	19.3

Geosyntec Consultants **Boring Log**

Project No.: FW0400 **Location: SPT-13**
Project Name: Oak Hammok Disposal Facility **Date: 6-Dec-2001**

Coordinates:
1351240 North
626443 East

Drilling Co.(Rig): U.S. Drilling (CME-55) Driller: J.C. Maffett
Method: Bentonite Circulation Logger: S. Dapp
tooling: 2.5 in. Diam. tri-cone Reviewer: S. Dapp

Ground Elevation: (m) 24.7 (ft.) 81.1

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0										23.3	76.3
1.2	4.0										23.0	75.3
1.5	5.0	9		A							22.6	74.3
1.8	6.0				dark brown						22.3	73.3
2.1	7.0				silty						22.0	72.3
2.4	8.0				fine to medium						21.7	71.3
2.7	9.0				sand						21.4	70.3
3.0	10.0	28		B							21.1	69.3
3.4	11.0										20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	28		C							19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0				light brown						19.3	63.3
5.2	17.0				silty						19.0	62.3
5.5	18.0				medium						18.7	61.3
5.8	19.0				sand						18.4	60.3
6.1	20.0	21		D							18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0				white						17.2	56.3
7.3	24.0				silty						16.9	55.3
7.6	25.0	12		E	medium to coarse						16.6	54.3
7.9	26.0				sand						16.2	53.3
8.2	27.0				brown						15.9	52.3
8.5	28.0				silty						15.6	51.3
8.8	29.0				medium to coarse						15.3	50.3
9.1	30.0	13		F	sand						15.0	49.3

Geosyntec Consultants

Boring Log

Project No.: FW0400
Project Name: Oak Hammok Disposal Facility
Location: SPT-14
Date: 6-Dec-2001

Coordinates:
1350398 North
626102 East

Drilling Co.(Rig): U.S. Drilling (CME-45)
Method: Bentonite Circulation
tooling: 2.5 in. Diam. tri-cone

Driller: K. Claprood
Logger: S. Iravani
Reviewer: S. Dapp

Ground Elevation:
(m) 24.7
(ft.) 81.0

Depth (m)	Depth (ft.)	Un-Corrected SPT "N" (blows/ft)	Graphic Log	Sampl	Soil Description	Lab Tests -200 US (%)	w (%)	LL (%)	PI	G	Boring Elevation (m)	Boring Elevation (ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0				white						23.3	76.3
1.2	4.0	13		A	coarse						23.0	75.3
1.5	5.0				sand						22.6	74.3
1.8	6.0										22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0				brown						21.7	71.3
2.7	9.0	10		B	silty						21.4	70.3
3.0	10.0				medium to coarse						21.1	69.3
3.4	11.0				sand						20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	14		C							19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0				white						19.3	63.3
5.2	17.0				medium to coarse						19.0	62.3
5.5	18.0				sand						18.7	61.3
5.8	19.0	10		D							18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0										17.8	58.3
6.7	22.0										17.5	57.3
7.0	23.0										17.2	56.3
7.3	24.0	8		E							16.9	55.3
7.6	25.0										16.6	54.3
7.9	26.0				white						16.2	53.3
8.2	27.0				silty						15.9	52.3
8.5	28.0				medium to coarse						15.6	51.3
8.8	29.0	14		F	sand						15.3	50.3
9.1	30.0										15.0	49.3

Geosyntec Consultants **Boring Log**

Project No.: FW0400 **Location:** SPT-15
Project Name: Oak Hammok Disposal Facility **Date:** 6-Dec-2001

Coordinates:
1349802 North
625707 East

Drilling Co.(Rig): U.S. Drilling (CME-45) Driller: K. Claprood
Method: Bentonite Circulation Logger: S. Iravani
tooling: 2.5 in. Diam. tri-cone Reviewer: S. Dapp

Ground Elevation:

(m)	(ft.)
24.6	80.7

Depth		Un-Corrected SPT	Graphic Log		Soil Description	Lab Tests					Boring Elevation	
(m)	(ft.)	"N" (blows/ft)		Sampl		-200 US (%)	w (%)	LL (%)	PI	G	(m)	(ft.)
0.3	1.0										23.9	78.3
0.6	2.0										23.6	77.3
0.9	3.0				white						23.3	76.3
1.2	4.0	21		A	silty						23.0	75.3
1.5	5.0				medium						22.6	74.3
1.8	6.0				sand						22.3	73.3
2.1	7.0										22.0	72.3
2.4	8.0				white						21.7	71.3
2.7	9.0	39		B	silty						21.4	70.3
3.0	10.0				fine						21.1	69.3
3.4	11.0				sand						20.8	68.3
3.7	12.0										20.5	67.3
4.0	13.0										20.2	66.3
4.3	14.0	14		C							19.9	65.3
4.6	15.0										19.6	64.3
4.9	16.0										19.3	63.3
5.2	17.0										19.0	62.3
5.5	18.0										18.7	61.3
5.8	19.0	7		D							18.4	60.3
6.1	20.0										18.1	59.3
6.4	21.0				white						17.8	58.3
6.7	22.0				coarse						17.5	57.3
7.0	23.0				sand						17.2	56.3
7.3	24.0	11		E							16.9	55.3
7.6	25.0										16.6	54.3
7.9	26.0										16.2	53.3
8.2	27.0										15.9	52.3
8.5	28.0										15.6	51.3
8.8	29.0	10		F							15.3	50.3
9.1	30.0										15.0	49.3

Attachment 2

Rotosonic Boring Logs

(SB-1 through SB-3)

Kubal-Furr & Associates
-Environmental Consultants-

LOG OF BORING SB-1

(Page 1 of 2)

OMNI Waste Oak Hammock Site Investigation	Date Started	: 11/2/01	Company Rep.	: K. Smith
	Date Completed	: 11/3/01	Northing Coord.	: 1356401.00
	Hole Diameter	: 4 inches	Easting Coord.	: 624799.00
Holopaw, FL	Drilling Method	: Rotosonic	Survey By	: Johnston's Surveying
Project # 48OH01	Sampling Method	: Rotosonic	Logged By	: G. Kinsman

Depth in Feet	Surf. Elev. 80.00	GRAPHIC	DESCRIPTION	Samples	Shelby Tube Sample
0	80		SILTY SAND, Olive Black to Brown, well sorted, fine grained	1	
5	75			2	
10	70		SAND, Moderate Yellowish Brown, well sorted, fine grained with minor silt	3	
15	65			4	
20	60		SILTY SAND, Dark Yellowish Brown to Gray to Dark Gray to Grayish Black, medium-fine grained, sub-angular quartz grains, becoming more Silty 40-47ft	5	
25	55			6	
30	50			7	
35	45			8	
40	40			9	
45	35		SILTY SAND, Light Olive Gray to Grayish Olive, with minor dark minerals (5%-10%), well sorted, fine grained, DISTURBED SAMPLE- 55'-65'	10	
50	30			11	
55	25			12	
60	20			13	
65	15		DISTURBED SAMPLE-65'-75' CLAYEY SAND, Grayish Olive with minor shell fragments	14	
70	10		SANDY SHELLY CLAY, Light Olive Gray to Light Olive	15	
75	5			16	
80	0			17	
85	-5		SHELL HASH with minor clay, Yellowish Gray, Some whole shells, fragments from 2mm-50mm	18	
90					

02-26-2002 C:\Program Files\mtech2002\OMNI Logs\SB-1.bor

Kubal-Furr & Associates
-Environmental Consultants-

LOG OF BORING SB-1

(Page 2 of 2)

OMNI Waste Oak Hammock Site Investigation	Date Started : 11/2/01 Date Completed : 11/3/01 Hole Diameter : 4 inches Drilling Method : Rotosonic Sampling Method : Rotosonic	Company Rep. : K. Smith Northing Coord. : 1356401.00 Easting Coord. : 624799.00 Survey By : Johnston's Surveying Logged By : G. Kinsman	
Holopaw, FL			
Project # 48OH01			

Depth in Feet	Surf. Elev. 80.00	GRAPHIC	DESCRIPTION	Samples	Shelby Tube Sample
90	-10		SHELLY SILTY SAND with Partially Cemented Shells, Grayish Olive	19	
95	-15			20	
100	-20		SILTY SAND with minor Shell fragments, Light Olive Gray, fine grained	21	
105	-25		CLAYEY SAND/SANDY CLAY with minor Shell fragments, Light Olive Gray to Grayish Olive, fine grained	22	
110	-30			23	
115	-35			24	
120	-40			25	
125	-45			26	
130	-50			27	
135	-55		SILTY SAND with Shell fragments (2mm-25mm), and minor Dark Minerals, Grayish Olive, well sorted, fine grained	28	
140	-60			29	
145	-65			30	
150	-70			31	
155	-75		CLAYEY SAND with Shell fragments, Grayish Olive, fine grained	32	
160	-80			33	
165	-85		CALCAREOUS SAND with Shell fragments, Grayish Olive, fine grained	34	
170	-90		CLAY, STIFF, PLASTIC, with fine Phosphatic nodules, Olive Gray (Top of Hawthorn Group)	35	
175	-95			36	175-177'
180					

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LOG OF BORING SB-2

(Page 1 of 2)

OMNI Waste Oak Hammock Site Investigation	Date Started : 10/31/01	Company Rep. : K. Smith	
	Date Completed : 11/01/01	Northing Coord. : 1353191.00	
	Hole Diameter : 4 inches	Easting Coord. : 624139.00	
Holopaw, FL	Drilling Method : Rotosonic	Survey By : Johnston's Surveying	
Project # 48OH01	Sampling Method : Rotosonic	Logged By : G. Kinsman / J. Furr	

Depth in Feet	Surf. Elev. 82.00	DESCRIPTION	Samples	Shelby Tube Sample
0	82	SILTY SAND, Gray	1	
2.5		SILT,Dark Black, Organic Rich at top grading less organic to Dark Brown SILT	1, 2, 3	
12.5		SAND, PaleYellowish Brown, well sorted, sub-angular quartz grains, fine grained with minor silt	3, 4	
20	62	SILTY SAND, Dark Brown to Olive Gray to Dusky Yellowish Green, fine grained, less Silty 25-35ft.	5, 6, 7, 8, 9, 10, 11	
55	27	DISTURBED SAMPLE-55-65' CLAY with Shell fragments (1mm-2mm), Grayish Green	12, 13	
65	17	SHELL HASH with Shell fragments 2mm-50mm, Fragments included complete Gastopods, Bivalves, Yellowish Gray, Poorly Sorted	14, 15	

Depth scale: 0 (82), 5 (77), 10 (72), 15 (67), 20 (62), 25 (57), 30 (52), 35 (47), 40 (42), 45 (37), 50 (32), 55 (27), 60 (22), 65 (17), 70 (12), 75

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LOG OF BORING SB-2

(Page 2 of 2)

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 10/31/01	Company Rep.	: K. Smith
Date Completed	: 11/01/01	Northing Coord.	: 1353191.00
Hole Diameter	: 4 inches	Easting Coord.	: 624139.00
Drilling Method	: Rotosonic	Survey By	: Johnston's Surveying
Sampling Method	: Rotosonic	Logged By	: G. Kinsman / J. Furr

Depth in Feet	Surf. Elev. 82.00	GRAPHIC	DESCRIPTION	Samples	Shelby Tube Sample
75	7				
			CLAYEY SAND to SANDY CLAY, medium to fine grained, Large Oyster Shell fragments (2mm-50mm), and Dark Minerals (10%) 90-115ft., Grayish Green to Dark Grayish Green	16	
80	2			17	
85	-3			18	
90	-8			19	
95	-13			20	
100	-18			21	
105	-23			22	
110	-28			23	
115	-33			24	
120	-38		CALCAREOUS SAND with Shell fragments, Grayish Olive, fine grained	25	
125	-43		CLAYEY SAND with Shell fragments, Olive Gray	26	
			CLAY with Shell fragments, Olive Gray,		
130	-48		SANDY CLAY with SHARKS TOOTH, 2mm-50mm PHOSPHATE NODULES and minor Shell fragments, Gray, (Top of Hawthorn Group)	27	
135	-53		CLAY, STIFF, PLASTIC with fine Phosphatic Nodules, fine sand stringers 143-145ft., Olive Gray	28	
140	-58			29	
145	-63			30	145-147'
150					

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-Environmental Consultants-

LOG OF BORING SB-3

(Page 1 of 2)

OMNI Waste
Oak Hammock
Site Investigation
Holopaw, FL
Project # 48OH01

Date Started	: 11/01/01	Company Rep.	: K. Smith
Date Completed	: 11/02/01	Northing Coord.	: 1353810.00
Hole Diameter	: 4 inches	Easting Coord.	: 626532.00
Drilling Method	: Rotosonic	Survey By	: Johnston's Surveying
Sampling Method	: Rotosonic	Logged By	: G. Kinsman / J. Furr

Depth in Feet	Surf. Elev. 79.20	GRAPHIC	DESCRIPTION	Samples	Shelby Tube Sample
0	79		SILTY SAND, Black, Organic-rich	1	
5	74		SILTY SAND, Pale Yellowish Brown	2	
10	69			3	
			SAND, PaleYellowish Brown, fine grained, clean quartz sand		
15	64		SILTY SAND, Dark Yellowish Brown to Grayish Brown to Grayish Olive, Medium to fine grained	4	
20	59			5	
25	54			6	
30	49			7	
35	44			8	
40	39			9	
45	34			10	
50	29			11	
55	24		SANDY SILTY CLAY with large (1-mm-50mm) fragments, Grayish Olive Green	12	
60	19			13	
65	14		SHELLY SAND with large Shell fragments (1-mm-50mm), Yellowish Gray, some whole shells	14	
70	9		SHELL HASH with CLAY, Shell fragments from 5mm-50mm, Yellowish Gray	15	
75	4		SHELLY SAND with fragments from 5mm-25mm, Yellowish Gray to Pale Greenish Yellow	16	
80					

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-Environmental Consultants-

LOG OF BORING SB-3

(Page 2 of 2)

OMNI Waste Oak Hammock Site Investigation	Date Started : 11/01/01	Company Rep. : K. Smith	
	Date Completed : 11/02/01	Northing Coord. : 1353810.00	
	Hole Diameter : 4 inches	Easting Coord. : 626532.00	
Holopaw, FL	Drilling Method : Rotosonic	Survey By : Johnston's Surveying	
Project # 48OH01	Sampling Method : Rotosonic	Logged By : G. Kinsman / J. Furr	

Depth in Feet	Surf. Elev. 79.20	GRAPHIC	DESCRIPTION	Samples	Shelby Tube Sample
80	-1			17	
85	-6			18	
90	-11		CLAYEY SAND, Pale Olive to Grayish Olive, well sorted, fine grained, mixed with minor Shell fragments 95-146ft.	19	
95	-16			20	
100	-21			21	
105	-26			22	
110	-31			23	
115	-36			24	
120	-41			25	
125	-46			26	
130	-51			27	
135	-56			28	
140	-61			29	
145	-66		SANDY CLAY with PHOSPHATE NODULES and Shell fragments, Olive Gray, (Top of Hawthorn Group)	30	
150	-71		CLAY, STIFF, PLASTIC, with fine Phosphatic Nodules, Olive Gray, (Hawthorn Group)	31	
155	-76			32	155-157'
160					

Attachment 3

Laboratory Test Results

Grain Size Analyses

Specific Gravity Determination

Maximum and Minimum Index Density Determination

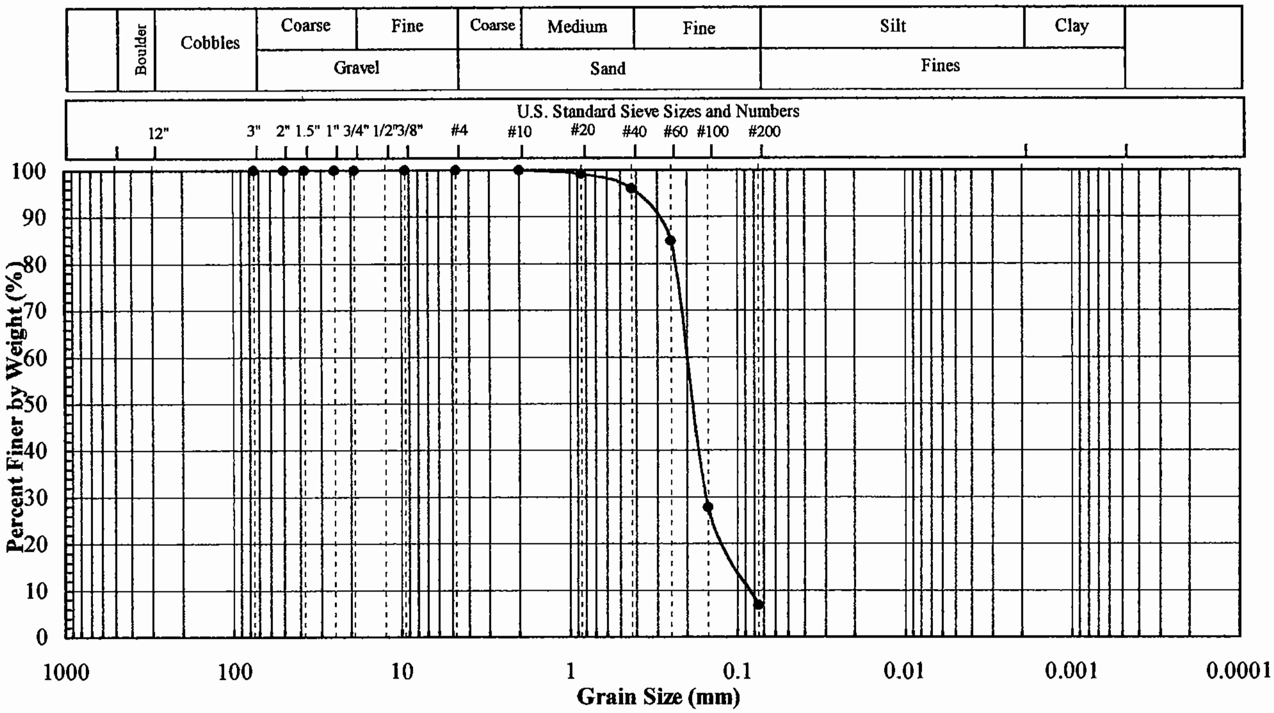
Excel Geotechnical Testing
"Excellence in Testing"
941 Forrest Street, Roswell, Georgia 30075
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Oak Hammock SWD Facility
Project No:	33
Client Sample ID:	B
Lab Sample No:	A27

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

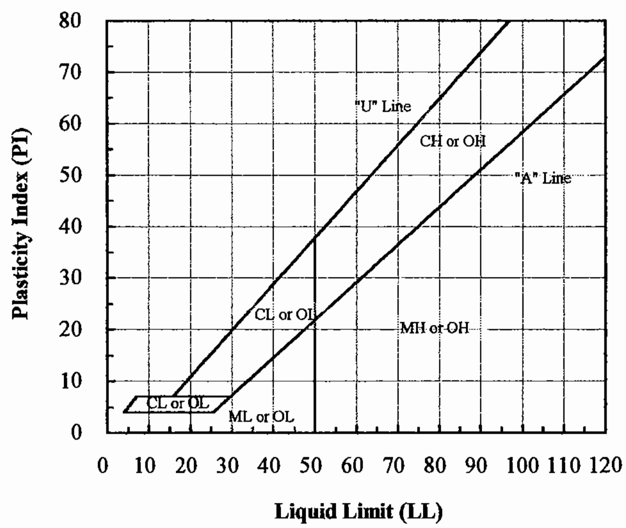


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	99
#40	0.425	96
#60	0.250	85
#100	0.150	28
#200	0.075	7

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	93.3
Fines (%):	6.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
B	A27	19.6	6.7				

Note(s): COMPOSITE SAMPLE PREPARED BY MIXING SAMPLES COLLECTED FROM BORINGS SPT-13 THROUGH SPT-15.

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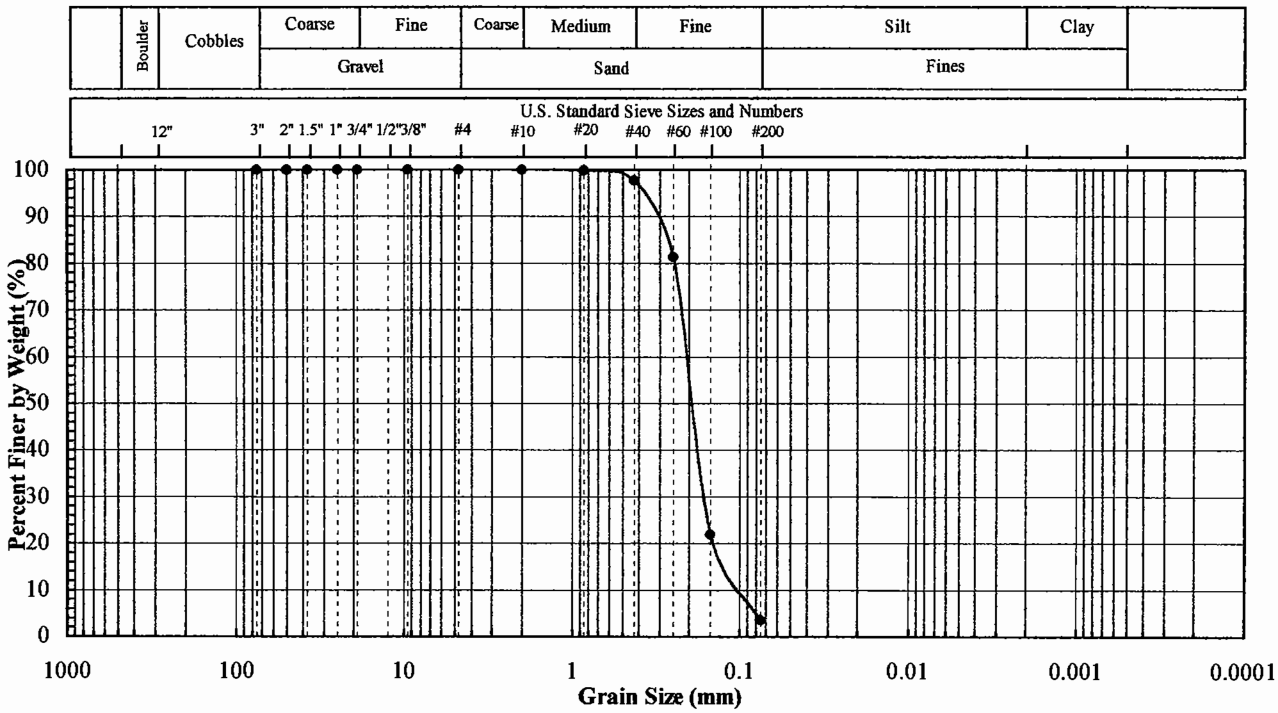
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Oak Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-A
Lab Sample No:	A29

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

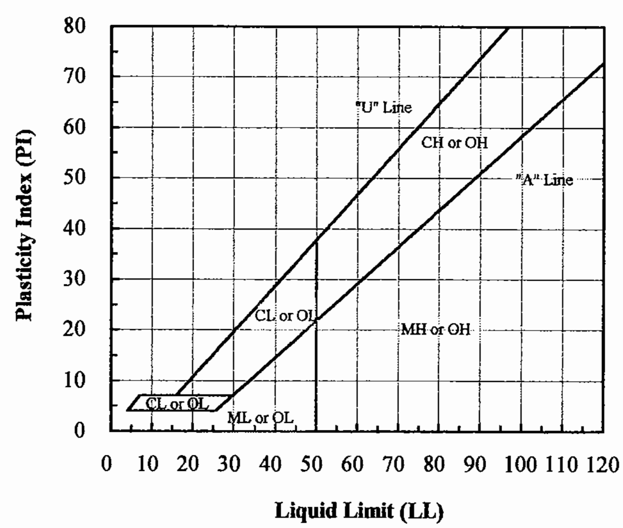


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	100
#40	0.425	98
#60	0.250	81
#100	0.150	22
#200	0.075	3

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	96.5
Fines (%):	3.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
BR-A	A29	19.7	3.5				

Note(s): COMPOSITE SAMPLE PREPARED BY MIXING SAMPLES COLLECTED FROM 5-FOOT DEPTH FROM BORINGS SPT-13 THROUGH SPT-15.

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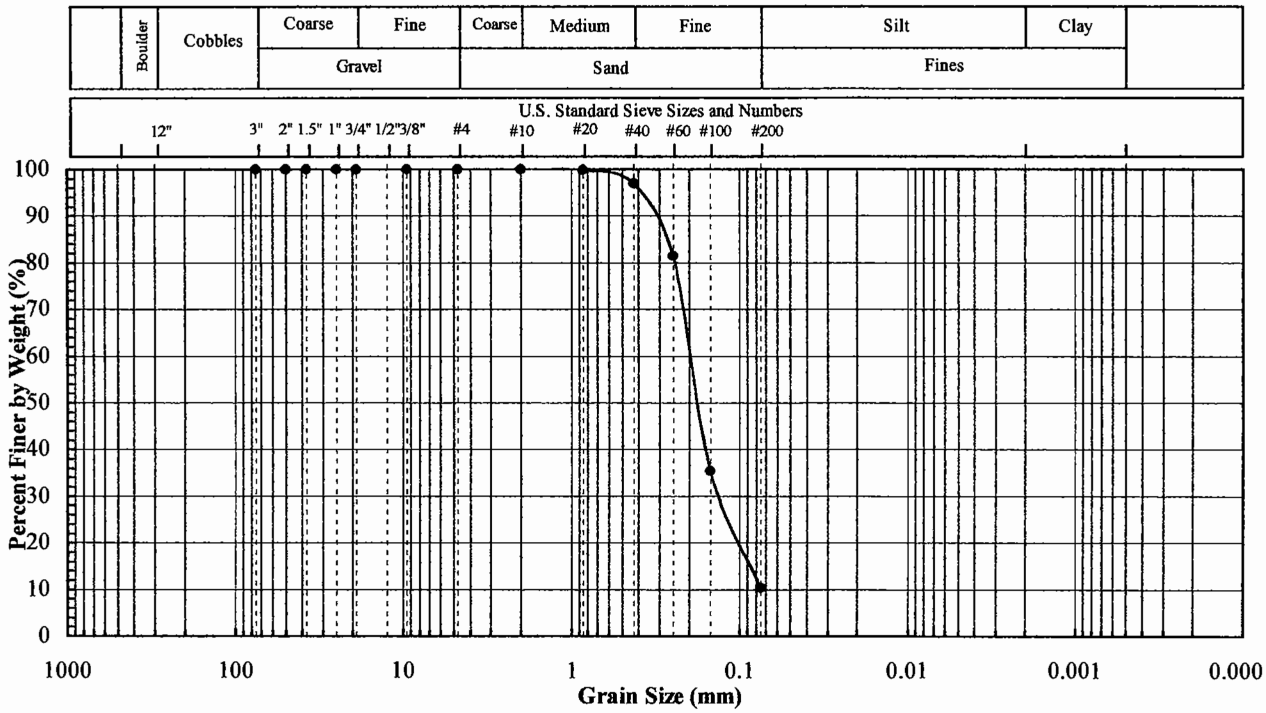
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Oak Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-B
Lab Sample No:	A30

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

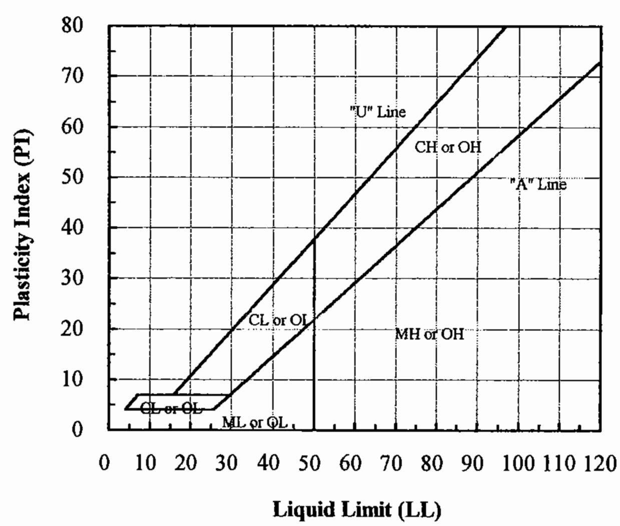


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	100
#40	0.425	97
#60	0.250	81
#100	0.150	35
#200	0.075	10

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	89.6
Fines (%):	10.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (%)	PL (%)	PI (-)	
BR-B	A30	22.7	10.4				

Note(s): COMPOSITE SAMPLE PREPARED BY MIXING SAMPLES COLLECTED FROM 10-FOOT DEPTH FROM BORINGS SPT-13 THROUGH SPT-15.

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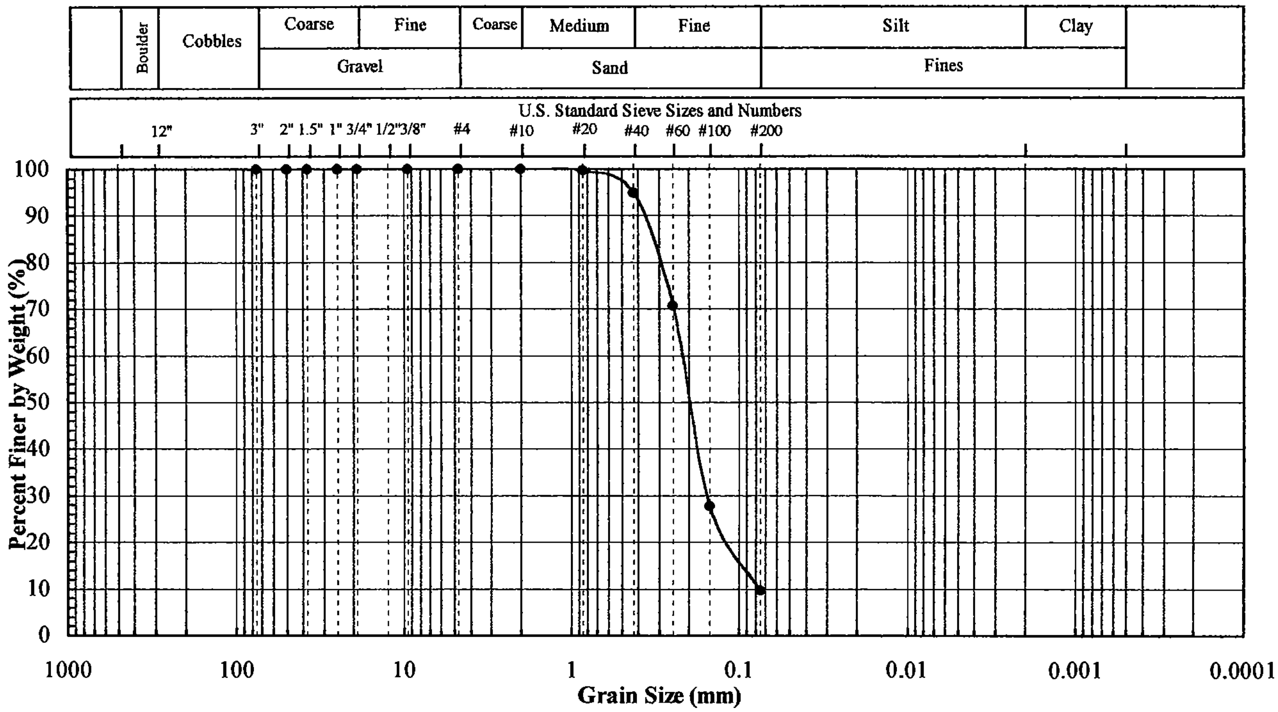
Project Name:	Oak Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-C
Lab Sample No:	A31

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

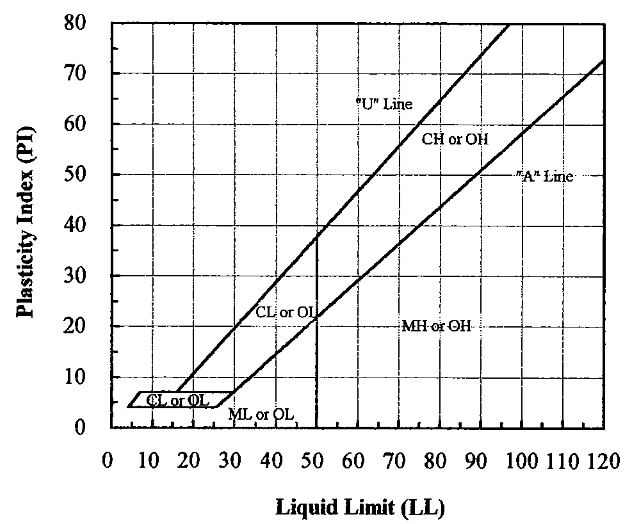


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	100
#40	0.425	95
#60	0.250	71
#100	0.150	28
#200	0.075	10

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	90.4
Fines (%):	9.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	Atterberg Limits PL (%)	Atterberg Limits PI (-)	Engineering Classification
BR-C	A31	21.7	9.6				

Note(s): COMPOSITE SAMPLE PREPARED BY MIXING SAMPLES COLLECTED FROM 15-FOOT DEPTH FROM BORINGS SPT-13 THROUGH SPT-15.

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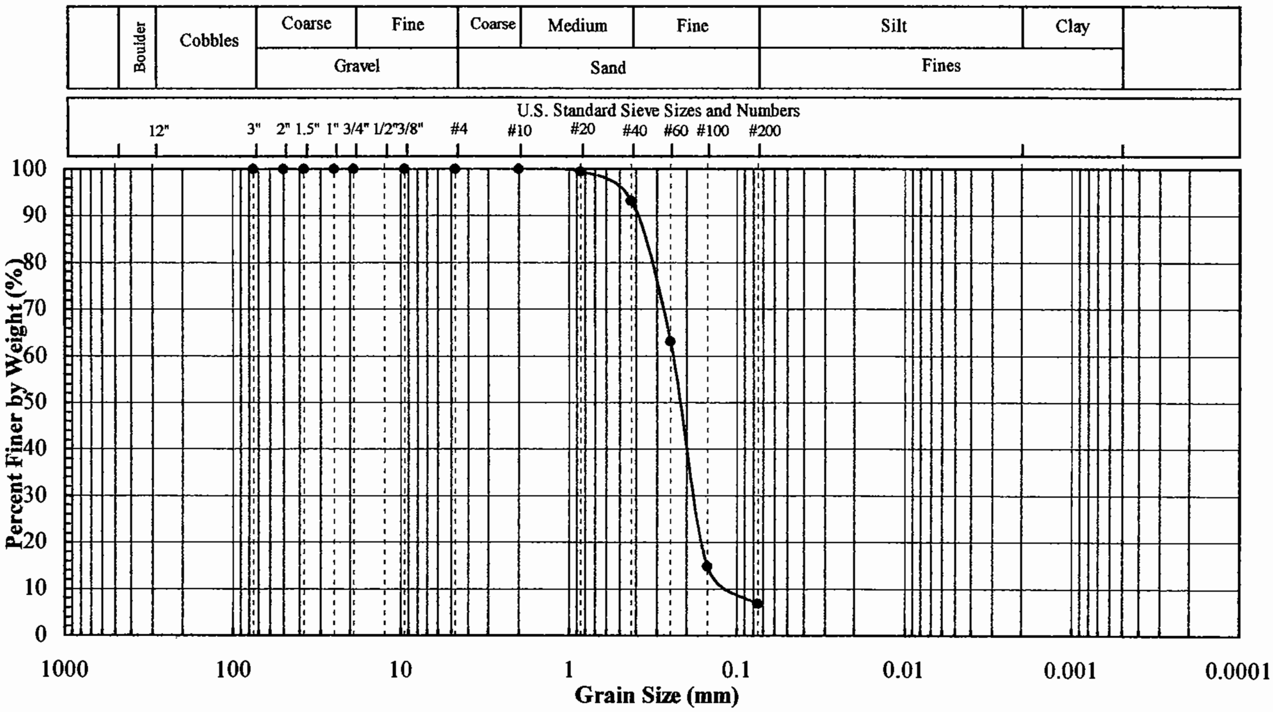
Project Name:	Oak Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-D
Lab Sample No:	A32

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

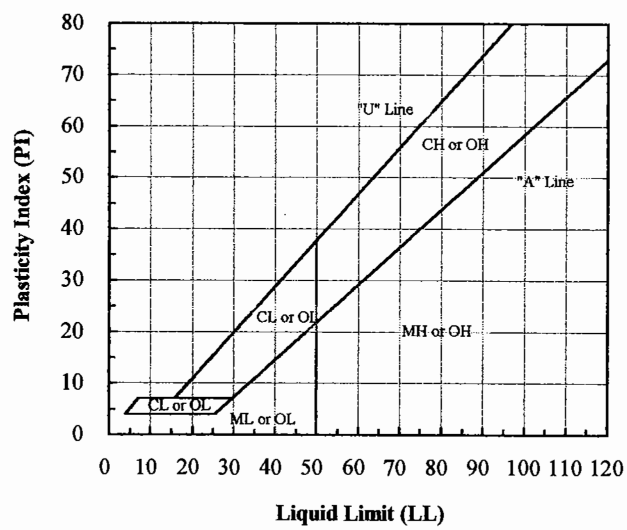


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	99
#40	0.425	93
#60	0.250	63
#100	0.150	15
#200	0.075	7

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	93.2
Fines (%):	6.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
BR-D	A32	22.0	6.8				

Note(s): COMPOSITE SAMPLE PREPARED BY MIXING SAMPLES COLLECTED FROM 20-FOOT DEPTH FROM BORINGS SPT-13 THROUGH SPT-15.

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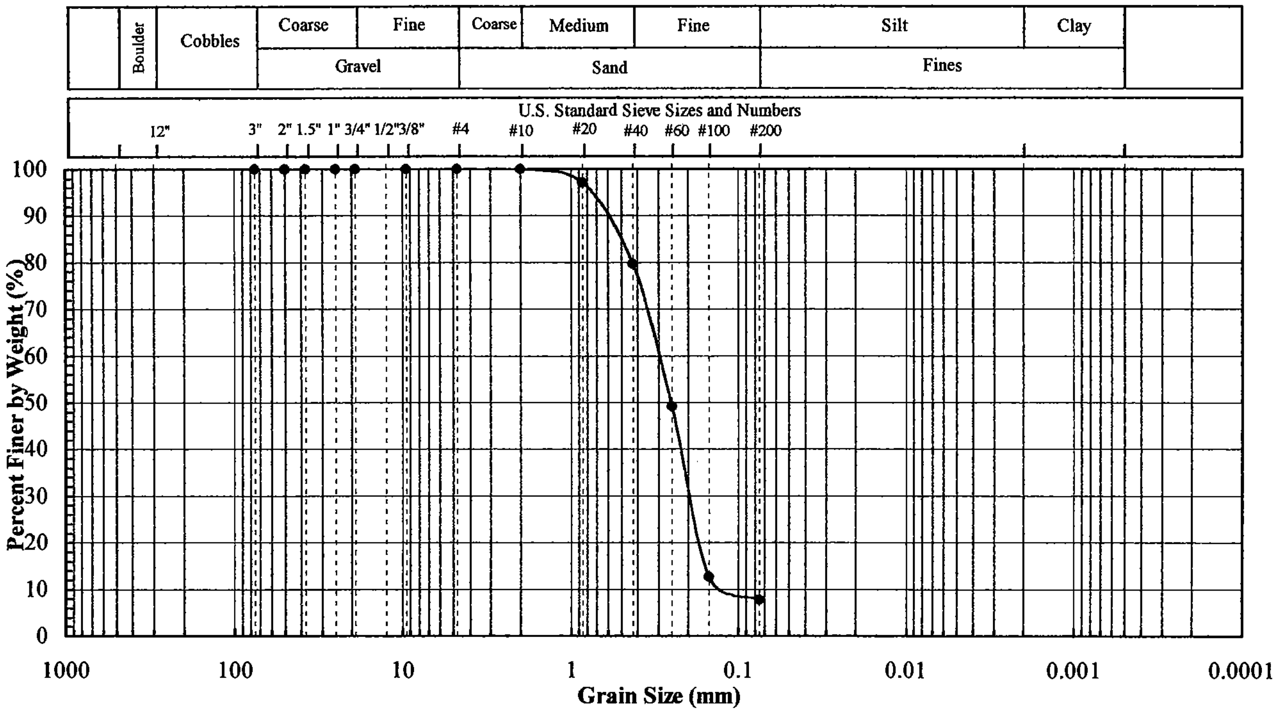
Project Name:	Oak Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-E
Lab Sample No:	A33

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

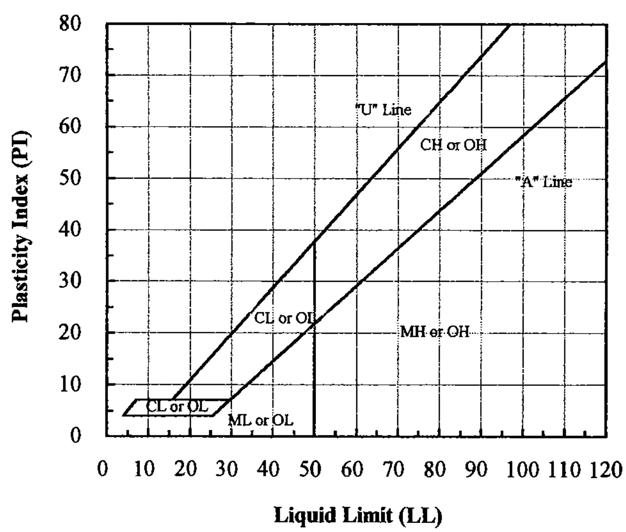


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	97
#40	0.425	80
#60	0.250	49
#100	0.150	13
#200	0.075	8

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	92.3
Fines (%):	7.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
BR-E	A33	21.4	7.7				

Note(s): COMPOSITE SAMPLE PREPARED BY MIXING SAMPLES COLLECTED FROM 25-FOOT DEPTH FROM BORINGS SPT-13 THROUGH SPT-15.

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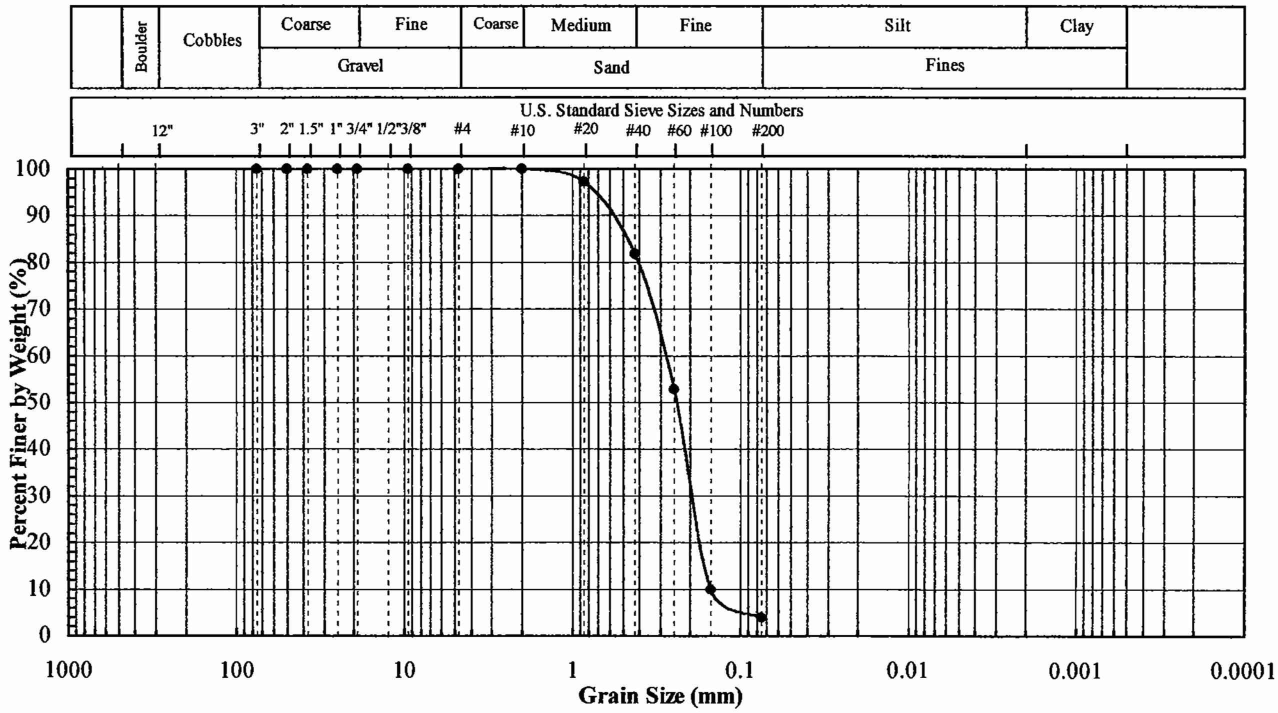
Project Name:	Oak Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-F
Lab Sample No:	A34

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

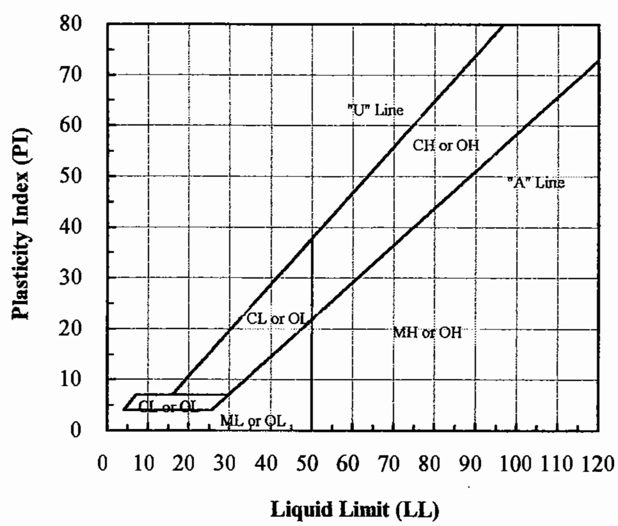


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	97
#40	0.425	82
#60	0.250	53
#100	0.150	10
#200	0.075	4

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	96.1
Fines (%):	3.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
BR-F	A34	20.7	3.9				

Note(s): COMPOSITE SAMPLE PREPARED BY MIXING SAMPLES COLLECTED FROM 30-FOOT DEPTH FROM BORINGS SPT-13 THROUGH SPT-15.

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Test Results Summary

Project Name: Oak Hammock SWD Facility
Project No.: 33

Index Density Test Results

Sample Info.		Test Information								Remarks
Site ID (-)	Lab No. (-)	Moisture Content ASTM D 2216 (%)	Fines Content ASTM D 1140 (%)	Specific Gravity ASTM D 854 (%)	Min Index Density ASTM D 4254 (Method) (gr/cm^3)			Max Index Density ASTM D 4253 (gr/cm^3)		
					A	B	C	Standard [1]	EGT [2]	
B	A27	0.3	NA	2.678	1.25	1.22	1.21	1.59	1.54	Unwashed

Notes:

1 - Test performed at Geotesting Express of Georgia.

2 - Test performed at Excel Geotechnical Testing using a 4 in. Proctor Compaction mold tapped vigorously at the side with a 5.5 in. wide steel fork under a surcharge of 17.2 lb.

BEARING CAPACITY ANALYSIS

24 May 2002

1. INTRODUCTION

1.1 Project Description

The Oak Hammock Disposal (OHD) landfill footprint is approximately 264 acres encompassing an area approximately 6,000 feet in the north-south direction and with about 3,000 feet in the north east-west direction. The maximum landfill height is approximately 95 feet above existing ground surface. the landfill sideslopes are 4 horizontal to 1 vertical (4H:1V).

1.2 Purpose of Analysis

The overall bearing capacity was checked for the proposed OHD facility. A worst-case loading scenario was assumed to ensure that an adequate safety factor exists against bearing capacity failure.

1.3 Method of Analysis

The ultimate bearing capacity was calculated according the method first proposed by Terzaghi (1943) using modified bearing capacity factors for a local shear failure mode proposed by Vesic (1973). The overall bearing failure planes were calculated to be at a depth greater than the thickness of the soil layers above the Ocala Group, using relationships proposed by Vesic (1973). Therefore, the average soil properties were conservatively assumed throughout the entire zone of the bearing capacity failure plane. The dimension for the landfill width was estimated for a worst-case loading scenario during construction of Phase 1, and the maximum load calculated for the entire landfill was conservatively assumed to act across the landfill width in the analysis.

2. ANALYSIS PARAMETERS

2.1 Geometry

A minimum landfill width (B_{MIN}) of approximately 400 ft was used, as this would be the minimal width of the landfill in a North-South direction during the critical portion of construction of Phase 1. This is the minimum width that the fill would be placed, as shown in the permit drawing Sheet 26 of 50. Since the bearing capacity is directly proportional to the width of the loaded area, use of a minimum width is conservative as the safety factor would increase with a larger width.

2.2 Foundation Soils

The stratigraphy underlying the proposed OHD facility consists of three major divisions: The post-Hawthorn undifferentiated formation (to a depth of 155 ft), the Hawthorn Group (from a depth of 155 ft to 300 ft), and the Ocala Group (below a depth of 300 ft). A detailed discussion of the statigraphy underlying the proposed OHD facility was presented in the calculation package entitled *Geotechnical Investigation Report*.

The post-Hawthorn undifferentiated formation consists of two distinct layers: a surficial silty sand to a depth of approximately 70 ft and a shelly sand layer from a depth of approximately 70 ft to 155 ft. The calculation package titled *Geotechnical Investigation Report* has shown that the effective friction angle (ϕ') of these soils to be an average of 30° from empirical correlations applied to the standard penetration test (SPT) that was conducted on site.

The Hawthorn Group consists of two distinct formations: the Peace River formation which approximately comprised the top 77 ft of the Hawthorn Group, and the Arcadia formation which approximately comprised the bottom 68 ft of the Hawthorn Group. Below the Hawthorn Group is the Ocala Group, which consists principally of limestone.

2.3 Vertical Load

The vertical load imparted to the foundation soils from the subgrade fill and waste were calculated in the package entitled *Settlement Analysis*, and are shown in the cited package as Figures 7 and 8, respectively. The vertical load imposed upon the foundation soil, during the critical stage of construction of Phase 1, can be conservatively estimated as the combination of the greatest load from the waste summed with the greatest load from the subgrade fill from the entire landfill area. Assuming 95 ft of waste at 70 pcf and 11.5 ft of subgrade at 120 pcf, this yields a maximum load ($q_{\max}$) of 8,030 psf.

3. BEARING CAPACITY CALCULATION

A comprehensive theory for evaluation of the ultimate bearing capacity was first presented by Terzaghi (1943). Figure 1 is taken from Das (1990), and annotated to show the relative dimensions of the proposed OHD facility and depth to the Ocala Group. Note that a minimum landfill width (B_{MIN}) of approximately 400 ft was used, as this would be the width of the landfill in a North-South direction during the critical construction stage during Phase 1. The depth of the soil wedge (H_{MIN}) mobilized by the landfill load, is calculated by the trigonometric relationship with the angle that this soil wedge makes with respect to the horizontal (α). Vesic (1973) presented the relationship between this angle (α) and the effective friction angle of the soil (ϕ') as shown below in Equation 2. Note that the calculation package titled *Geotechnical Investigation Report* has shown that the effective friction angle of the soil (ϕ') of the foundation soils to be an average of 30°.

$$\alpha = 45^\circ + \frac{\phi'}{2} \quad \text{and} \quad H_{MIN} = \left(\frac{B_{MIN}}{2}\right)\tan(\alpha) \qquad \text{Equation 2}$$

Where: α = angle of soil wedge with respect to horizontal (degrees)
ϕ' = effective friction angle of soil = 30°
H_{MIN} = Minimum depth of soil wedge (ft.)
B_{MIN} = Minimum width of landfill = 400 ft.

The above relationship yields a minimum depth of the soil wedge (H_{MIN}) to be approximately 350 ft. This is slightly greater than the depth of the soil layers at the proposed OHD facility (the undifferentiated sand layers and the Hawthorn Group), as the Ocala Group starts at a depth of approximately 300 ft. Therefore, a significant portion of the bearing capacity failure surface would be contained within the Ocala Group (see Figure 1). In an effort to quantify the lower bound for the factor of safety, the following analysis makes the conservative assumption that the foundation soil continues beyond the bearing capacity failure surface (i.e., the Ocala Group is replaced by soil with ϕ'= 30°). The limestone of the Ocala Group is expected to actually have an effective friction angle much greater than 30°.

The mode of bearing capacity failure in sand was shown by Vesic (1973) to be a function of the relative density of the soil (D_r) and the ratio of the depth of the foundation measured from the ground surface (D_f) to the modified footing width (B^*). This relationship is shown graphically in Figure 2. Since the bottom of the landfill is at existing ground ($D_f = 0$), the ratio (D_f / B^*) is equal to 0. Also, the average relative density (D_r) was shown in the calculation package entitled *Geotechnical Investigation Report* to be approximately equal to 50 percent (0.5). This identifies the bearing capacity failure mode as that of local shear failure, as is shown in Figure 2.

The general equation for ultimate bearing capacity was presented by Terzaghi (1943), and is shown as Equation 3 for the assumed case of a continuous strip footing. Note that the buoyant unit weight was used as the assumption of the water table at existing ground level is conservative. The modified bearing capacity factors (N_c', N_q', N_γ') are used for the local shear failure mode.

$$q_{ult} = cN_c' + qN_q' + \frac{1}{2}(\gamma - \gamma_w)B_{MIN}N_\gamma' \qquad \text{Equation 3}$$

Where: q_{ult} = ultimate bearing capacity of the foundation soil (psf).
c = cohesion of the foundation soil = 0.
q = overburden pressure at top of existing grade = 0.
γ = total unit weight of foundation soils = 120 pcf.
γ_w = unit weight of water = 62.4 pcf.
B_{MIN} = Minimum width of landfill = 400 ft.
N_c', N_q', N_γ' modified bearing capacity factor for local shear failure mode.

The modified bearing capacity factor (N_γ') is a function of the effective friction angle of the soil (ϕ') of the foundation soils, which was estimated in the calculation package entitled *Geotechnical Investigation Report* to be an average of 30°. This relationship is shown graphically in Figure 3, taken from Das (1990), and was used to calculate the modified bearing capacity factor (N_γ') equal to 5.6. Thus, Equation 3 yields an ultimate bearing capacity (q_{ult}) of 64,500 psf.

The vertical load from the subgrade fill and the waste were calculated in the package entitled *Settlement Analysis*, and is shown in the cited calculation package as Figures 7 and 8, respectively. The vertical load imposed upon the foundation soil, during the critical stage of construction for Phase 1, can be conservatively estimated as the combination of the greatest load from the waste summed with the greatest load from the sub-grade fill from the entire landfill area. This yields a maximum load ($q_{\max}$) of 6,700 psf. Conservatively assuming that this load acts across the entire width (B_{MIN}) of 400 ft, a safety factor (SF) greater than 8.0 is obtained as the ratio of the ultimate bearing capacity to the maximum load (SF=$q_{ult} / q_{\max}$). The actual factor of safety would be considerable greater than that calculated due to the conservative assumptions made in the analysis.

Potential failure surfaces within the soils at the proposed OHD facility would be due to deep-seated slope stability failure mechanisms. Slope stability analysis for the proposed OHD facility in presented in the calculation package entitled *Slope Stability Analyses*.

4. SUMMARY AND CONCLUSIONS

The maximum total pressure (due to subgrade fill plus waste), q_{max}, exerted upon the foundation soil was calculated as 6,700 psf, well below the calculated ultimate bearing capacity, q_{ult}, of the foundation soil of 64,500 psf. Therefore the factor of safety

$\left(SF = \frac{q_{max}}{q_{ult}} \right)$ is greater than 9.5. This calculation is very conservative since the potential bearing capacity failure surface extends into the Ocala Group, which was assumed to be soil rather than limestone.

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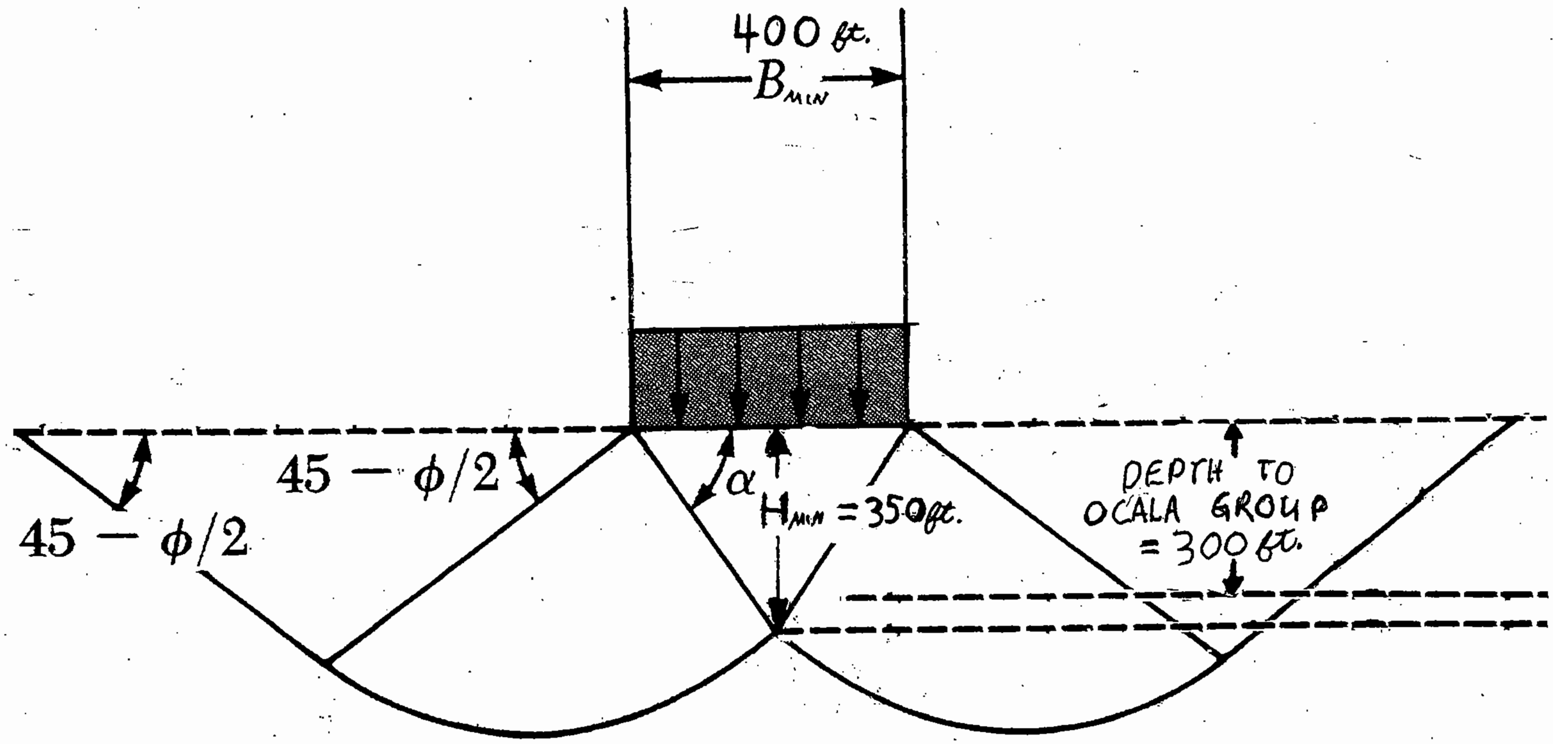

Figure 1. Overall Bearing Capacity, from Das (1990).

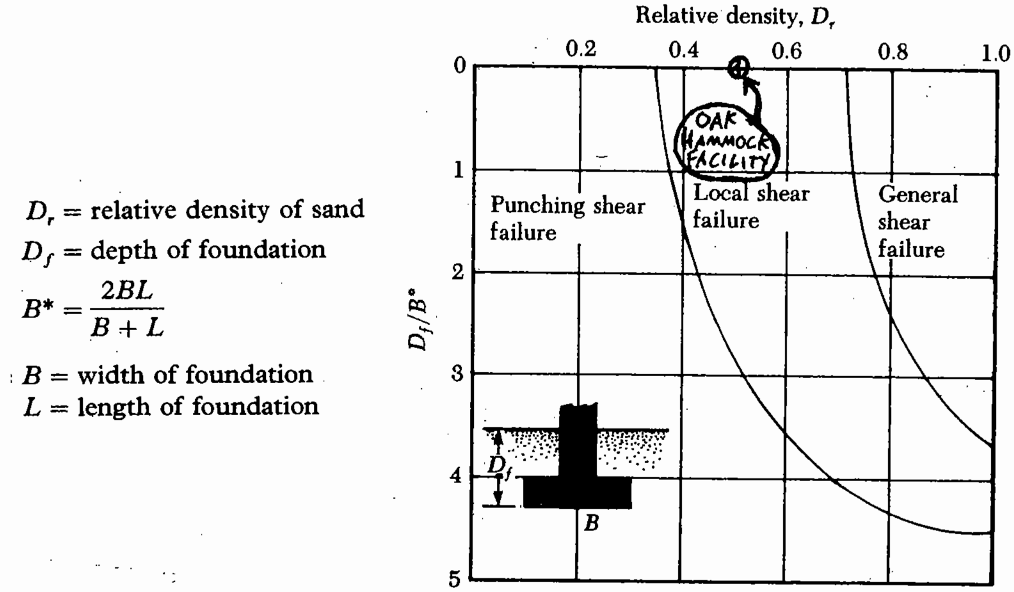

Figure 2. Modes of Foundation Failure in Sand, from Vesic (1973).

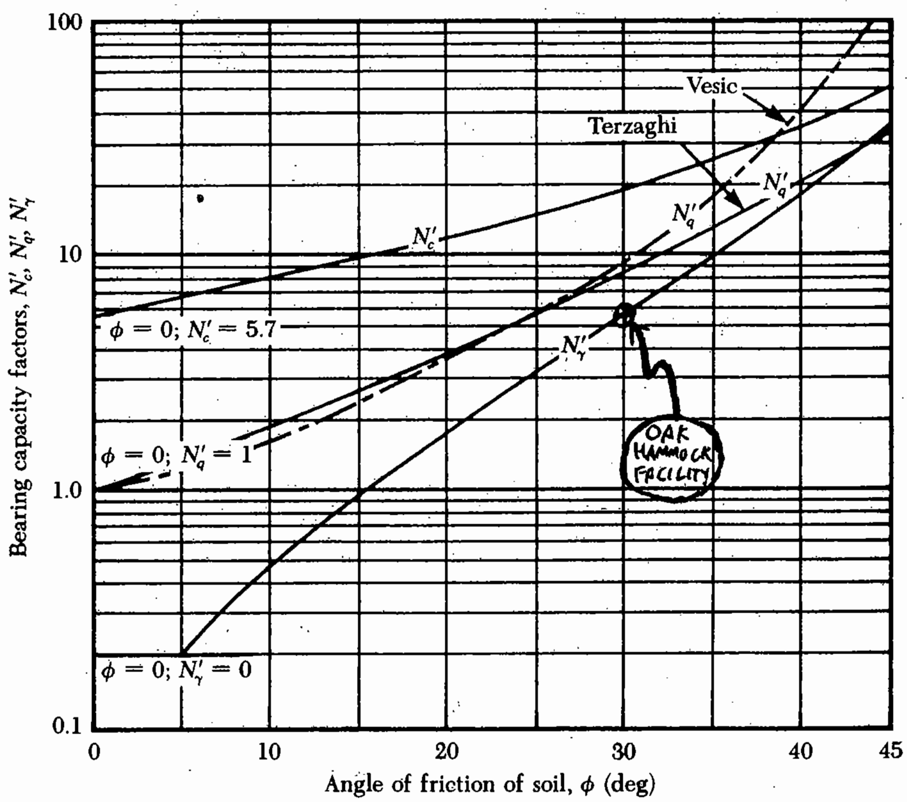

Figure 3. Modified Bearing Capacity Factors, from Das (1990).

SLOPE STABILITY ANALYSES

24 May 2002

List of Figures

1. INTRODUCTION

1.1 General

The Oak Hammock Disposal (OHD) facility will involve construction of a landfill approximately 264 acres in site on currently undeveloped land. A double-composite liner system will be utilized in the proposed landfill. Issues related to slope stability are evaluated in this calculation package. Potential slip surfaces may pass through the waste mass, the liner system, or the foundation soils.

1.2 Purpose of the Analysis

The purpose of the analysis is to evaluate the slope stability of the proposed OHD landfill with respect to circular and non-circular shear surfaces. The final waste configuration was evaluated for circular failure surfaces passing through the waste and lower soils and non-circular failure surfaces through the waste and along the liner system interfaces. The outer perimeter berm of the landfill and interim waste slopes were also evaluated for circular shear surfaces. A factor of safety of 1.50 for all permanent slopes and 1.30 for all temporary slopes has been established as minimum criteria in accordance with current state-of-practice for landfill design. The analysis of the final cover system (veneer) slope stability is not included in this section and is presented in a separate calculation package entitled "*Final Cover System Slope Stability Analysis*".

1.3 Method of Analysis

Two-dimensional effective stress stability analyses were performed using the method of slices and the computer program University of Texas Analysis of Slopes, Version 3 (UTEXAS3) [Wright, 1995]. A generalized method that satisfies both force and moment equilibrium and incorporates the parallel side force assumption described by Spencer [Spencer, 1967] is used by the program. UTEXAS3 includes automatic search routines that systematically modify the initial trial shear surface until convergence on the critical surface is achieved.

2. INPUT PARAMETERS

2.1 Geometry

The maximum height of the proposed landfill is approximately 98 feet. The side slopes of the proposed landfill will be 4H:1V. The ground water table is conservatively assumed to be at the ground surface for the analyses.

2.1.1 Subsurface Stratigraphy

A simplified subsurface statigraphy, based on the calculation package entitled "*Geotechnical Investigation Report*" was used for the stability analyses. The simplified subsurface is composed of (from top to bottom):

- loose to medium density, silty sands to approximately 160 feet in depth; and

- an underlying formation, referred to as the Hawthorn Group, consisting primarily of undifferentiated sands, silty sands, and clayey sands with dolomite cementation.

2.1.2 Liner System Geometry

The proposed landfill consists of a double-composite liner system over a compacted subgrade above the foundation soils. A typical cross-section of the liner system is presented in Figure 1. As shown above the compacted subgrade, the liner system consists of, from bottom to top: (i) the secondary geosynthetic clay liner (GCL); (ii) the secondary 60-mil HDPE textured geomembrane; (iii) the secondary geocomposite drainage layer; (iv) the primary GCL; (v) the primary 60-mil HDPE textured geomembrane; (vi) the primary geocomposite drainage layer; and (vi) a liner protective layer. Because the maximum head on the primary geomembrane will be less than 12 inches, a phreatic surface within the landfill was not considered. A perched phreatic surface within the waste was not considered likely to occur due to the sandy nature of initial cover soils and also was not considered. ?

2.1.3 Final Configuration Geometry

The typical cross-sectional geometry for the final configuration (i.e., after closure) of the OHD facility is shown in Figure 2. As shown, the cross-section consists of, from bottom to top: (i) foundation soils; (ii) a compacted subgrade; (iii) the double-composite liner system; (iv) municipal solid waste (MSW); and (v) the final cover system. The critical cross-section is one in which the slope reaches the full height of 98 feet. The maximum slope at the top of the proposed landfill is 5 percent. It is planned that the facility will reach its maximum height with a 4H:1V sideslope.

2.1.4 Perimeter Berm Geometry

As shown in Figure 2, the perimeter berm is 16 feet high with 3H:1V sideslopes and a 32-foot wide crest. The analysis for the perimeter berm considered the presence of the full height (i.e., 98 feet total height) of material behind the berm.

2.1.5 Interim Configuration Geometry

The interim configuration stability analysis of the landfill evaluated the stability of the MSW during operation. The interim waste slopes are expected to have a maximum slope of 3H:1V. The double-composite liner system has a maximum slope of 2 percent. The total height of the slope was evaluated for 95 feet (instead of 98 feet) because the analysis considered the operation condition (i.e., without the final cover system). Since the location of the landfill interim waste slope varies resulting in a variable subgrade thickness, the soil immediately under the double-composite liner system was conservatively defined as loose to medium density, silty sand.

2.2 Material Properties

2.2.1 Soil Properties

Soil properties used for the stability analyses were selected using the results of the site characterization program as described in the calculation package entitled "*Geotechnical Investigation Report*". For the Hawthorn Group, a unit weight of 115 lb/ft^3 and a peak drained friction angle of 30 degrees were selected, disregarding any possible soil cohesion. For the loose to medium density silty sand layer above the Hawthorn, a unit weight of 115 lb/ft^3 and a peak drained friction angle of 25 degrees were selected. For the outer perimeter berm and the compacted subgrade, a unit weight of 120 lb/ft^3 and a peak drained friction angle of 35 degrees were used. This is consistent with values for compacted silty sand. For the liner protective layer, a unit weight of 100 lb/ft^3 and a peak drained friction angle of 30 degrees were used. As a possible construction alternative, shredded tire chips may be incorporated into the liner protective layer. This possibility is not considered to have an effect on stability calculations because the shear strength of shredded tire chips is comparable to that of MSW [GeoSyntec, 1998]. MSW generally has a peak drained friction angle greater than 30 degrees. Therefore, significant reduction in shear strength parameters was not considered for the liner protective layer. For the final cover system, a unit weight of 120 lb/ft^3 and a peak drained friction angle of 35 degrees were used.

The soil properties are summarized in the following table.

Material	Unit Weight (lb/ft^3)	Cohesion (lb/ft^2)	Friction Angle (degrees)
Hawthorne Formation	115	0	30
Silty Sand	115	0	25
Berm/Compacted Subgrade	120	0	35
Liner Protective Layer	110	0	30
Final Cover System	120	0	35

2.2.2 Geosynthetic Material Properties

The weakest component of the double-composite liner system is the potentially hydrated GCL. Based on the study by Bonaparte et al. (1996) on hydrated unreinforced GCL, the following Mohr-Coulomb strength envelope, shown in Figure 3, was used and is summarized in the following table.

Normal Stress (lb/ft^2)	Shear Stress (lb/ft^2)
0	0
2005	429
5013	787
10025	1143
15038	1594
18000	1908

As shown, the shear strength envelope varies almost linearly with a shear stress range of 429 lb/ft^2 to 1,908 lb/ft^2 at a corresponding normal stress range of 2,005 lb/ft^2 to 18,000 lb/ft^2. Although reinforced GCL is typically used for construction, the shear strength envelope for unreinforced GCL was used in the analyses due to unavailability of strength characteristics for reinforced GCL. This is conservative because reinforced GCL has greater shear strength characteristics.

2.2.3 Waste Material Properties

The waste material which will be disposed in the proposed landfill will primarily consist of MSW. Figure 4 presents the unit weight versus depth relationship used for the analyses [Kavazanjian, 1995]. The unit weight of MSW is a function of the overburden and therefore varies with depth (i.e., the unit weight of MSW increases with depth). As shown, the unit weight varies linearly with depth from 0 to 115 feet (35 meters) with a unit weight variation of 41.4 lb/ft^3 (6.5 kN/m^3) to 66.9 lb/ft^3 (10.5 kN/m^3), respectively. It varies asymptotically between 115 feet (35 meters) and 328 feet (100 meters) to a unit weight of approximately 83.4 lb/ft^3 (13.1 kN/m^3).

For the slope stability analysis of the final configuration slope geometry, the MSW was divided into sublayers. Each sublayer was given a unit weight corresponding to its midpoint depth. For the slope stability analysis of the interim configuration slope geometry, the MSW was given an overall unit weight value of 54.8 lb/ft^3 (8.6 kN/m^3). This value corresponds to the lower limit of the average range indicated on Figure 4 and was selected because the MSW would be recently placed (i.e., unconsolidated).

The shear strength of the MSW was modeled using a truncated linear Mohr-Coulomb envelope presented in Figure 5 [Kavazanjian, 1995]. As shown, the shear strength envelope has a constant value for shear stress of 500 lb/ft^2 (24 kPa) in the normal stress range of 0 to 625 lb/ft^2 (30 kPa) and transitions to a linear relationship corresponding to drained friction angle of 33 degrees.

2.3 Slope Stability Cases

The following cases of slope stability were considered:

- Case 1 - Final Configuration Circular Shear Surfaces: Circular shear surfaces that pass through the final cover system, the retained MSW, the double-composite liner system, and/or the foundation soils of the final configuration of the proposed landfill.

- Case 2 - Final Configuration Non-Circular Shear Surfaces: Non-circular shear surfaces that pass through the final cover system, the retained MSW, and along the double-composite liner system of the final configuration of the proposed OHD facility.

- Case 3 - Perimeter Berm Stability: Circular shear surfaces that pass through the slope of the perimeter berm.

- Case 4 - Interim Configuration Shear Surfaces: Circular and non-circular shear surfaces that pass through the MSW and/or the double-composite liner system on the 3H:1V interim waste slopes.

3. ANALYSES RESULTS

The results for the circular and non-circular shear surface stability analyses for the final configuration of the proposed landfill are presented in Figures 6 and 7, respectively.

Figure 8 shows the results of the circular shear surface stability analysis for the perimeter berm and Figure 10 shows the results considering the interim waste configuration slope stability. Input data files and results of computations by UTEXAS3 are included as Attachments 1, 2, 3, and 4 for Cases 1, 2, 3, and 4, respectively. The corresponding factors of safety are summarized below:

CASE	SHEAR SURFACE	FACTOR OF SAFETY
1	1-A	3.97
	1-B	3.63
	1-C	4.18
2	2-A	2.17
	2-B	1.89 √
	2-C	2.07
3	3-A	2.04
4	4-A	2.02
	4-B	1.38 √

3.1 Case 1 - Final Configuration Circular Shear Surfaces

Figure 6 shows circular shear surfaces through the final configuration of the proposed landfill side slope which illustrate the factors of safety at different positions along the slope. Surface 1-A is a deep-seated circular shear surface originating to the right of the slope crest and exiting at the toe. Surface 1-B is a circular shear surface through the MSW starting near the crest and exiting on the face of the perimeter berm. Surface 1-C is a circular shear surface originating on the slope and terminating near the crest of the perimeter berm. As indicated, all circular shear surfaces have factors of safety greater than 1.50.

3.2 Case 2 - Final Configuration Non-Circular Shear Surfaces

Figure 7 shows non-circular shear surfaces though the double-composite liner system. Surface 2-A is a non-circular shear surface through the double-composite liner system originating on the face of slope. Surface 2-B is a non-circular shear surface through the double-composite liner system originating near the slope crest. Surface 2-C is a non-circular shear surface originating to the right of the slope crest. The most critical non-circular shear surface was the shear surface through the double-composite liner system originating near the slope crest (surface 2-B). As shown, all surfaces have a factor of safety greater than 1.50.

3.3 Case 3 - Perimeter Berm Stability

The perimeter berm of the proposed landfill was analyzed considering the presence of the full height of MSW (i.e., 98 feet total height). Figure 8 shows the most critical shear surface for the berm. The factor of safety is 2.04.

3.4 Case 4 - Interim Configuration Shear Surfaces

Figure 9 shows the most critical circular and non-circular shear surfaces for the interim configuration of the proposed landfill. Surface 4-A is the most critical circular shear surface which originates near the slope crest, passes through the MSW into the foundation silty sand, and terminates left of the slope toe. Surface 4-B is the most critical non-circular shear surface through the liner system originating near the slope crest and exiting at the toe of the slope. As shown, surface 4-B has a factor of safety greater than 1.30. This is a temporary slope maintained during operation and the indicated factor of safety is satisfactory for an interim condition. In addition, waste progression generally proceeds by maintaining benches at an approximate 30-foot height increment. Therefore, the interim overall average slopes during operation are generally much shallower than 3H:1V.

4. SUMMARY AND CONCLUSION

The slope stability analyses showed that the most critical shear surface for the final configuration of the proposed landfill slopes was a non-linear surface through the liner system originating near the crest (surface 2-B). This surface has a calculated factor of safety of 1.89 which is greater than the required minimum factor of safety of 1.50. The stability analysis for the perimeter berm indicated that the critical shear surface (surface 3-A) has a calculated factor of safety of 2.04 which is greater than 1.50. The stability analysis for the interim configuration of the proposed landfill slopes indicated that the calculated factor of safety for the critical shear surface (surface 4-B) is 1.38. This is considered satisfactory because the interim configuration case is a temporary operational consideration and a factor of safety greater than 1.30 is acceptable. In addition, as previously stated, waste progression generally proceeds by maintaining benches and the actual interim average slopes will be shallower than 3H:1V.

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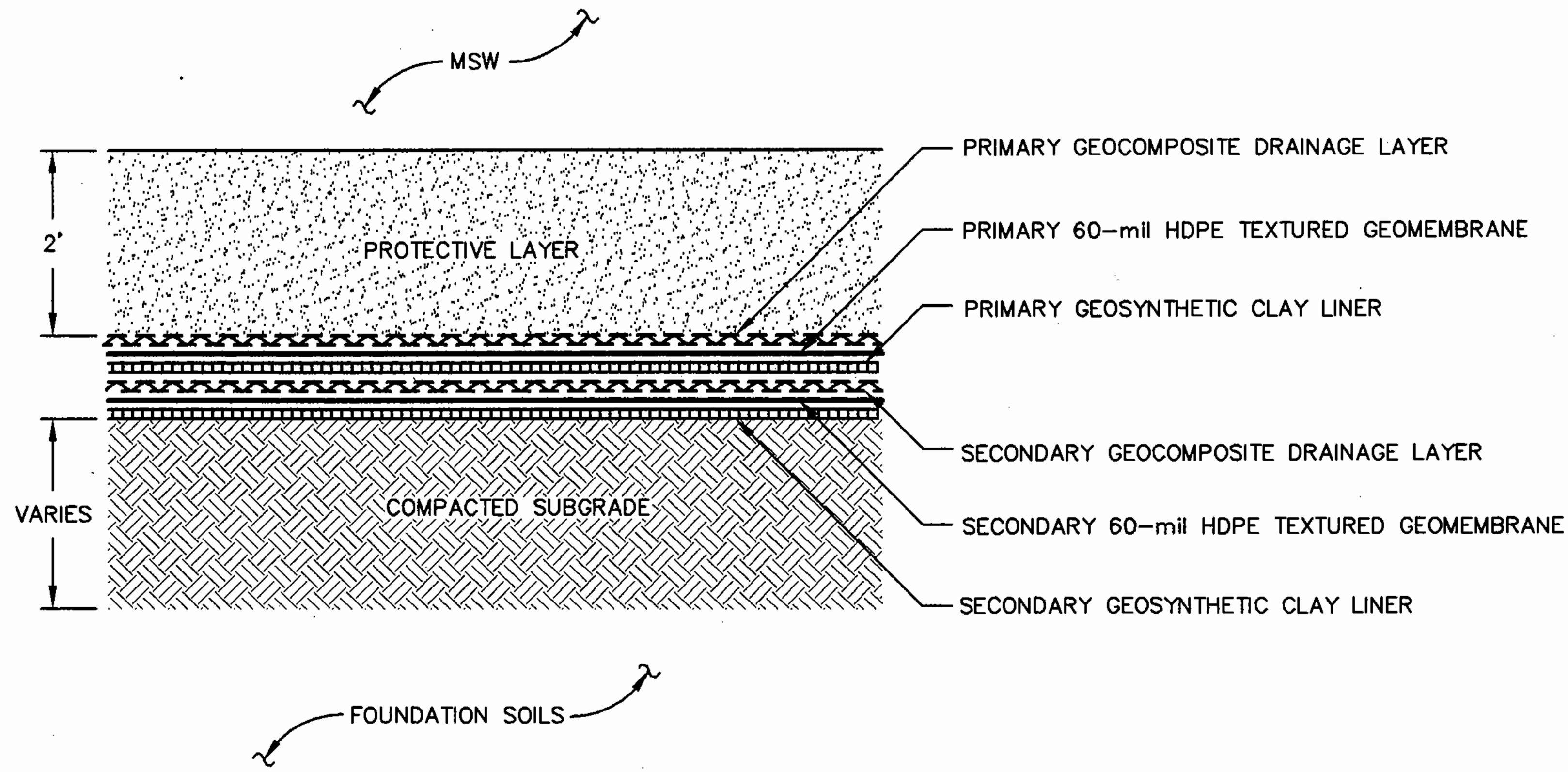

Project	OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION
Figure Title	**LINER SYSTEM COMPONENTS**

Project Number	Date	File No.	Figure No.
FW0400	MARCH 02	0400FA018	1

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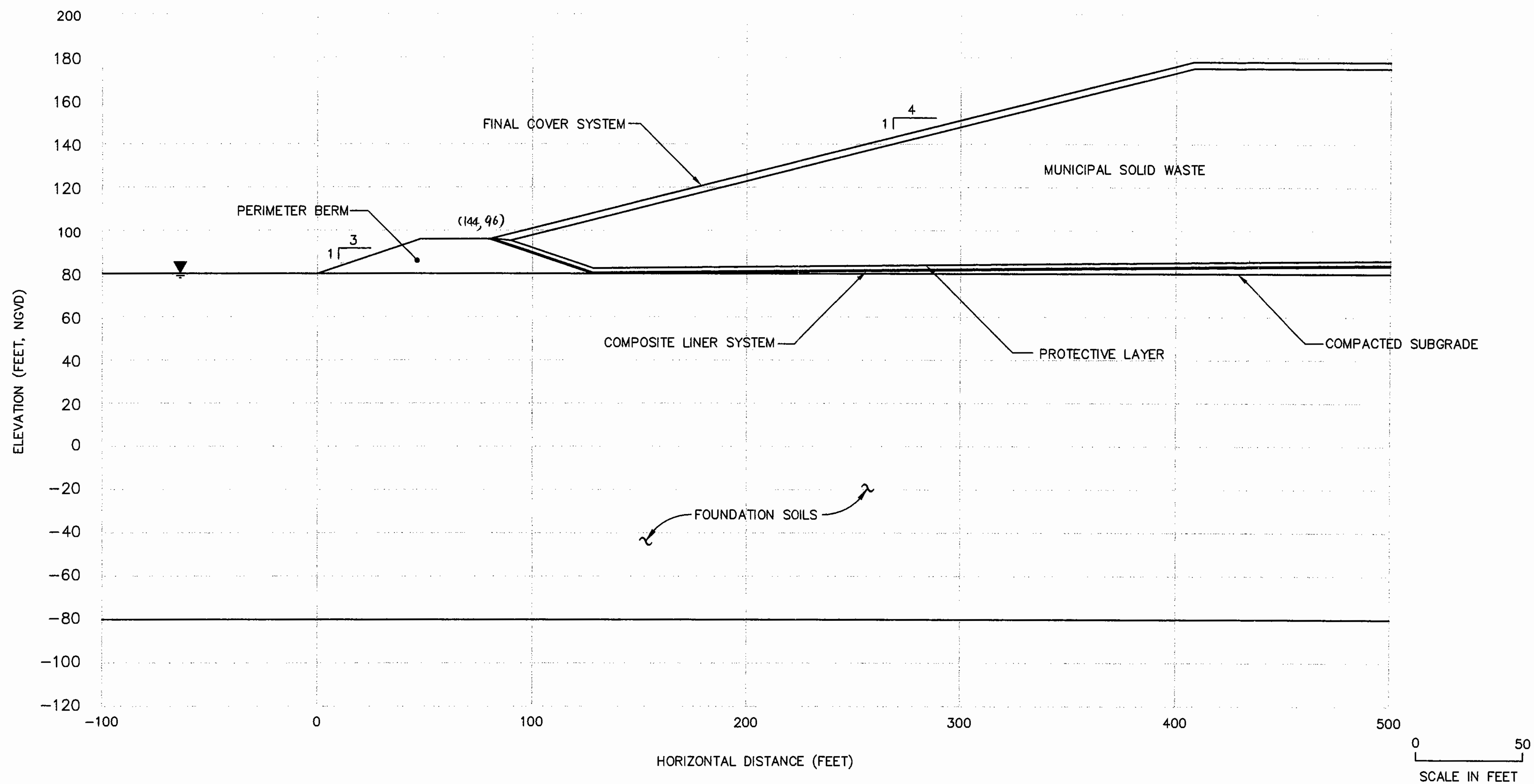

Project			
OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **FINAL CONFIGURATION GEOMETRY**			
Project Number	Date	File No.	Figure No.
FW0400	MARCH 02	0400FA030	**2**

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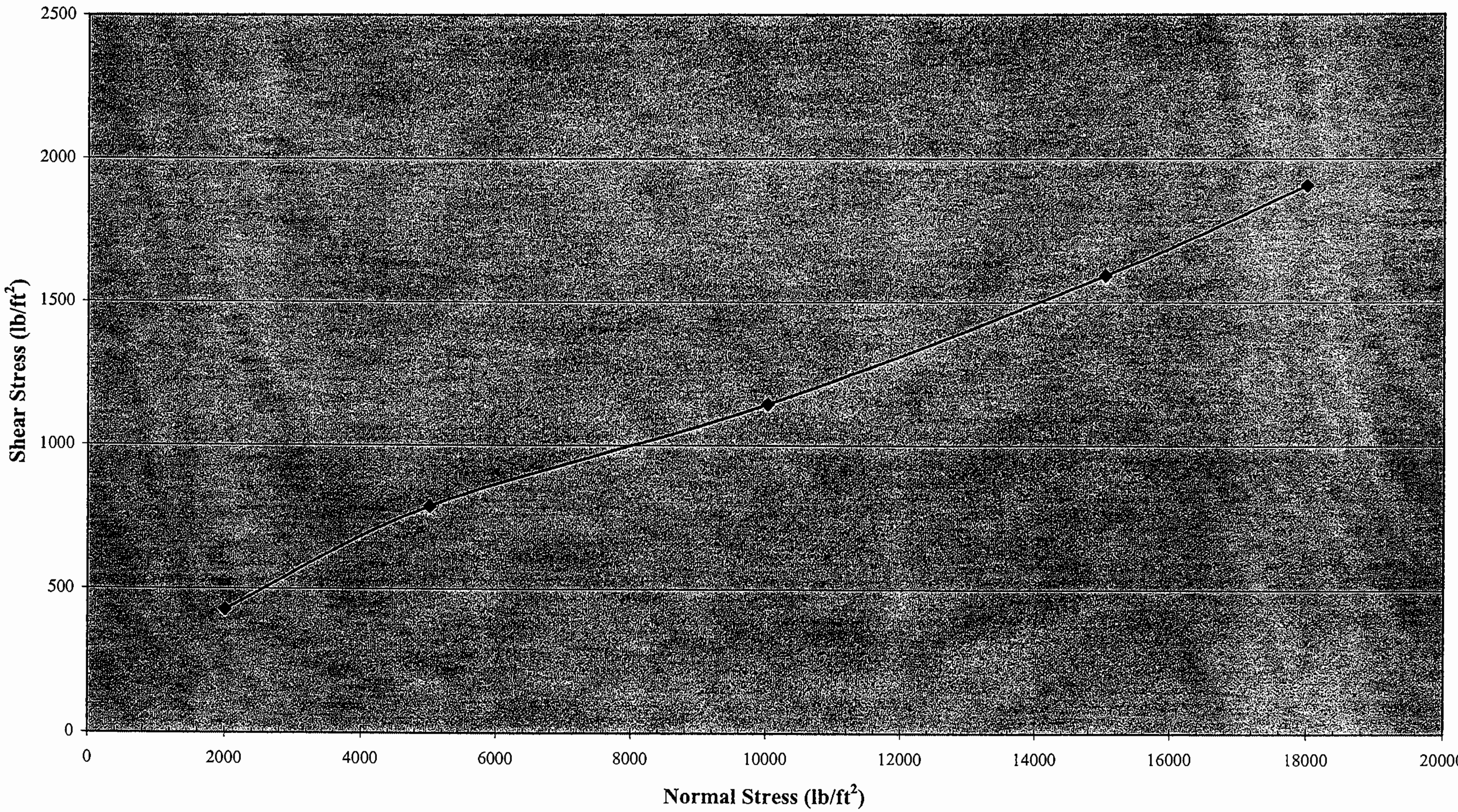
Figure 3
Unreinforced GCL Shear Strength Envelope
[Bonaparte et. al., 1996]



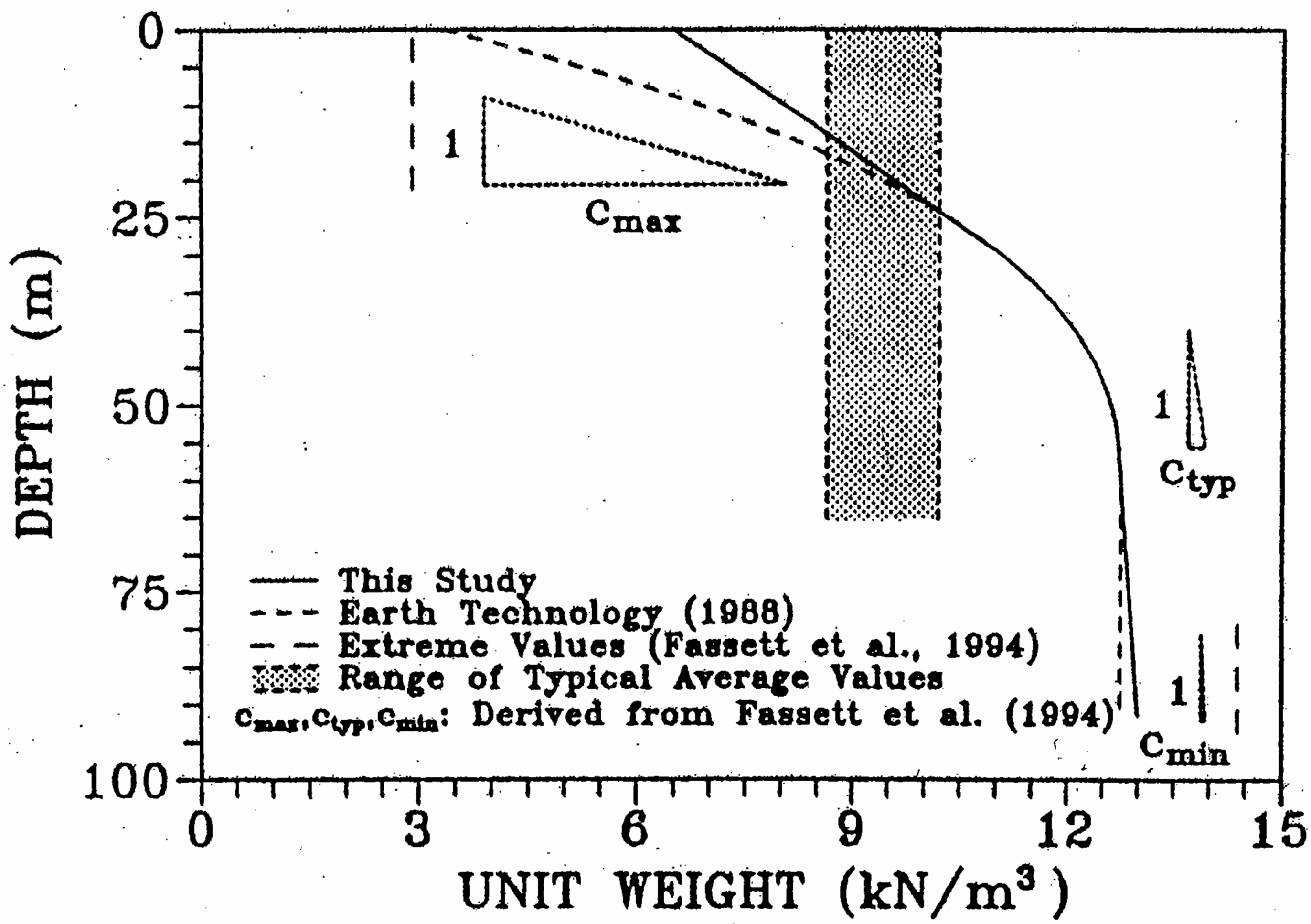


Figure 4 - MSW Unit Weight Versus Depth Relationship [Kavazanjian, 1995]

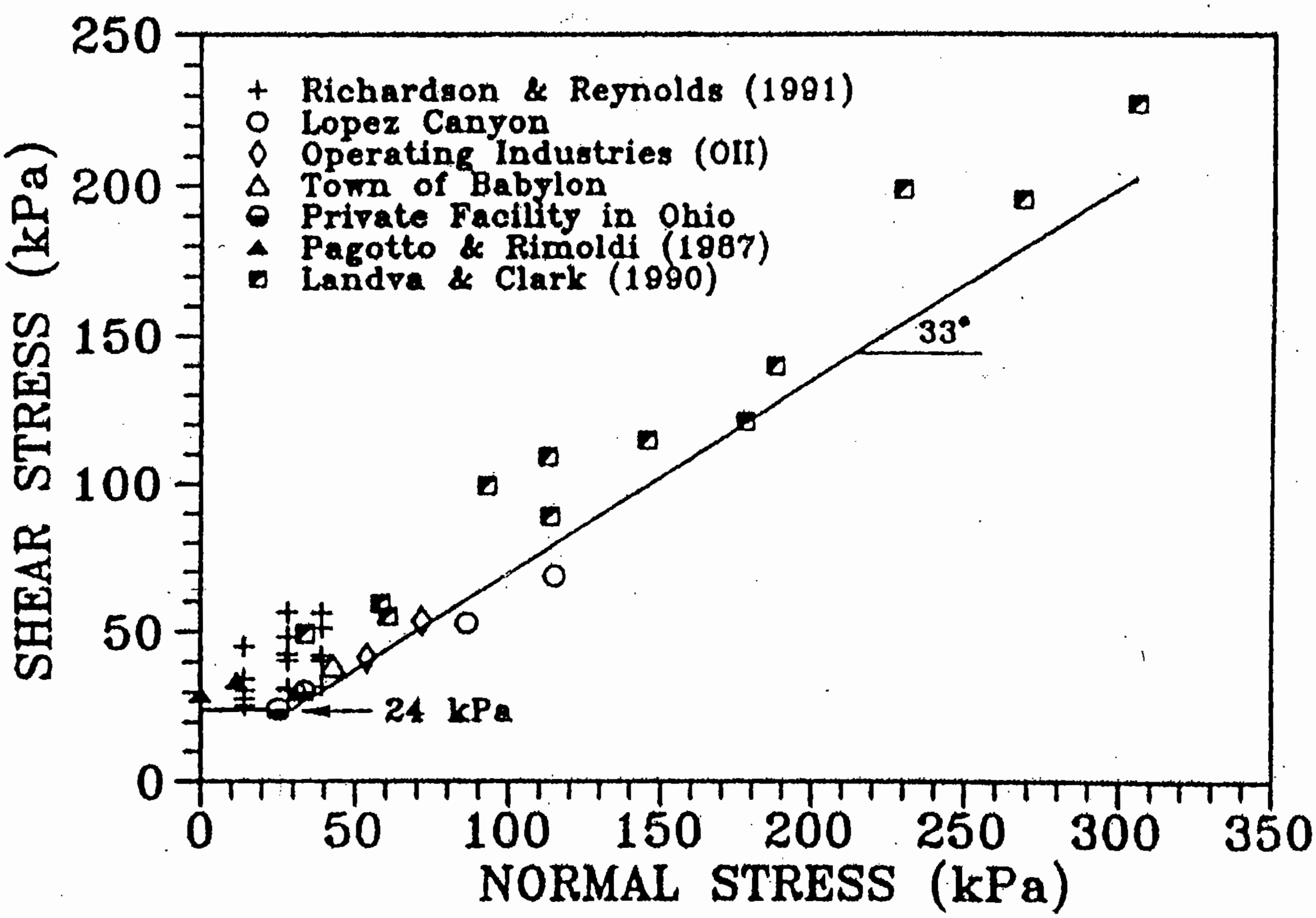
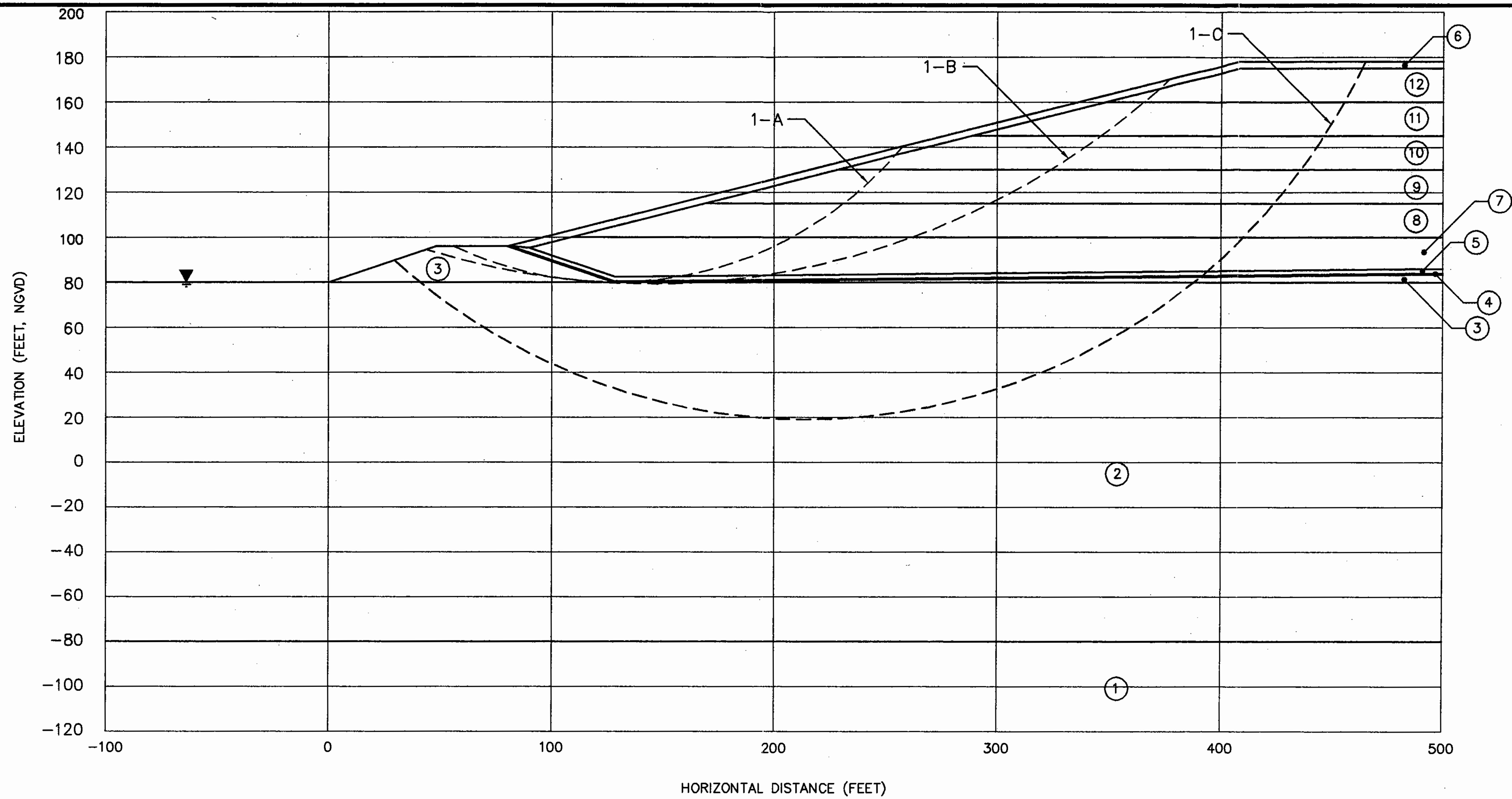


Figure 5 - MSW Shear Strength Envelope [Kavazanjian, 1995]



STABILITY ANALYSIS – CASE 1

Layer Number	Total Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (degrees)
1	115	0	30
2	115	0	25
3	120	0	35
4	110	GCL NON-LINEAR ENVELOPE	
5	110	0	35
6	100	0	35
7	67.5	MSW NON-LINEAR ENVELOPE	
8	63.1		
9	58.5		
10	53.4		
11	48.1		
12	22.6		

SURFACE	FACTOR OF SAFETY
1−A	3.97
1−B	3.63
1−C	4.18

0 50
SCALE IN FEET

Project	OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION
Figure Title	**FINAL CONFIGURATION CIRCULAR SHEAR SURFACES**
Project Number	FW0400
Date	MARCH 02
File No.	0400FA031
Figure No.	6
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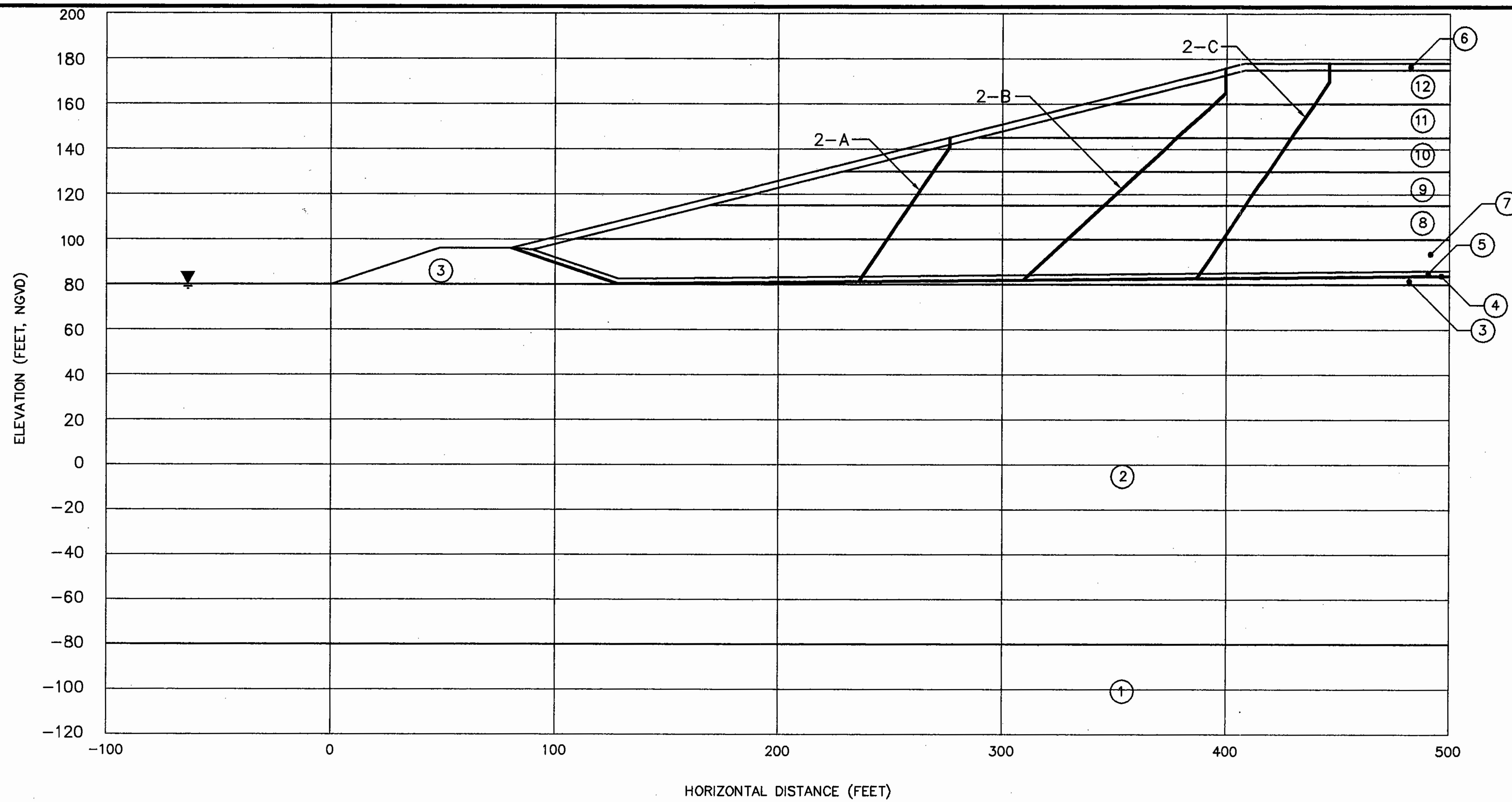

STABILITY ANALYSIS – CASE 2

Layer Number	Total Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (degrees)
1	115	0	30
2	115	0	25
3	120	0	35
4	110	GCL NON-LINEAR ENVELOPE	
5	110	0	35
6	100	0	35
7	67.5	MSW NON-LINEAR ENVELOPE	
8	63.1		
9	58.5		
10	53.4		
11	48.1		
12	22.6		

SURFACE	FACTOR OF SAFETY
2-A	2.17
2-B	1.89
2-C	2.07

0 50
SCALE IN FEET

Project: OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION

Figure Title: **FINAL CONFIGURATION NON-CIRCULAR SHEAR SURFACES**

Project Number	Date	File No.	Figure No.
FW0400	MARCH 02	0400FA032	7

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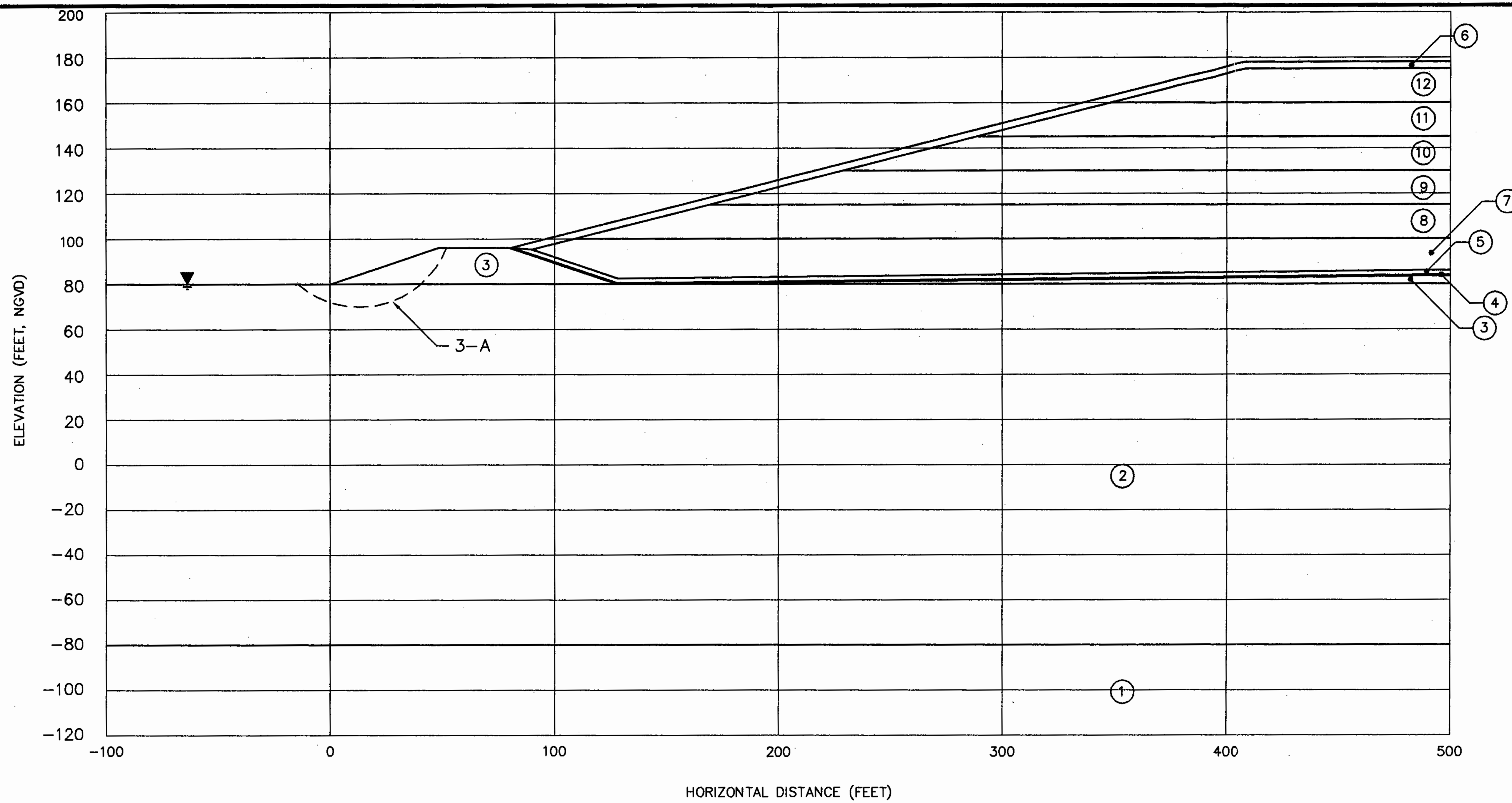


STABILITY ANALYSIS – CASE 3

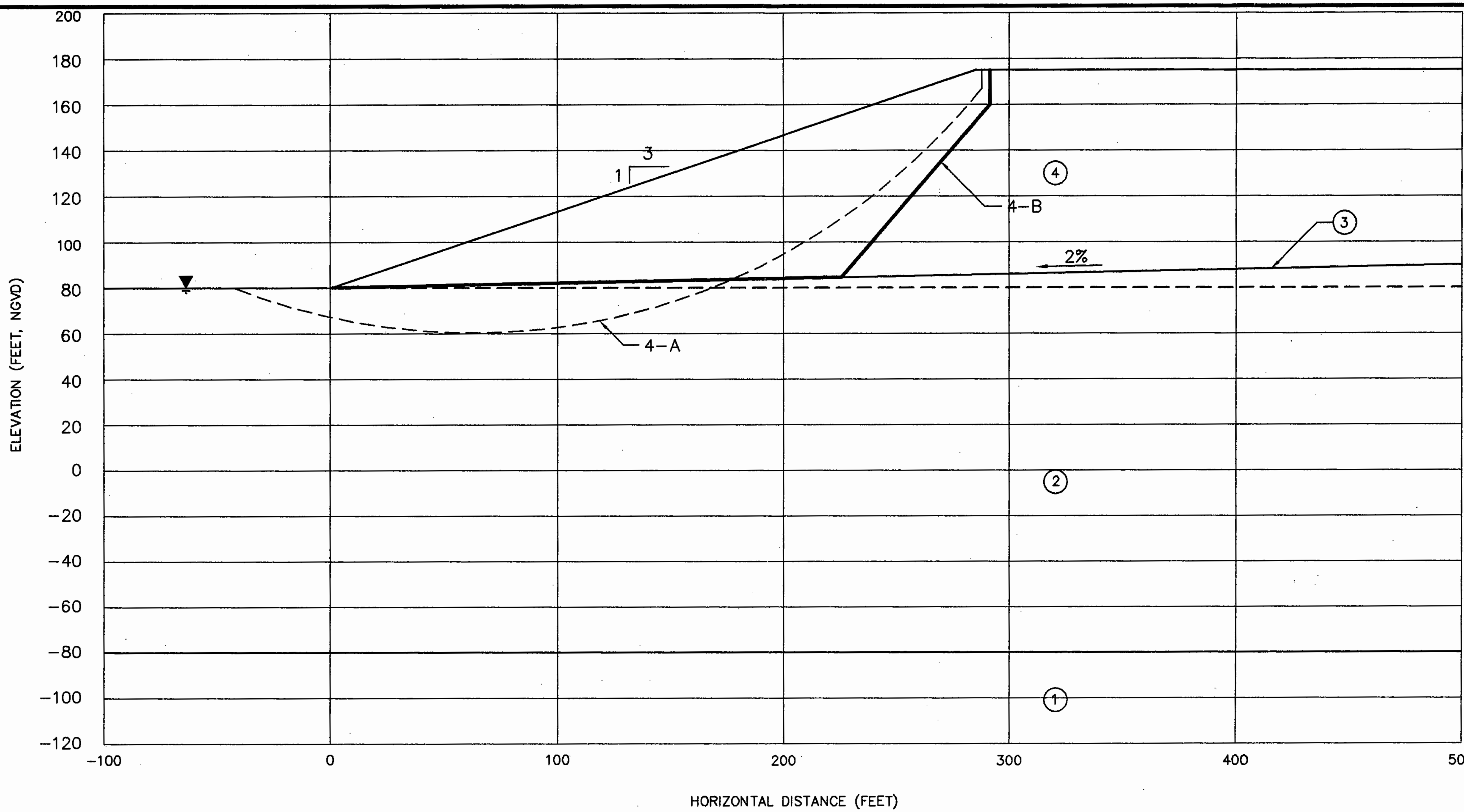
Layer Number	Total Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (degrees)
1	115	0	30
2	115	0	25
3	120	0	35
4	110	GCL NON-LINEAR ENVELOPE	
5	110	0	35
6	100	0	35
7	67.5	MSW NON-LINEAR ENVELOPE	
8	63.1		
9	58.5		
10	53.4		
11	48.1		
12	22.6		

SURFACE	FACTOR OF SAFETY
3−A	2.04

0 50
SCALE IN FEET

Project: OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **PERIMETER BERM CIRCULAR SHEAR SURFACE**			
Project Number: FW0400	Date: MARCH 02	File No.: 0400FA033	Figure No.: **8**
Consultant / Engineer: GEOSYNTEC CONSULTANTS			

14055 RIVEREDGE DRIVE, SUITE 300 • TAMPA, FLORIDA 33637 USA
TEL: (813) 558-0990 • FAX: (813) 558-9726



STABILITY ANALYSIS – CASE 4

Layer Number	Total Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (degrees)
1	115	0	30
2	115	0	25
3	110	GCL NON-LINEAR ENVELOPE	
4	54.8	MSW NON-LINEAR ENVELOPE	

SURFACE	FACTOR OF SAFETY
4–A	2.02
4–B	1.38

Project: OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION

Figure Title: **INTERIM CONFIGURATION SHEAR SURFACES**

Project Number	Date	File No.	Figure No.
FW0400	MARCH 02	0400FA034	9

Consultant / Engineer: GEOSYNTEC CONSULTANTS
14055 RIVEREDGE DRIVE, SUITE 300 · TAMPA, FLORIDA 33637 USA
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Attachment 1

CASE 1

UTEXAS3 Computer Data Files

Final Configuration Circular Shear Surfaces

- Surface 1-A: File A_CIR.DAT
- Surface 1-B: File B_CIR.DAT
- Surface 1-C: File C_CIR.DAT

A_CIR.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175


MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80


ANAlysis/computation data follow -
Circle
127.986 250.156 170.047
PROCEDURE
SPENCER
FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

A_CIR.OUT

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Date: 3:27:2002 Time: 15:54: 1 Input file: a_CIR.DAT

TABLE NO. 1
****
* COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
* Originally Coded By Stephen G. Wright *
* Version No. 1.206 *
* Last Revision Date 6/ 4/96 *
* (C) Copyright 1985-1996 S. G. Wright *
* All Rights Reserved *
****

****
*
* RESULTS OF COMPUTATIONS PERFORMED USING THIS COMPUTER *
* PROGRAM SHOULD NOT BE USED FOR DESIGN PURPOSES UNLESS THEY *
* HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL *
* DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE *
* ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER *
* PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS *
* PROGRAM BEFORE ATTEMPTING ITS USE. *
*
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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 2
****
* NEW PROFILE LINE DATA *
****

PROFILE LINE 1 - MATERIAL TYPE = 1
HAWTHORNE - MAT. 1

Point	X	Y
1	-500.000	-80.000
2	1200.000	-80.000

PROFILE LINE 2 - MATERIAL TYPE = 2
SAND - MAT. 2

Point	X	Y
1	-500.000	80.000
2	1200.000	80.000

PROFILE LINE 3 - MATERIAL TYPE = 3
BERM - MAT. 3

Point	X	Y
1	.000	80.000
2	48.000	96.000
3	80.000	96.000
4	128.000	80.000
5	1200.000	90.880

PROFILE LINE 4 - MATERIAL TYPE = 4
LINER - MAT. 4

Point	X	Y
1	80.000	96.000
2	80.904	96.226
3	128.079	80.501
4	1200.000	91.380

PROFILE LINE 5 - MATERIAL TYPE = 5
PROTECTIVE LAYER - MAT. 5

Point	X	Y
1	80.904	96.226
2	89.619	95.362
3	128.394	82.504
4	1200.000	93.380

PROFILE LINE 6 - MATERIAL TYPE = 6
FINAL COVER - MAT. 6

Point	X	Y
1	80.904	96.226
2	408.369	178.000
3	1200.000	178.000

PROFILE LINE 7 - MATERIAL TYPE = 7
MSW A - MAT. 7

Point	X	Y
1	89.819	95.362
2	108.369	100.000
3	1200.000	100.000

PROFILE LINE 8 - MATERIAL TYPE = 8
MSW B - MAT. 8

Point	X	Y
1	108.369	100.000
2	168.369	115.000
3	1200.000	115.000

PROFILE LINE 9 - MATERIAL TYPE = 9
MSW C - MAT. 9

Point	X	Y
1	168.369	115.000
2	228.369	130.000
3	1200.000	130.000

PROFILE LINE 10 - MATERIAL TYPE = 10
MSW D - MAT. 10

Point	X	Y
1	228.369	130.000
2	288.369	145.000
3	1200.000	145.000

PROFILE LINE 11 - MATERIAL TYPE = 11
MSW E - MAT. 11

Point	X	Y
1	288.369	145.000
2	348.369	160.000
3	1200.000	160.000

PROFILE LINE 12 - MATERIAL TYPE = 12
MSW F - MAT. 12

Point	X	Y
1	348.369	160.000
2	408.369	175.000
3	1200.000	175.000

All new profile lines defined - No old lines retained

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 3
****
* NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
****

DATA FOR MATERIAL TYPE 1
HAWTHORNE - MAT. 1

Unit weight of material = 115.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 30.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 2
SAND - MAT. 2

Unit weight of material = 115.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 30.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 3
BERM - MAT. 3

Unit weight of material = 120.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 35.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 4
LINER - MAT. 4

Unit weight of material = 110.000

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	.000	.000
3	2005.000	429.000
4	5013.000	787.000
5	10025.000	1143.000
6	15038.000	1594.000
7	18000.000	1908.000

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 5
PROTECTIVE LAYER - MAT. 5

Unit weight of material = 110.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 35.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 6
FINAL COVER - MAT. 6

Unit weight of material = 120.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 35.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 7
MSW A - MAT. 7

Unit weight of material = 67.500

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-1.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 8
MSW B - MAT. 8

Unit weight of material = 63.100

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240

7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 9
MSW C - MAT. 9

Unit weight of material = 58.500

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

Unit weight of material = 53.400

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

Unit weight of material = 48.100

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

Unit weight of material = 22.600

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

All new material properties defined - No old data retained
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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 5
****
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
****

Line No.	Point	X	Y	
1 - Unit weight of water =			62.40	PHREATIC
1	1	-500.000	80.000	PHREATIC
1	2	1000.000	80.000	PHREATIC

All new piezometric lines defined - No old lines retained
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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 15
****
* NEW ANALYSIS/COMPUTATION DATA *
****

Circular Shear Surface(s)

Computations Performed for Single Shear Surface

Center Coordinates for Center of Circle -

X = 127.986
Y = 250.156
Radius = 170.047

Procedure used to compute the factor of safety: SPENCER

Initial trial estimate for the factor of safety = 3.000

Maximum number of iterations allowed for
calculating the factor of safety = 100

Short form of output will be used for search

THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination = 15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence = 100.000

Allowed moment imbalance for convergence = 100.000

Maximum subtended angle to be used for subdivision of the
circle into slices = 3.00 degrees

Depth of crack = .000

Depth of water in crack = .000

Unit weight of water in crack = 62.400

Seismic coefficient = .000

Conventional (single-stage) computations to be performed
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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 16
****
* NEW SLOPE GEOMETRY DATA *
****

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

Point	X	Y
1	-500.000	80.000
2	.000	80.000
3	48.000	96.000
4	80.000	96.000
5	80.904	96.226
6	408.369	178.000
7	1200.000	178.000

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	56.2	96.0					
1	60.3	94.2	1737.1	3	.00	35.00	.0
	64.4	92.5					
2	68.5	90.9	5106.2	3	.00	35.00	.0
	72.7	89.3					
3	76.4	88.2	6834.4	3	.00	35.00	.0
	80.0	87.0					
4	80.5	86.9	998.3	3	.00	35.00	.0
	80.9	86.8					
5	85.2	85.6	11927.7	3	.00	35.00	.0
	89.5	84.5					
6	89.7	84.5	491.9	3	.00	35.00	.0
	89.8	84.4					
7	94.2	83.6	15334.3	3	.00	35.00	.0
	98.5	82.7					
8	102.9	82.0	17053.4	3	.00	35.00	.0
	107.3	81.4					
9	107.9	81.3	2059.1	3	.00	35.00	.0
	108.4	81.2					
10	112.8	80.8	18321.7	3	.00	35.00	.0
	117.2	80.4					
11	121.7	80.3	18844.3	3	.00	35.00	.0
	126.1	80.1					
12	126.9	80.1	3278.3	3	.00	35.00	.0
	127.7	80.1					
13	127.8	80.1	668.3	4	NONLINEAR ENVELOPE		.0
	128.0	80.1					
14	128.0	80.1	29.8	4	NONLINEAR ENVELOPE		.0
	128.0	80.1					
15	128.0	80.1	168.2	4	NONLINEAR ENVELOPE		.0
	128.1	80.1					
16	128.2	80.1	670.8	4	NONLINEAR ENVELOPE		.0
	128.4	80.1					
17	132.8	80.2	19468.3	4	NONLINEAR ENVELOPE		.0
	137.3	80.4					
18	139.3	80.5	9207.3	4	NONLINEAR ENVELOPE		.0
	141.4	80.6					
19	145.8	81.1	20379.9	5	.00	35.00	.0
	150.2	81.6					
20	154.2	82.2	18400.9	5	.00	35.00	.0
	158.2	82.8					

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	158.2	82.8					
21	162.5	83.7	20240.7	7	NONLINEAR ENVELOPE		.0
	166.9	84.6					
22	167.6	84.8	3494.7	7	NONLINEAR ENVELOPE		.0
	168.4	85.0					
23	172.7	86.1	19864.3	7	NONLINEAR ENVELOPE		.0
	177.0	87.3					
24	181.2	88.7	19142.5	7	NONLINEAR ENVELOPE		.0
	185.4	90.1					
25	189.6	91.7	18116.9	7	NONLINEAR ENVELOPE		.0
	193.7	93.3					
26	197.8	95.2	16810.9	7	NONLINEAR ENVELOPE		.0
	201.8	97.0					
27	204.8	98.5	11617.9	7	NONLINEAR ENVELOPE		.0
	207.8	100.0					
28	211.7	102.2	14011.5	8	NONLINEAR ENVELOPE		.0
	215.5	104.4					

A_CIR.OUT

29	219.3	106.8	12242.2	8	NONLINEAR ENVELOPE		.0
	223.1	109.2					
30	225.7	111.0	7737.9	8	NONLINEAR ENVELOPE		.0
	228.4	112.9					
31	229.8	113.9	3733.5	8	NONLINEAR ENVELOPE		.0
	231.2	115.0					
32	234.6	117.8	8067.4	9	NONLINEAR ENVELOPE		.0
	238.1	120.6					
33	241.4	123.6	6079.3	9	NONLINEAR ENVELOPE		.0
	244.7	126.5					
34	246.5	128.3	2533.6	9	NONLINEAR ENVELOPE		.0
	248.3	130.0					
35	251.4	133.2	3061.1	10	NONLINEAR ENVELOPE		.0
	254.4	136.5					
36	254.5	136.5	23.3	10	NONLINEAR ENVELOPE		.0
	254.5	136.5					
37	256.2	138.5	618.6	6	.00	35.00	.0
	257.9	140.4					

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 27

****
* Seismic Forces and Forces Due to Surface Pressures for *
* Individual Slices for Conventional Computations or the *
* First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *

****

Slice No.	X	Seismic Force	Y for Seismic Force	FORCES DUE TO SURFACE PRESSURES Normal Force	Shear Force	X	Y
1	60.3	0.	95.1	0.	0.	.0	.0
2	68.5	0.	93.4	0.	0.	.0	.0
3	76.4	0.	92.1	0.	0.	.0	.0
4	80.5	0.	91.5	0.	0.	.0	.0
5	85.2	0.	91.4	0.	0.	.0	.0
6	89.7	0.	91.4	0.	0.	.0	.0
7	94.2	0.	91.3	0.	0.	.0	.0
8	102.9	0.	91.3	0.	0.	.0	.0
9	107.9	0.	91.5	0.	0.	.0	.0
10	112.8	0.	91.9	0.	0.	.0	.0
11	121.7	0.	93.1	0.	0.	.0	.0
12	126.9	0.	94.0	0.	0.	.0	.0
13	127.8	0.	94.2	0.	0.	.0	.0
14	128.0	0.	94.3	0.	0.	.0	.0
15	128.0	0.	94.3	0.	0.	.0	.0
16	128.2	0.	94.3	0.	0.	.0	.0
17	132.8	0.	95.0	0.	0.	.0	.0
18	139.3	0.	95.9	0.	0.	.0	.0
19	145.8	0.	97.2	0.	0.	.0	.0
20	154.2	0.	99.0	0.	0.	.0	.0
21	162.5	0.	101.0	0.	0.	.0	.0
22	167.6	0.	102.2	0.	0.	.0	.0
23	172.7	0.	103.5	0.	0.	.0	.0
24	181.2	0.	105.8	0.	0.	.0	.0
25	189.6	0.	108.4	0.	0.	.0	.0
26	197.8	0.	111.2	0.	0.	.0	.0
27	204.8	0.	113.8	0.	0.	.0	.0
28	211.7	0.	116.5	0.	0.	.0	.0
29	219.3	0.	119.8	0.	0.	.0	.0
30	225.7	0.	122.8	0.	0.	.0	.0
31	229.8	0.	124.8	0.	0.	.0	.0
32	234.6	0.	127.3	0.	0.	.0	.0
33	241.4	0.	130.9	0.	0.	.0	.0
34	246.5	0.	333.8	0.	0.	.0	.0
35	251.4	0.	136.5	0.	0.	.0	.0
36	254.5	0.	138.0	0.	0.	.0	.0
37	256.2	0.	139.2	0.	0.	.0	.0

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 29

****
* Information Generated During Iterative Solution for the Factor *
* of Safety and Side Force Inclination by Spencer's Procedure *

****

Iter-ation	Trial Factor of Safety	Trial Side Force Inclination (degrees)	Force Imbalance (lbs.)	Moment Imbalance (ft.-lbs.)	Delta-F	Delta Theta (degrees)
1	3.00000	15.0000	-.2360E+05	.1552E+07		
First-order corrections to F and THETA					.335E+00	-.169E+02
Values factored by .508E+00 - Deltas too large					.170E+00	-.859E+01
2	3.17049	6.4056	-.1298E+05	.5919E+06		
First-order corrections to F and THETA					.724E+00	.722E+01
Values factored by .690E+00 - Deltas too large					.500E+00	.498E+01
3	3.67049	11.3884	-.5578E+04	.4110E+06		
First-order corrections to F and THETA					.263E+00	-.113E+01
Second-order correction - Iteration 1					.288E+00	-.113E+01
Second-order correction - Iteration 2					.288E+00	-.113E+01
4	3.95887	10.2609	.3783E+02	-.2045E+05		
First-order corrections to F and THETA					.532E-02	.201E+00
Second-order correction - Iteration 1					.534E-02	.201E+00
Second-order correction - Iteration 2					.534E-02	.201E+00
5	3.96421	10.4623	.1440E-01	-.3420E+01		
First-order corrections to F and THETA					.170E-06	.282E-04

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was 9.709 - at slice 33
Material: 9 Normal stress: 709.550
Strength from previous trial: 501.240
Estimated strength for new trial: 555.140

TABLE NO. 29

****
* Information Generated During Iterative Solution for the Factor *
* of Safety and Side Force Inclination by Spencer's Procedure *

****

Iter-ation	Trial Factor of Safety	Trial Side Force Inclination (degrees)	Force Imbalance (lbs.)	Moment Imbalance (ft.-lbs.)	Delta-F	Delta Theta (degrees)
1	3.96421	10.4623	-.1289E+03	.1001E+05		
First-order corrections to F and THETA					.732E-02	-.225E-01
Second-order correction - Iteration 1					.733E-02	-.234E-01
Second-order correction - Iteration 2					.734E-02	-.234E-01
2	2.97154	10.4390	.2686E-02	-.7143E-01		
First-order corrections to F and THETA					-.211E-06	-.105E-05

For trial number 3 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 33
Material: 9 Normal stress: 702.308
Strength from previous trial: 550.437
Estimated strength for new trial: 550.437

TABLE NO. 29

****
* Information Generated During Iterative Solution for the Factor *
* of Safety and Side Force Inclination by Spencer's Procedure *

****

Iter-ation	Trial Factor of Safety	Trial Side Force Inclination (degrees)	Force Imbalance (lbs.)	Moment Imbalance (ft.-lbs.)	Delta-F	Delta Theta (degrees)
1	3.97154	10.4390	.2686E-02	-.7143E-01		
First-order corrections to F and THETA					-.211E-06	-.105E-05

Factor of Safety - - - - - - - - 3.972
Side Force Inclination - - - - - 10.44
Number of Iterations - - - - - - 1

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 38

****
* Final Results for Stresses Along the Shear Surface *
* (Results for Critical Shear Surface in Case of a Search.) *

****

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 3.972 Side Force Inclination = 10.44 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE--------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	60.3	94.2	262.3	262.3	46.2
2	68.5	90.9	735.0	735.0	129.6
3	76.4	88.2	1100.5	1100.5	194.0
4	80.5	86.9	1280.3	1280.3	225.7
5	85.2	85.6	1584.3	1584.3	279.3
6	89.7	84.5	1861.6	1861.6	328.2
7	94.2	83.6	1965.2	1965.2	346.5
8	102.9	82.0	2119.3	2119.3	373.6
9	107.9	81.3	2184.2	2184.2	385.1
10	112.8	80.8	2209.5	2209.5	389.5
11	121.7	80.3	2220.0	2220.0	391.4
12	126.9	80.1	2206.1	2206.1	389.0
13	127.8	80.1	2150.1	2150.1	112.4
14	128.0	80.1	2149.9	2149.9	112.4
15	128.0	80.1	2149.8	2149.8	112.4
16	128.2	80.1	2149.5	2149.5	112.3
17	132.8	80.2	2193.8	2193.8	113.7
18	139.3	80.5	2249.4	2249.4	115.3
19	145.8	81.1	2289.3	2289.3	403.6
20	154.2	82.2	2264.5	2264.5	399.2
21	162.5	83.7	2227.8	2227.8	388.0
22	167.6	84.8	2210.3	2210.3	385.2
23	172.7	86.1	2170.3	2170.3	378.6
24	181.2	88.7	2084.4	2084.4	364.6
25	189.6	91.7	1971.4	1971.4	346.1
26	197.8	95.2	1832.8	1832.8	323.4
27	204.8	98.5	1693.4	1693.4	300.6
28	211.7	102.2	1542.2	1542.2	275.9
29	219.3	106.8	1359.4	1359.4	246.0
30	225.7	111.0	1188.4	1188.4	218.1
31	229.8	113.9	1069.5	1069.5	198.6
32	234.6	117.8	919.1	919.1	174.0
33	241.4	123.6	702.3	702.3	138.6
34	246.5	128.3	517.3	517.3	126.2
35	251.4	133.2	326.5	326.5	126.2
36	254.5	136.5	207.0	207.0	126.2
37	256.2	138.5	132.2	132.2	23.3

CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION = .01 (= .105E-01)
SHOULD NOT EXCEED .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION = .02 (= .210E-01)
SHOULD NOT EXCEED .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN = .64 (= .641E+00)
SHOULD NOT EXCEED .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM = .00 (= .262E-02)
SHOULD NOT EXCEED .100E+03

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 39

****
* Final Results for Side Forces and Stresses Between Slices. *
* (Results for Critical Shear Surface in Case of a Search.) *

****

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 3.972 Side Force Inclination = 10.44 Degrees

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	64.4	1330.	95.0	.712	838.4	-100.7
2	72.7	4755.	93.0	.553	924.9	479.7
3	80.0	8790.	91.8	.536	1171.0	754.3
4	80.9	9340.	91.7	.522	1100.9	839.2
5	89.5	15396.	90.6	.438	688.4	1496.3
6	89.8	15627.	90.6	.436	677.8	1517.0
7	98.5	22238.	89.8	.399	482.2	1954.1
8	107.3	28410.	89.6	.383	390.1	2213.3
9	108.4	29079.	89.6	.382	382.5	2236.3
10	117.2	34378.	89.7	.374	333.7	2387.4
11	126.1	38663.	90.2	.370	302.1	2473.2
12	127.7	39294.	90.4	.369	297.5	2483.0
13	128.0	39331.	90.4	.370	302.8	2472.5
14	128.0	39332.	90.4	.370	303.1	2472.0
15	128.1	39341.	90.4	.370	304.4	2469.4
16	128.4	39376.	90.5	.371	309.6	2458.9
17	137.3	39837.	92.0	.388	431.0	2185.8
18	141.4	39693.	92.8	.396	476.7	2067.4
19	150.2	41156.	94.0	.388	414.7	2117.6
20	158.2	41528.	95.3	.383	368.6	2128.5
21	166.9	40871.	97.1	.378	327.0	2103.2
22	168.4	40651.	97.5	.378	320.5	2095.6
23	177.0	38794.	99.6	.374	285.7	2033.7
24	185.4	36023.	102.1	.372	255.3	1943.5
25	193.7	32479.	104.8	.370	228.5	1827.5
26	201.8	28338.	107.9	.369	204.2	1688.8
27	207.8	24960.	110.3	.369	186.9	1571.9
28	215.5	20261.	113.8	.368	164.8	1400.2
29	223.1	15530.	117.5	.369	145.0	1209.1
30	228.4	12195.	120.4	.371	133.1	1057.3
31	231.2	10479.	122.0	.372	128.1	971.1

32	238.1	6485.	126.2	.379	116.5	739.7
33	244.7	3177.	130.9	.409	133.5	455.3
34	248.3	1809.	133.7	.466	176.4	266.6
35	254.4	449.	138.1	.537	174.6	110.6
36	254.5	442.	138.2	.536	173.8	112.2
37	257.9	0.	247.2	ABOVE	.0	.0

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =          .01  (=  .105E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION  =          .02  (=  .210E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN =          .64  (=  .641E+00)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM   =          .00  (=  .262E-02)
     SHOULD NOT EXCEED      .100E+03

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED
```

B_CIR.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.269 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.169 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175


MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Pierometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 15
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometrio Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80


ANAlysis/computation data follow -
Circle
144.579 422.318 342.868
PROCEDURE
SPENCER
FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

B_CIR.OUT

```
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         TABLE NO. 1
         ****************************************
         * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
         * Originally Coded By Stephen G. Wright  *
         * Version No. 1.206                      *
         * Last Revision Date  6/ 4/96            *
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         ****************************************

         ***************************************************************
         *                                                             *
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         * DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE    *
         * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER   *
         * PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS       *
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         STABILITY ANALYSES - 98 FEET
         CIRCULAR; RS 03/18/2002

         TABLE NO.  2
         ************************
         * NEW PROFILE LINE DATA *
         ************************

         PROFILE LINE  1 - MATERIAL TYPE =  1
         HAWTHORNE - MAT. 1

              Point       X              Y

                1      -500.000        -80.000
                2      1200.000        -80.000

         PROFILE LINE  2 - MATERIAL TYPE =  2
         SAND - MAT. 2

              Point       X              Y

                1      -500.000         80.000
                2      1200.000         80.000

         PROFILE LINE  3 - MATERIAL TYPE =  3
         BERM - MAT. 3

              Point       X              Y

                1          .000         80.000
                2        48.000         96.000
                3        80.000         96.000
                4       128.000         80.000
                5      1200.000         90.880

         PROFILE LINE  4 - MATERIAL TYPE =  4
         LINER - MAT. 4

              Point       X              Y

                1        80.000         96.000
                2        80.904         96.226
                3       128.079         80.501
                4      1200.000         91.380

         PROFILE LINE  5 - MATERIAL TYPE =  5
         PROTECTIVE LAYER - MAT. 5

              Point       X              Y

                1        80.904         96.226
                2        89.819         95.362
                3       128.394         82.504
                4      1200.000         93.380

         PROFILE LINE  6 - MATERIAL TYPE =  6
         FINAL COVER - MAT. 6

              Point       X              Y

                1        80.904         96.226
                2       408.369        178.000
                3      1200.000        178.000

         PROFILE LINE  7 - MATERIAL TYPE =  7
         MSW A - MAT. 7

              Point       X              Y

                1        89.819         95.362
                2       108.369        100.000
                3      1200.000        100.000

         PROFILE LINE  8 - MATERIAL TYPE =  8
         MSW B - MAT. 8

              Point       X              Y

                1       108.369        100.000
                2       168.369        115.000
                3      1200.000        115.000

         PROFILE LINE  9 - MATERIAL TYPE =  9
         MSW C - MAT. 9

              Point       X              Y

                1       168.369        115.000
                2       228.369        130.000
                3      1200.000        130.000

         PROFILE LINE 10 - MATERIAL TYPE = 10
         MSW D - MAT. 10

              Point       X              Y

                1       228.369        130.000
                2       288.369        145.000
                3      1200.000        145.000

         PROFILE LINE 11 - MATERIAL TYPE = 11
         MSW E - MAT. 11

              Point       X              Y

                1       288.369        145.000
                2       348.369        160.000
                3      1200.000        160.000

         PROFILE LINE 12 - MATERIAL TYPE = 12
         MSW F - MAT. 12

              Point       X              Y

                1       348.369        160.000
                2       408.369        175.000
                3      1200.000        175.000

         All new profile lines defined - No old lines retained
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         TABLE NO.  3
         *****************************************************************
         * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
         *****************************************************************

         DATA FOR MATERIAL TYPE  1
         HAWTHORNE - MAT. 1

              Unit weight of material =  115.000

              CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
              Cohesion - - - - - - - -            .000
              Friction angle - - - - -  30.000 degrees

              Pore water pressures defined by piezometric line
              Number of the piezometric line used =  1
              Negative pore pressures set to zero

         DATA FOR MATERIAL TYPE  2
         SAND - MAT. 2

              Unit weight of material =  115.000

              CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
              Cohesion - - - - - - - -            .000
              Friction angle - - - - -  30.000 degrees

              Pore water pressures defined by piezometric line
              Number of the piezometric line used =  1
              Negative pore pressures set to zero

         DATA FOR MATERIAL TYPE  3
         BERM - MAT. 3

              Unit weight of material =  120.000

              CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
              Cohesion - - - - - - - -            .000
              Friction angle - - - - -  35.000 degrees

              Pore water pressures defined by piezometric line
              Number of the piezometric line used =  1
              Negative pore pressures set to zero

         DATA FOR MATERIAL TYPE  4
         LINER - MAT. 4

              Unit weight of material =  110.000

              ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
              Point      Normal Stress      Shear Stress

                1           -1000.000              .000
                2                .000              .000
                3            2005.000           429.000
                4            5013.000           767.000
                5           10025.000          1143.000
                6           15038.000          1594.000
                7           18000.000          1908.000

              Pore water pressures defined by piezometric line
              Number of the piezometric line used =  1
              Negative pore pressures set to zero

         DATA FOR MATERIAL TYPE  5
         PROTECTIVE LAYER - MAT. 5

              Unit weight of material =  110.000

              CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
              Cohesion - - - - - - - -            .000
              Friction angle - - - - -  35.000 degrees

              Pore water pressures defined by piezometric line
              Number of the piezometric line used =  1
              Negative pore pressures set to zero

         DATA FOR MATERIAL TYPE  6
         FINAL COVER - MAT. 6

              Unit weight of material =  120.000

              CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
              Cohesion - - - - - - - -            .000
              Friction angle - - - - -  35.000 degrees

              Pore water pressures defined by piezometric line
              Number of the piezometric line used =  1
              Negative pore pressures set to zero

         DATA FOR MATERIAL TYPE  7
         MSW A - MAT. 7

              Unit weight of material =   67.500

              ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
              Point      Normal Stress      Shear Stress

                1           -1000.000              .000
                2              -1.000              .000
                3                .000           501.240
                4             208.850           501.240
                5             417.700           501.240
                6             626.550           501.240
                7             835.400           636.867
                8            5221.250          3485.038

              Pore water pressures defined by piezometric line
              Number of the piezometric line used =  1
              Negative pore pressures set to zero

         DATA FOR MATERIAL TYPE  8
         MSW B - MAT. 8

              Unit weight of material =   63.100

              ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
              Point      Normal Stress      Shear Stress

                1           -1000.000              .000
                2            -100.000              .000
                3                .000           501.240
                4             208.850           501.240
                5             417.700           501.240
                6             626.550           501.240
```

7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 9
MSW C - MAT. 9

Unit weight of material = 56.500

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

Unit weight of material = 53.400

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

Unit weight of material = 48.100

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

Unit weight of material = 22.600

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

All new material properties defined - No old data retained
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TABLE NO. 5
****
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
****

Line No.	Point	X	Y	
1 - Unit weight of water =			62.40	PHREATIC
1	1	-500.000	80.000	PHREATIC
1	2	1000.000	80.000	PHREATIC

All new piezometric lines defined - No old lines retained
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TABLE NO. 15
****
* NEW ANALYSIS/COMPUTATION DATA *
****

Circular Shear Surface(s)

Computations Performed for Single Shear Surface

Center Coordinates for Center of Circle -

X = 144.579
Y = 422.318
Radius = 342.868

Procedure used to compute the factor of safety: SPENCER

Initial trial estimate for the factor of safety = 3.000

Maximum number of iterations allowed for
calculating the factor of safety = 100

Short form of output will be used for search

THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination = 15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence = 100.000

Allowed moment imbalance for convergence = 100.000

Maximum subtended angle to be used for subdivision of the
circle into slices = 3.00 degrees

Depth of crack = .000

Depth of water in crack = .000

Unit weight of water in crack = 62.400

Seismic coefficient = .000

Conventional (single-stage) computations to be performed
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TABLE NO. 16
****
* NEW SLOPE GEOMETRY DATA *
****

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

Point	X	Y
1	-500.000	80.000
2	.000	80.000
3	48.000	96.000
4	80.000	96.000
5	80.904	96.226
6	408.369	178.000
7	1200.000	178.000

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	43.8	94.6					
1	45.9	94.0	673.2	3	.00	35.00	.0
	48.0	93.3					
2	56.7	91.0	10344.7	3	.00	35.00	.0
	65.4	88.7					
3	72.7	87.2	15544.0	3	.00	35.00	.0
	80.0	85.6					
4	80.5	85.5	1148.9	3	.00	35.00	.0
	80.9	85.4					
5	85.4	84.6	13452.2	3	.00	35.00	.0
	89.8	83.9					
6	98.7	82.7	33159.4	3	.00	35.00	.0
	107.6	81.4					
7	108.0	81.4	1527.2	3	.00	35.00	.0
	108.4	81.4					
8	116.8	80.7	34918.7	3	.00	35.00	.0
	125.2	80.0					
9	126.6	79.9	6099.4	2	.00	30.00	4.6
	128.0	79.9					
10	128.0	79.8	170.5	2	.00	30.00	9.4
	128.1	79.8					
11	128.2	79.8	680.4	2	.00	30.00	10.0
	128.4	79.8					
12	136.5	79.6	37464.9	2	.00	30.00	22.4
	144.6	79.4					
13	153.6	79.7	46430.2	2	.00	30.00	19.7
	162.5	79.9					
14	163.3	80.0	3985.7	2	.00	30.00	2.5
	164.0	80.0					
15	166.2	80.1	11993.8	3	.00	35.00	.0
	168.4	80.3					
16	169.4	80.4	5900.0	3	.00	35.00	.0
	170.5	80.4					
17	173.8	80.7	18508.3	4	NONLINEAR ENVELOPE		.0
	177.1	81.0					
18	186.0	82.1	50328.1	5	.00	35.00	.0
	195.0	83.2					
19	195.0	83.2	188.0	5	.00	35.00	.0
	195.0	83.2					
20	203.9	84.7	50617.6	7	NONLINEAR ENVELOPE		.0
	212.7	86.3					

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	212.7	86.3					
21	220.5	88.1	45155.8	7	NONLINEAR ENVELOPE		.0
	228.4	89.8					
22	237.0	92.3	48869.3	7	NONLINEAR ENVELOPE		.0
	245.7	94.7					
23	253.6	97.3	42852.4	7	NONLINEAR ENVELOPE		.0
	261.5	100.0					
24	269.9	103.3	42364.1	8	NONLINEAR ENVELOPE		.0
	278.2	106.6					
25	283.3	108.8	24044.1	8	NONLINEAR ENVELOPE		.0
	288.4	111.1					
26	292.5	113.0	18270.1	8	NONLINEAR ENVELOPE		.0
	296.6	115.0					
27	304.6	119.2	31616.4	9	NONLINEAR ENVELOPE		.0
	312.5	123.4					
28	318.1	126.7	19352.2	9	NONLINEAR ENVELOPE		.0
	323.8	130.0					

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29	331.3	134.9	21355.8	10	NONLINEAR ENVELOPE		.0
	338.8	139.8					
30	342.5	142.4	8512.1	10	NONLINEAR ENVELOPE		.0
	346.2	145.0					
31	347.3	145.8	2233.7	11	NONLINEAR ENVELOPE		.0
	348.4	146.6					
32	355.4	152.1	11057.7	11	NONLINEAR ENVELOPE		.0
	362.5	157.6					
33	363.9	158.8	1442.3	11	NONLINEAR ENVELOPE		.0
	365.4	160.0					
34	368.8	163.0	2830.0	12	NONLINEAR ENVELOPE		.0
	372.3	166.0					
35	374.6	168.1	830.2	6	.00	35.00	.0
	376.9	170.1					

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TABLE No. 27

```
***************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for     *
*  Individual Slices for Conventional  Computations or the    *
*  First Stage of Multi-Stage Computations.                   *
*  (Information is for the Critical Shear Surface in the      *
*  Case of an Automatic Search.)                              *
***************************************************************
```

Slice No.	X	Seismic Force	Y for Seismic Force	FORCES DUE TO SURFACE PRESSURES Normal Force	Shear Force	X	Y
1	45.9	0.	94.6	0.	0.	.0	.0
2	56.7	0.	93.5	0.	0.	.0	.0
3	72.7	0.	91.6	0.	0.	.0	.0
4	80.5	0.	90.8	0.	0.	.0	.0
5	85.4	0.	90.9	0.	0.	.0	.0
6	98.7	0.	91.2	0.	0.	.0	.0
7	108.0	0.	91.6	0.	0.	.0	.0
8	116.8	0.	92.5	0.	0.	.0	.0
9	126.6	0.	93.8	0.	0.	.0	.0
10	128.0	0.	94.1	0.	0.	.0	.0
11	128.2	0.	94.1	0.	0.	.0	.0
12	136.5	0.	95.0	0.	0.	.0	.0
13	153.6	0.	97.0	0.	0.	.0	.0
14	163.3	0.	98.4	0.	0.	.0	.0
15	166.2	0.	98.9	0.	0.	.0	.0
16	169.4	0.	99.4	0.	0.	.0	.0
17	173.8	0.	100.2	0.	0.	.0	.0
18	186.0	0.	102.7	0.	0.	.0	.0
19	195.0	0.	104.6	0.	0.	.0	.0
20	203.9	0.	106.5	0.	0.	.0	.0
21	220.5	0.	110.3	0.	0.	.0	.0
22	237.0	0.	114.4	0.	0.	.0	.0
23	252.6	0.	119.1	0.	0.	.0	.0
24	269.9	0.	124.2	0.	0.	.0	.0
25	283.3	0.	128.7	0.	0.	.0	.0
26	292.5	0.	132.1	0.	0.	.0	.0
27	304.6	0.	136.7	0.	0.	.0	.0
28	318.1	0.	142.3	0.	0.	.0	.0
29	331.3	0.	148.2	0.	0.	.0	.0
30	342.5	0.	153.4	0.	0.	.0	.0
31	347.3	0.	155.7	0.	0.	.0	.0
32	355.4	0.	159.6	0.	0.	.0	.0
33	363.9	0.	164.1	0.	0.	.0	.0
34	368.8	0.	166.3	0.	0.	.0	.0
35	374.6	0.	168.8	0.	0.	.0	.0

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TABLE NO. 29

```
**********************************************************************
*  Information Generated During Iterative Solution for the Factor    *
*  of Safety and Side Force Inclination by Spencer's Procedure       *
**********************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment                Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F     Theta
ation  Safety    (degrees)     (lbs.)   (ft.-lbs.)             (degrees)

   1   3.00000    15.0000  -.3057E+05   .2119E+07
First-order corrections to F and THETA .........   .429E+00 -.802E+01
Second-order correction - Iteration   1 ........   .595E+00 -.802E+01
Second-order correction - Iteration   2 ........   .613E+00 -.802E+01
Second-order correction - Iteration   3 ........   .613E+00 -.802E+01
Values factored by  .815E+00 - Deltas too large    .500E+00 -.654E+01

   2   3.50000     8.4599  -.2858E+04  -.3639E+06
First-order corrections to F and THETA .........   .126E+00  .265E+01
Second-order correction - Iteration   1 ........   .130E+00  .265E+01
Second-order correction - Iteration   2 ........   .130E+00  .265E+01

   3   3.63021    11.1125   .6558E+01   .3327E+05
First-order corrections to F and THETA .........  -.327E-02 -.152E+00
Second-order correction - Iteration   1 ........  -.327E-02 -.152E+00

   4   3.62695    10.9606  -.1373E-02   .2455E+02
First-order corrections to F and THETA .........  -.220E-05 -.111E-03
```

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 31
Material: 11 Normal stress: 822.239
Strength from previous trial: 628.321
Estimated strength for new trial: 628.321

TABLE NO. 29

```
**********************************************************************
*  Information Generated During Iterative Solution for the Factor    *
*  of Safety and Sida Force Inclination by Spencer's Procedure       *
**********************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment                Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F     Theta
ation  Safety    (degrees)     (lbs.)   (ft.-lbs.)             (degrees)

   1   3.62695    10.9606  -.1373E-02   .2455E+02
First-order corrections to F and THETA .........  -.220E-05 -.111E-03
```

Factor of Safety - - - - - - - - 3.627
Side Force Inclination - - - - - 10.96
Number of Iterations - - - - - - 1

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TABLE NO. 38

```
*****************************************************************
*  Final Results for Stresses Along the Shear Surface           *
*  (Results for Critical Shear Surface in Case of a Search.)    *
*****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 3.627 Side Force Inclination = 10.96 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE--------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	45.9	94.0	189.0	189.0	36.5
2	56.7	91.0	693.3	693.3	133.8
3	72.7	87.2	1206.2	1206.2	232.9
4	80.5	85.5	1429.6	1429.6	276.0
5	85.4	84.6	1686.4	1686.4	325.6
6	98.7	82.7	2047.5	2047.5	395.3
7	108.0	81.4	2178.8	2178.8	420.6
8	116.8	80.7	2232.6	2232.6	431.0
9	126.6	79.9	2263.8	2259.2	359.6
10	128.0	79.8	2266.7	2257.3	359.3
11	128.2	79.8	2267.7	2257.7	359.4
12	136.5	79.6	2408.3	2385.9	379.8
13	153.6	79.7	2644.0	2624.4	417.8
14	163.3	80.0	2745.5	2743.0	436.6
15	166.2	80.1	2776.2	2776.2	536.0
16	169.4	80.4	2791.9	2791.9	539.0
17	173.8	80.7	2761.2	2761.2	143.1
18	186.0	82.1	2797.2	2797.2	540.0
19	195.0	83.2	2783.0	2783.0	537.3
20	203.9	84.7	2778.0	2778.0	523.4
21	220.5	88.1	2743.3	2743.3	517.2
22	237.0	92.3	2640.9	2640.9	498.9
23	253.6	97.3	2477.6	2477.6	469.6
24	269.9	103.3	2276.1	2276.1	433.6
25	283.3	108.8	2087.2	2087.2	399.7
26	292.5	113.0	1931.6	1931.6	371.9
27	304.6	119.2	1706.4	1706.4	331.5
28	318.1	126.7	1440.2	1440.2	283.9
29	331.2	134.9	1165.1	1165.1	234.6
20	342.5	142.4	927.2	927.2	192.0
31	347.3	145.8	822.2	822.2	173.2
32	355.4	152.1	608.4	608.4	138.2
33	362.9	158.8	360.2	360.2	138.2
34	368.8	163.0	271.2	271.2	138.2
35	374.6	168.1	137.6	117.6	26.6

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =        .02  (=  .177E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION   =        .02  (=  .201E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN  =     -25.49  (= -.255E+02)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM    =        .00  (=  .474E-02)
     SHOULD NOT EXCEED      .100E+03
```

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 39

```
*****************************************************************
*  Final Results for Side Forces and Stresses Between Slices.   *
*  (Results for Critical Shear Surface in Case of a Search.)    *
*****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 3.627 Side Force Inclination = 10.96 Degrees

-------------- VALUES AT RIGHT SIDE OF SLICE --------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	48.0	400.	94.4	.390	49.9	244.5
2	65.4	6016.	93.0	.594	1268.6	356.2
3	80.0	13352.	91.9	.603	2038.7	479.0
4	80.9	13857.	91.8	.591	1948.4	568.2
5	89.8	19499.	91.2	.504	1342.0	1280.2
6	107.6	31671.	90.7	.431	853.9	2045.8
7	108.4	32178.	90.7	.430	842.4	2067.0
8	125.2	42662.	91.1	.407	675.6	2195.2
9	128.0	44044.	91.3	.406	673.2	2400.6
10	128.1	44082.	91.3	.406	673.1	2400.7
11	128.4	44232.	91.3	.406	672.8	2401.2
12	144.6	51431.	92.6	.402	638.5	2451.9
13	162.5	57801.	94.5	.396	583.0	2510.5
14	164.0	58230.	94.6	.396	578.5	2513.8
15	168.4	59838.	95.1	.392	543.9	2565.1
16	170.5	60568.	95.3	.390	528.0	2587.8
17	177.1	59939.	96.8	.401	611.7	2386.2
16	195.0	63553.	99.3	.388	489.9	2514.5
19	195.0	63561.	99.3	.388	489.5	2514.8
20	212.7	64202.	102.5	.379	407.0	2534.7
21	226.4	62508.	106.0	.374	348.5	2492.3
22	245.7	58269.	110.5	.370	295.8	2384.9
23	261.5	52438.	115.2	.367	254.8	2236.8
24	278.2	44607.	120.8	.366	217.3	2032.2
25	288.4	39184.	124.6	.365	198.0	1882.8
26	296.6	34550.	127.8	.365	183.1	1750.1
27	312.5	25350.	134.6	.365	152.5	1470.0
28	323.8	18897.	139.8	.365	131.7	1249.1
29	338.8	10890.	147.4	.366	101.6	923.7
30	346.2	7403.	151.6	.375	104.1	727.7
31	348.4	6457.	152.8	.381	110.7	660.9
32	362.5	1605.	162.0	.486	162.3	191.0
33	365.4	1137.	163.9	.542	192.3	115.0
34	372.3	458.	167.7	.560	203.7	95.3
35	376.9	0.	16417.4	ABOVE	.0	.0

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =        .02  (=  .177E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION   =        .02  (=  .201E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN  =     -25.49  (= -.255E+02)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM    =        .00  (=  .474E-02)
     SHOULD NOT EXCEED      .100E+03
```

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED

C_CIR.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.360

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175


MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80


ANAlysis/computation data follow -
Circle
214.324 296.218 277.114
PROCEDURE
SPENCER
FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

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```
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          TABLE NO. 1
          ****************************************
          * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
          * Originally Coded By Stephen G. Wright  *
          * Version No. 1.206                      *
          * Last Revision Date  6/ 4/96            *
          * (C) Copyright 1985-1996 S. G. Wright   *
          * All Rights Reserved                    *
          ****************************************

          ************************************************************
          *                                                          *
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          * PROGRAM SHOULD NOT BE USED FOR DESIGN PURPOSES UNLESS THEY *
          * HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL   *
          * DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE   *
          * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER  *
          * PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS      *
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          STABILITY ANALYSES - 98 FEET
          CIRCULAR; RS 03/18/2002

          TABLE NO.  2
          ************************
          * NEW PROFILE LINE DATA *
          ************************

          PROFILE LINE  1 - MATERIAL TYPE =  1
          HAWTHORNE - MAT. 1

               Point      X              Y

                 1       -500.000       -80.000
                 2       1200.000       -80.000

          PROFILE LINE  2 - MATERIAL TYPE =  2
          SAND - MAT. 2

               Point      X              Y

                 1       -500.000        80.000
                 2       1200.000        80.000

          PROFILE LINE  3 - MATERIAL TYPE =  3
          BERM - MAT. 3

               Point      X              Y

                 1           .000        80.000
                 2         48.000        96.000
                 3         80.000        96.000
                 4        128.000        80.000
                 5       1200.000        90.880

          PROFILE LINE  4 - MATERIAL TYPE =  4
          LINER - MAT. 4

               Point      X              Y

                 1         80.000        96.000
                 2         80.904        96.226
                 3        128.079        80.501
                 4       1200.000        91.380

          PROFILE LINE  5 - MATERIAL TYPE =  5
          PROTECTIVE LAYER - MAT. 5

               Point      X              Y

                 1         80.904        96.226
                 2         89.819        95.362
                 3        128.394        82.504
                 4       1200.000        93.380

          PROFILE LINE  6 - MATERIAL TYPE =  6
          FINAL COVER - MAT. 6

               Point      X              Y

                 1         80.904        96.226
                 2        408.369       178.000
                 3       1200.000       178.000

          PROFILE LINE  7 - MATERIAL TYPE =  7
          MSW A - MAT. 7

               Point      X              Y

                 1         89.819        95.362
                 2        108.369       100.000
                 3       1200.000       100.000

          PROFILE LINE  8 - MATERIAL TYPE =  8
          MSW B - MAT. 8

               Point      X              Y

                 1        108.369       100.000
                 2        168.369       115.000
                 3       1200.000       115.000

          PROFILE LINE  9 - MATERIAL TYPE =  9
          MSW C - MAT. 9

               Point      X              Y

                 1        168.369       115.000
                 2        228.369       130.000
                 3       1200.000       130.000

          PROFILE LINE 10 - MATERIAL TYPE = 10
          MSW D - MAT. 10

               Point      X              Y

                 1        228.369       130.000
                 2        288.369       145.000
                 3       1200.000       145.000

          PROFILE LINE 11 - MATERIAL TYPE = 11
          MSW E - MAT. 11

               Point      X              Y

                 1        288.369       145.000
                 2        348.369       160.000
                 3       1200.000       160.000

          PROFILE LINE 12 - MATERIAL TYPE = 12
          MSW F - MAT. 12

               Point      X              Y

                 1        348.369       160.000
                 2        408.369       175.000
                 3       1200.000       175.000

          All new profile lines defined - No old lines retained
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          TABLE NO.  3
          *********************************************************************
          * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
          *********************************************************************

          DATA FOR MATERIAL TYPE  1
          HAWTHORNE - MAT. 1

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  2
          SAND - MAT. 2

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  3
          BERM - MAT. 3

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  4
          LINER - MAT. 4

               Unit weight of material =  110.000

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point     Normal Stress     Shear Stress

                 1          -1000.000            .000
                 2               .000            .000
                 3           2005.000         429.000
                 4           5013.000         767.000
                 5          10025.000        1143.000
                 6          15038.000        1594.000
                 7          18000.000        1908.000

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  5
          PROTECTIVE LAYER - MAT. 5

               Unit weight of material =  110.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  6
          FINAL COVER - MAT. 6

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  7
          MSW A - MAT. 7

               Unit weight of material =   67.500

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point     Normal Stress     Shear Stress

                 1          -1000.000            .000
                 2             -1.000            .000
                 3               .000         501.240
                 4            208.850         501.240
                 5            417.700         501.240
                 6            626.550         501.240
                 7            835.400         636.867
                 8           5221.250        3485.036

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  8
          MSW B - MAT. 8

               Unit weight of material =   63.100

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point     Normal Stress     Shear Stress

                 1          -1000.000            .000
                 2           -100.000            .000
                 3               .000         501.240
                 4            208.850         501.240
                 5            417.700         501.240
                 6            626.550         501.240
```

C_CIR.OUT

7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 9
MSW C - MAT. 9

Unit weight of material = 58.500

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

Unit weight of material = 53.400

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

Unit weight of material = 48.100

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

Unit weight of material = 22.600

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

All new material properties defined - No old data retained
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CIRCULAR; RS 03/18/2002

TABLE NO. 5
****
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
****

Line No.	Point	X	Y	
1 - Unit weight of water =			62.40	PHREATIC
1	1	-500.000	80.000	PHREATIC
1	2	1000.000	80.000	PHREATIC

All new piezometric lines defined - No old lines retained
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TABLE NO. 15
****
* NEW ANALYSIS/COMPUTATION DATA *
****

Circular Shear Surface(s)

Computations Performed for Single Shear Surface

Center Coordinates for Center of Circle -
X = 214.324
Y = 296.218
Radius = 277.114

Procedure used to compute the factor of safety: SPENCER

Initial trial estimate for the factor of safety = 3.000

Maximum number of iterations allowed for
calculating the factor of safety = 100

Short form of output will be used for search

THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination = 15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence = 100.000

Allowed moment imbalance for convergence = 100.000

Maximum subtended angle to be used for subdivision of the
circle into slices = 3.00 degrees

Depth of crack = .000

Depth of water in crack = .000

Unit weight of water in crack = 62.400

Seismic coefficient = .000

Conventional (single-stage) computations to be performed
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CIRCULAR; RS 03/18/2002

TABLE NO. 16
****
* NEW SLOPE GEOMETRY DATA *
****

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

Point	X	Y
1	-500.000	80.000
2	.000	80.000
3	48.000	96.000
4	80.000	96.000
5	80.904	96.226
6	408.369	178.000
7	1200.000	178.000

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	29.4	89.8					
1	35.0	85.1	8676.3	3	.00	35.00	.0
	40.5	80.4					
2	40.7	80.2	820.1	3	.00	35.00	.0
	41.0	80.0					
3	44.5	77.3	14650.4	2	.00	30.00	169.5
	48.0	74.6					
4	53.9	70.4	35811.9	2	.00	30.00	601.0
	59.8	66.2					
5	66.0	62.3	48486.3	2	.00	30.00	1105.6
	72.1	58.4					
6	76.0	56.1	36960.5	2	.00	30.00	1490.3
	80.0	53.8					
7	80.5	53.6	4491.5	2	.00	30.00	1648.2
	80.9	53.3					
8	85.4	51.0	48147.5	2	.00	30.00	1810.1
	89.8	48.6					
9	96.4	45.6	80657.3	2	.00	30.00	2149.1
	102.9	42.5					
10	105.7	41.3	35930.9	2	.00	30.00	2413.9
	108.4	40.2					
11	115.1	37.6	95420.4	2	.00	30.00	2648.1
	121.9	35.0					
12	125.0	33.9	45298.9	2	.00	30.00	2874.8
	128.0	32.9					
13	128.0	32.9	597.2	2	.00	30.00	2940.3
	128.1	32.9					
14	128.2	32.8	2383.9	2	.00	30.00	2944.3
	128.4	32.8					
15	135.3	30.7	110204.1	2	.00	30.00	3076.6
	142.3	28.6					
16	149.4	26.9	121096.5	2	.00	30.00	3311.8
	156.4	25.2					
17	162.4	24.1	109193.6	2	.00	30.00	3489.2
	168.4	22.9					
18	175.6	21.9	137612.0	2	.00	30.00	3623.8
	182.7	20.9					
19	190.0	20.3	144338.5	2	.00	30.00	3727.0
	197.2	19.6					
20	204.4	19.4	149477.2	2	.00	30.00	3783.0
	211.7	19.1					

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	211.7	19.1					
21	213.0	19.1	27632.7	2	.00	30.00	3799.5
	214.3	19.1					
22	221.3	19.3	148542.3	2	.00	30.00	3788.8
	228.4	19.5					
23	235.6	20.0	154747.9	2	.00	30.00	3742.9
	242.8	20.6					
24	250.0	21.5	154317.5	2	.00	30.00	3649.8
	257.2	22.4					
25	264.4	23.8	152203.7	2	.00	30.00	3509.7
	271.5	25.1					
26	278.5	26.7	148450.5	2	.00	30.00	3321.0
	285.6	28.4					
27	287.0	28.8	28761.1	2	.00	30.00	3194.6
	288.4	29.2					
28	295.3	31.3	141768.6	2	.00	30.00	3038.9
	302.2	33.4					

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29	309.1	35.9	134440.6	2	.00	30.00	2751.7
	315.9	38.4					
30	322.6	41.2	125790.1	2	.00	30.00	2420.1
	329.2	44.1					
31	335.8	47.2	115960.5	2	.00	30.00	2044.8
	342.3	50.4					
32	345.3	52.0	51578.5	2	.00	30.00	1744.4
	348.4	53.7					
33	354.6	57.4	99137.3	2	.00	30.00	1413.0
	360.9	61.0					
34	366.9	65.0	86190.3	2	.00	30.00	934.4
	373.0	69.0					
35	378.8	73.3	72800.9	2	.00	30.00	416.3
	384.7	77.6					
36	386.2	78.8	16896.9	2	.00	30.00	73.7
	387.7	80.0					
37	389.3	81.3	17611.5	3	.00	35.00	.0
	390.9	82.7					
38	391.2	82.9	3173.4	4	NONLINEAR ENVELOPE		.0
	391.5	83.2					
39	392.7	84.2	12190.8	5	.00	35.00	.0
	393.9	85.2					
40	399.3	90.0	50391.2	7	NONLINEAR ENVELOPE		.0
	404.7	94.9					

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TABLE NO. 26

```
****************************************************************
*  Coordinate, Height, Strength and Pore Water Pressure        *
*  Information for Individual Slices for Conventional          *
*  Computations or First Stage of Multi-Stage Computations.    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                               *
****************************************************************
```

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	404.7	94.9					
41	406.6	96.6	15462.2	7	NONLINEAR ENVELOPE		.0
	408.4	98.4					
42	409.2	99.2	6703.8	7	NONLINEAR ENVELOPE		.0
	410.0	100.0					
43	415.0	105.3	37143.2	8	NONLINEAR ENVELOPE		.0
	420.0	110.5					
44	422.0	112.8	12854.8	8	NONLINEAR ENVELOPE		.0
	424.0	115.0					
45	428.6	120.6	25482.8	9	NONLINEAR ENVELOPE		.0
	433.2	126.2					
46	434.6	128.1	6726.3	9	NONLINEAR ENVELOPE		.0
	436.1	130.0					
47	440.3	135.9	15997.9	10	NONLINEAR ENVELOPE		.0
	444.4	141.8					
48	445.5	143.4	3151.5	10	NONLINEAR ENVELOPE		.0
	446.5	145.0					
49	450.3	151.2	8531.9	11	NONLINEAR ENVELOPE		.0
	454.1	157.4					
50	454.9	158.7	1150.6	11	NONLINEAR ENVELOPE		.0
	455.6	160.0					
51	459.0	166.4	3767.5	12	NONLINEAR ENVELOPE		.0
	462.4	172.8					
52	463.0	173.9	413.1	12	NONLINEAR ENVELOPE		.0
	463.5	175.0					
53	464.2	176.5	258.7	6	.00	35.00	.0
	465.0	178.0					

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TABLE NO. 27

```
****************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for      *
*  Individual Slices for Conventional  Computations or the     *
*  First Stage of Multi-Stage Computations.                    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                               *
****************************************************************
```

				FORCES DUE TO SURFACE PRESSURES			
Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
1	35.0	0.	88.4	0.	0.	.0	.0
2	40.7	0.	86.9	0.	0.	.0	.0
3	44.5	0.	86.1	0.	0.	.0	.0
4	53.9	0.	83.3	0.	0.	.0	.0
5	66.0	0.	79.3	0.	0.	.0	.0
6	76.0	0.	76.3	0.	0.	.0	.0
7	80.5	0.	75.1	0.	0.	.0	.0
8	85.4	0.	74.3	0.	0.	.0	.0
9	96.4	0.	72.3	0.	0.	.0	.0
10	105.7	0.	70.4	0.	0.	.0	.0
11	115.1	0.	68.9	0.	0.	.0	.0
12	125.0	0.	67.5	0.	0.	.0	.0
13	128.0	0.	67.1	0.	0.	.0	.0
14	128.2	0.	67.1	0.	0.	.0	.0
15	135.3	0.	66.7	0.	0.	.0	.0
16	149.4	0.	66.0	0.	0.	.0	.0
17	162.4	0.	65.7	0.	0.	.0	.0
18	175.6	0.	65.8	0.	0.	.0	.0
19	190.0	0.	66.2	0.	0.	.0	.0
20	204.4	0.	67.0	0.	0.	.0	.0
21	213.0	0.	67.6	0.	0.	.0	.0
22	221.3	0.	68.5	0.	0.	.0	.0
23	235.6	0.	70.2	0.	0.	.0	.0
24	250.0	0.	72.2	0.	0.	.0	.0
25	264.4	0.	74.7	0.	0.	.0	.0
26	278.5	0.	77.6	0.	0.	.0	.0
27	287.0	0.	79.6	0.	0.	.0	.0
28	295.3	0.	81.7	0.	0.	.0	.0
29	309.1	0.	85.5	0.	0.	.0	.0
30	322.6	0.	89.8	0.	0.	.0	.0
31	335.8	0.	94.7	0.	0.	.0	.0
32	345.3	0.	98.6	0.	0.	.0	.0
33	354.6	0.	102.6	0.	0.	.0	.0
34	366.9	0.	108.5	0.	0.	.0	.0
35	378.8	0.	115.2	0.	0.	.0	.0
36	386.2	0.	120.1	0.	0.	.0	.0
37	389.3	0.	122.5	0.	0.	.0	.0
38	391.2	0.	124.1	0.	0.	.0	.0
39	392.7	0.	125.3	0.	0.	.0	.0

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TABLE NO. 27

```
****************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for      *
*  Individual Slices for Conventional  Computations or the     *
*  First Stage of Multi-Stage Computations.                    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                               *
****************************************************************
```

				FORCES DUE TO SURFACE PRESSURES			
Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
40	399.3	0.	129.4	0.	0.	.0	.0
41	406.6	0.	133.8	0.	0.	.0	.0
42	409.2	0.	135.4	0.	0.	.0	.0
43	415.0	0.	138.9	0.	0.	.0	.0
44	422.0	0.	143.2	0.	0.	.0	.0
45	428.6	0.	147.7	0.	0.	.0	.0
46	434.6	0.	152.1	0.	0.	.0	.0
47	440.3	0.	156.6	0.	0.	.0	.0
48	445.5	0.	161.2	0.	0.	.0	.0
49	450.3	0.	165.9	0.	0.	.0	.0
50	454.9	0.	171.1	0.	0.	.0	.0
51	459.0	0.	174.5	0.	0.	.0	.0
52	463.0	0.	176.4	0.	0.	.0	.0
53	464.2	0.	177.3	0.	0.	.0	.0

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TABLE NO. 29

```
******************************************************************
*  Information Generated During Iterative Solution for the Factor *
*  of Safety and Side Force Inclination by Spencer's Procedure    *
******************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment               Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F    Theta
ation  Safety    (degrees)     (lbs.)   (ft.-lbs.)            (degrees)

   1   3.00000    15.0000  -.2955E+06   .1847E+06
First-order corrections to F and THETA .........   .442E+00 -.137E+02
Values factored by  .628E+00 - Deltas too large    .278E+00 -.859E+01

   2   3.27776     6.4056  -.1411E+06   .3616E+07
First-order corrections to F and THETA .........   .934E+00 -.336E+00
Values factored by  .535E+00 - Deltas too large    .500E+00 -.180E+00

   3   3.77776     6.2257  -.7554E+05   .1847E+07
First-order corrections to F and THETA .........   .677E+00 -.874E-01
Values factored by  .739E+00 - Deltas too large    .500E+00 -.646E-01

   4   4.27776     6.1611  -.2622E+05   .6126E+06
First-order corrections to F and THETA .........   .304E+00 -.121E-01
Second-order correction - Iteration   1 ........   .329E+00 -.121E-01
Second-order correction - Iteration   2 ........   .329E+00 -.121E-01

   5   4.60713     6.1490   .1582E+03  -.4790E+04
First-order corrections to F and THETA .........  -.207E-02  .526E-03
Second-order correction - Iteration   1 ........  -.207E-02  .533E-03

   6   4.60506     6.1495  -.1094E+00   .1553E+02
First-order corrections to F and THETA .........   .751E-06 -.550E-05
```

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was 40.987 - at slice 48
Material: 10 Normal stress: 1162.631
Strength from previous trial: 501.240
Estimated strength for new trial: 849.371

TABLE NO. 29

```
******************************************************************
*  Information Generated During Iterative Solution for the Factor *
*  of Safety and Side Force Inclination by Spencer's Procedure    *
******************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment               Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F    Theta
ation  Safety    (degrees)     (lbs.)   (ft.-lbs.)            (degrees)

   1   4.60506     6.1495  -.9176E+03   .9090E+05
First-order corrections to F and THETA .........   .849E-02 -.297E-01
Second-order correction - Iteration   1 ........   .851E-02 -.297E-01
Second-order correction - Iteration   2 ........   .851E-02 -.297E-01

   2   4.61357     6.1198   .8578E-01  -.7510E+02
First-order corrections to F and THETA .........   .289E-05  .309E-04
```

For trial number 3 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 49
Material: 11 Normal stress: 786.596
Strength from previous trial: 605.174
Estimated strength for new trial: 605.174

TABLE NO. 29

```
******************************************************************
*  Information Generated During Iterative Solution for the Factor *
*  of Safety and Side Force Inclination by Spencer's Procedure    *
******************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment               Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F    Theta
ation  Safety    (degrees)     (lbs.)   (ft.-lbs.)            (degrees)

   1   4.61357     6.1198   .8578E-01  -.7510E+02
First-ordar corrections to F and THETA .........   .289E-05  .309E-04

Factor of Safety - - - - - - - - -     4.614
Side Force Inclination - - - - -        6.12
Number of Iterations - - - - - -       1
```

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TABLE NO. 38

```
****************************************************************
*  Final Results for Stresses Along the Shear Surface          *
*  (Results for Critical Shear Surface in Case of a Search.)   *
****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 4.614 Side Force Inclination = 6.12 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	35.0	85.1	1027.6	1027.6	156.0
2	40.7	80.2	2069.0	2069.0	314.0
3	44.5	77.3	2571.5	2402.1	300.6
4	53.9	70.4	3610.5	3009.5	376.6
5	66.0	62.3	4593.5	3488.0	436.5
6	76.0	56.1	5323.0	3832.6	479.6
7	80.5	53.6	5629.9	3981.7	498.3
8	85.4	51.0	6082.2	4272.1	534.6
9	96.4	45.6	6826.8	4677.7	585.4

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10	105.7	41.3	7284.3	4870.4	609.5
11	115.1	37.6	7667.5	5019.4	628.1
12	125.0	33.9	8026.7	5151.9	644.7
13	128.0	32.9	8127.9	5187.6	649.2
14	128.2	32.8	8134.8	5190.5	649.5
15	135.3	30.7	8468.1	5391.5	674.7
16	149.4	26.9	9072.3	5760.5	720.9
17	162.4	24.1	9546.8	6057.6	758.1
18	175.6	21.9	9926.0	6302.2	788.7
19	190.0	20.3	10244.0	6517.0	815.6
20	204.4	19.4	10469.4	6686.4	836.7
21	213.0	19.1	10570.0	6770.5	847.3
22	221.3	19.3	10617.3	6828.5	854.5
23	235.6	20.0	10636.2	6893.3	862.6
24	250.0	21.5	10559.4	6909.6	864.7
25	264.4	23.8	10395.9	6886.2	861.7
26	278.5	26.7	10147.6	6824.6	854.0
27	287.0	28.8	9969.3	6774.6	847.8
28	295.3	31.3	9722.9	6694.0	837.7
29	309.1	35.9	9288.8	6537.0	818.1
30	322.6	41.2	8768.0	6347.9	794.4
31	335.8	47.2	8173.5	6128.7	767.0
32	345.3	52.0	7696.3	5952.0	744.8
33	354.6	57.4	7132.0	5719.0	715.7
34	366.9	65.0	6301.2	5366.8	671.6
35	378.8	73.3	5413.7	4997.5	625.4
36	386.2	78.8	4833.8	4760.1	595.7
37	389.3	81.3	4498.3	4498.3	682.7
38	391.2	82.9	4666.0	4666.0	161.6
39	392.7	84.2	4217.2	4217.2	640.0

1

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
40	399.3	90.0	3851.7	3851.7	562.6
41	406.6	96.6	3468.7	3468.7	508.7
42	409.2	99.2	3318.3	3318.3	487.5
43	415.0	105.3	2966.4	2966.4	438.0
44	422.0	112.8	2544.0	2544.0	378.5
45	428.6	120.6	2134.5	2134.5	320.9
46	434.6	128.1	1761.6	1761.6	268.4
47	440.3	135.9	1408.1	1408.1	218.7
48	445.5	143.4	1085.5	1085.5	173.2
49	450.3	151.2	786.6	786.6	131.2
50	454.9	158.7	491.9	491.9	108.6
51	459.0	166.4	300.3	300.3	108.6
52	463.0	173.9	144.1	144.1	108.6
53	464.2	176.5	118.1	118.1	17.9

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =           .08  (=  .795E-01)
     SHOULD NOT EXCEED       .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION   =           .25  (=  .246E+00)
     SHOULD NOT EXCEED       .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN  =         82.63  (=  .826E+02)
     SHOULD NOT EXCEED       .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM    =           .02  (=  .226E-01)
     SHOULD NOT EXCEED       .100E+03
```

1

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TABLE NO. 39
**************************************************************
*  Final Results for Side Forces and Stresses Between Slices.  *
*  (Results for Critical Shear Surface in Case of a Search.)   *
**************************************************************

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety =  4.614      Side Force Inclination =   6.12 Degrees
```

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	40.5	11443.	85.7	.404	371.1	1368.7
2	41.0	12469.	85.3	.380	298.7	1515.7
3	48.0	28633.	81.3	.315	-147.4	2804.2
4	59.8	63619.	76.2	.337	44.0	4196.8
5	72.1	104895.	71.8	.356	378.9	5168.4
6	80.0	133136.	69.2	.365	595.1	5684.0
7	80.9	136413.	68.9	.364	579.3	5745.6
8	89.8	169885.	66.3	.354	415.9	6367.4
9	102.9	220023.	62.8	.343	213.6	7169.9
10	108.4	240283.	61.5	.340	147.3	7446.3
11	121.9	288896.	58.8	.334	12.6	8022.1
12	128.0	309578.	57.8	.332	-39.4	8237.4
13	228.1	309841.	57.8	.332	-40.0	8240.1
14	128.4	310889.	57.7	.332	-42.6	8350.5
15	142.3	355551.	55.7	.327	-163.6	8689.4
16	156.4	396824.	54.2	.322	-293.0	9075.2
17	168.4	427873.	53.2	.318	-400.6	9345.2
18	182.7	459539.	52.6	.314	-521.9	9592.8
19	197.2	484539.	52.4	.310	-632.3	9754.4
20	211.7	502193.	52.8	.307	-730.1	9828.0
21	214.3	504576.	52.9	.306	-746.4	9831.9
22	228.4	512843.	53.8	.303	-824.9	9803.1
23	242.8	513472.	55.4	.300	-890.4	9686.2
24	257.2	506126.	57.4	.297	-939.0	9482.2
25	271.5	491097.	60.0	.294	-969.8	9193.4
26	285.6	468892.	63.1	.292	-981.6	8822.8
27	288.4	463715.	63.8	.291	-981.6	8740.2
28	302.2	433889.	67.6	.289	-969.7	8277.0
29	315.9	398755.	71.9	.287	-937.4	7742.8
30	329.2	359441.	76.7	.286	-884.4	7144.1
31	342.3	317223.	82.2	.286	-810.4	6489.3
32	348.4	296470.	84.9	.206	-767.7	6159.9
33	360.9	252769.	91.2	.287	-669.1	5451.2
34	373.0	210297.	97.9	.288	-566.7	4742.7
35	384.7	170732.	105.0	.289	-475.2	4070.1
36	387.7	161033.	106.9	.289	-455.0	3904.8
37	390.9	151210.	108.9	.288	-448.2	3753.4
38	391.5	148934.	109.3	.289	-436.8	3705.0
39	393.9	141896.	110.9	.288	-433.6	3597.0
40	404.7	110470.	118.1	.282	-408.7	3081.1

1

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
41	408.4	100137.	120.7	.281	-395.7	2896.8
42	410.0	95542.	121.9	.281	-380.5	2816.3
43	420.0	68592.	129.8	.285	-290.2	2311.3
44	424.0	58615.	133.1	.288	-252.2	2102.5
45	433.2	37495.	141.5	.294	-169.0	1609.0
46	436.1	31578.	144.3	.298	-139.5	1447.8
47	444.4	16668.	153.2	.311	-60.6	977.1
48	446.5	13574.	155.5	.320	-33.8	851.8
49	454.1	4798.	165.1	.374	57.0	405.3
50	455.6	3657.	167.3	.404	85.8	318.3
51	462.4	529.	175.3	.474	85.7	117.3
52	463.5	330.	176.2	.415	53.9	165.0
53	465.0	0.	655.7	ABOVE	.0	.0

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =           .08  (=  .795E-01)
     SHOULD NOT EXCEED       .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION   =           .25  (=  .246E+00)
     SHOULD NOT EXCEED       .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN  =         82.63  (=  .826E+02)
     SHOULD NOT EXCEED       .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM    =           .02  (=  .226E-01)
     SHOULD NOT EXCEED       .100E+03

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED
```

Attachment 2

CASE 2

UTEXAS3 Computer Data Files

Final Configuration Non-Circular Shear Surfaces

- Surface 2-A: File A_NC.DAT
- Surface 2-B: File B_NC.DAT
- Surface 2-C: File C_NC.DAT

A_NC.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175

MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
     115
     Conventional Shear Strength
     0 30
     Piezometric Line
     1
2 SAND - MAT. 2
     115
     Conventional Shear Strength
     0 30
     Piezometric Line
     1
3 BERM - MAT. 3
     120
     Conventional Shear Strength
     0 35
     Piezometric Line
     1
4 LINER - MAT. 4
     110
     Nonlinear Mohr-Coulomb
     -1000 0
     0 0
     2005 429
     5013 787
     10025 1143
     15038 1594
     18000 1908

     Piezometric Line
     1
5  PROTECTIVE LAYER - MAT. 5
     110
     Conventional Shear Strength
     0 35
     Piezometric Line
     1
6 FINAL COVER - MAT. 6
     120
     Conventional Shear Strength
     0 35
     Piezometric Line
     1
7 MSW-A - MAT. 7
     67.5
     Nonlinear Mohr-Coulomb
     -1000 0
     -1 0
     0 501.24
     208.85 501.24
     417.7 501.24
     626.55 501.24
     835.4 616.86719
     5221.25 3485.03818

     Piezometric Line
     1
8 MSW B - MAT. 8
     63.1
     Nonlinear Mohr-Coulomb
     -1000 0
     -100 0
     0 501.24
     208.85 501.24
     417.7 501.24
     626.55 501.24
     835.4 636.86719
     5221.25 3485.03818

     Piezometric Line
     1
9 MSW C - MAT. 9
     58.5
     Nonlinear Mohr-Coulomb
     -1000 0
     -100 0
     0 501.24
     208.85 501.24
     417.7 501.24
     626.55 501.24
     835.4 636.86719
     5221.25 3485.03818

     Piezometric Line
     1
10 MSW D - MAT. 10
     53.4
     Nonlinear Mohr-Coulomb
     -1000 0
     -100 0
     0 501.24
     208.85 501.24
     417.7 501.24
     626.55 501.24
     835.4 636.86719
     5221.25 3485.03818

     Piezometric Line
     1
11 MSW E - MAT. 11
     48.1
     Nonlinear Mohr-Coulomb
     -1000 0
     -100 0
     0 501.24
     208.85 501.24
     417.7 501.24
     626.55 501.24
     835.4 636.86719
     5221.25 3485.03818

     Piezometric Line
     1
12 MSW F - MAT. 12
     22.6
     Nonlinear Mohr-Coulomb
     -1000 0
     -100 0
     0 501.24
     208.85 501.24
     417.7 501.24
     626.55 501.24
     835.4 636.86719
     5221.25 3485.03818

     Piezometric Line
     1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80

ANAlysis/computation data follow -
NonCircular
80.452 96.113
128.039 80.250
235.769 81.328
276.402 141

FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

A_NC.OUT

```
1         UTEXAS3 - VER. 1.206 -  6/ 4/96 - (C) 1985-1996 S. G. WRIGHT
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          Date:  3:27:2002   Time: 16:38:18   Input file: A_NC.DAT


          TABLE NO. 1
          ****************************************
          * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
          * Originally Coded By Stephen G. Wright  *
          * Version No. 1.206                      *
          * Last Revision Date  6/ 4/96            *
          * (C) Copyright 1985-1996 S. G. Wright   *
          * All Rights Reserved                    *
          ****************************************

          ***************************************************************
          *                                                             *
          *      RESULTS OF COMPUTATIONS PERFORMED USING THIS COMPUTER *
          * PROGRAM SHOULD NOT BE USED FOR DESIGN PURPOSES UNLESS THEY *
          * HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL   *
          * DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE   *
          * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER  *
          * PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS      *
          * PROGRAM BEFORE ATTEMPTING ITS USE.                         *
          *                                                             *
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          * OR ADAPTABILITY OF THIS COMPUTER PROGRAM.                  *
          *                                                             *
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          OAK HAMMOCK DISPOSAL FACILITY
          STABILITY ANALYSES - 98 FEET
          NON-CIRCULAR; RS 03/18/2002

          TABLE NO.  2
          ************************
          * NEW PROFILE LINE DATA *
          ************************

          PROFILE LINE  1 - MATERIAL TYPE =  1
          HAWTHORNE - MAT. 1

               Point       X              Y

                 1       -500.000        -80.000
                 2       1200.000        -80.000

          PROFILE LINE  2 - MATERIAL TYPE =  2
          SAND - MAT. 2

               Point       X              Y

                 1       -500.000         80.000
                 2       1200.000         80.000

          PROFILE LINE  3 - MATERIAL TYPE =  3
          BERM - MAT. 3

               Point       X              Y

                 1           .000         80.000
                 2         48.000         96.000
                 3         80.000         96.000
                 4        128.000         80.000
                 5       1200.000         90.880

          PROFILE LINE  4 - MATERIAL TYPE =  4
          LINER - MAT. 4

               Point       X              Y

                 1         80.000         96.000
                 2         80.904         96.226
                 3        128.079         80.501
                 4       1200.000         91.380

          PROFILE LINE  5 - MATERIAL TYPE =  5
          PROTECTIVE LAYER - MAT. 5

               Point       X              Y

                 1         80.904         96.226
                 2         89.819         95.362
                 3        128.394         82.504
                 4       1200.000         93.380

          PROFILE LINE  6 - MATERIAL TYPE =  6
          FINAL COVER - MAT. 6

               Point       X              Y

                 1         80.904         96.226
                 2        408.369        178.000
                 3       1200.000        178.000

          PROFILE LINE  7 - MATERIAL TYPE =  7
          MSW A - MAT. 7

               Point       X              Y

                 1         89.819         95.362
                 2        108.369        100.000
                 3       1200.000        100.000

          PROFILE LINE  8 - MATERIAL TYPE =  8
          MSW B - MAT. 8

               Point       X              Y

                 1        108.369        100.000
                 2        168.369        115.000
                 3       1200.000        115.000

          PROFILE LINE  9 - MATERIAL TYPE =  9
          MSW C - MAT. 9

               Point       X              Y

                 1        168.369        115.000
                 2        228.369        130.000
                 2       1200.000        130.000

          PROFILE LINE 10 - MATERIAL TYPE = 10
          MSW D - MAT. 10

               Point       X              Y

                 1        228.369        130.000
                 2        288.369        145.000
                 3       1200.000        145.000

          PROFILE LINE 11 - MATERIAL TYPE = 11
          MSW E - MAT. 11

               Point       X              Y

                 1        288.369        145.000
                 2        348.369        160.000
                 3       1200.000        160.000

          PROFILE LINE 12 - MATERIAL TYPE = 12
          MSW F - MAT. 12

               Point       X              Y

                 1        348.369        160.000
                 2        408.369        175.000
                 3       1200.000        175.000

          All new profile lines defined - No old lines retained
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          STABILITY ANALYSES - 98 FEET
          NON-CIRCULAR; RS 03/18/2002

          TABLE NO.  3
          ********************************************************************
          * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
          ********************************************************************

          DATA FOR MATERIAL TYPE  1
          HAWTHORNE - MAT. 1

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  2
          SAND - MAT. 2

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  3
          BERM - MAT. 3

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  4
          LINER - MAT. 4

               Unit weight of material =  110.000

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1          -1000.000              .000
                 2               .000              .000
                 3           2005.000           429.000
                 4           5013.000           787.000
                 5          10025.000          1143.000
                 6          15038.000          1594.000
                 7          18000.000          1908.000

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  5
          PROTECTIVE LAYER - MAT. 5

               Unit weight of material =  110.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  6
          FINAL COVER - MAT. 6

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  7
          MSW A - MAT. 7

               Unit weight of material =   67.500

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1          -1000.000              .000
                 2             -1.000              .000
                 3               .000           501.240
                 4            208.850           501.240
                 5            417.700           501.240
                 6            626.550           501.240
                 7            835.400           636.867
                 8           5221.250          3485.038

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  8
          MSW B - MAT. 8

               Unit weight of material =   63.100

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1          -1000.000              .000
                 2           -100.000              .000
                 3               .000           501.240
                 4            208.850           501.240
                 5            417.700           501.240
                 6            626.550           501.240
```

A_NC.OUT

```
    7           835.400          636.867
    8          5221.250         3485.038

  Pore water pressures defined by piezometric line
  Number of the piezometric line used =  1
  Negative pore pressures set to zero

DATA FOR MATERIAL TYPE  9
MSW C - MAT. 9

  Unit weight of material =   58.500

  ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
  Point     Normal Stress     Shear Stress

    1         -1000.000           .000
    2          -100.000           .000
    3              .000        501.240
    4           208.850        501.240
    5           417.700        501.240
    6           626.550        501.240
    7           835.400        636.867
    8          5221.250       3485.038

  Pore water pressures defined by piezometric line
  Number of the piezometric line used =  1
  Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

  Unit weight of material =   53.400

  ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
  Point     Normal Stress     Shear Stress

    1         -1000.000           .000
    2          -100.000           .000
    3              .000        501.240
    4           208.850        501.240
    5           417.700        501.240
    6           626.550        501.240
    7           835.400        636.867
    8          5221.250       3485.038

  Pore water pressures defined by piezometric line
  Number of the piezometric line used =  1
  Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

  Unir weight of material =   48.100

  ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
  Point     Normal Stress     Shear Stress

    1         -1000.000           .000
    2          -100.000           .000
    3              .000        501.240
    4           208.850        501.240
    5           417.700        501.240
    6           626.550        501.240
    7           835.400        636.867
    8          5221.250       3485.038

  Pore water pressures defined by piezometric line
  Number of the piezometric line used =  1
  Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

  Unit weight of material =   22.600

  ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
  Point     Normal Stress     Shear Stress

    1         -1000.000           .000
    2          -100.000           .000
    3              .000        501.240
    4           208.850        501.240
    5           417.700        501.240
    6           626.550        501.240
    7           835.400        636.867
    8          5221.250       3485.038

  Pore water pressures defined by piezometric line
  Number of the piezometric line used =  1
  Negative pore pressures set to zero

All new material properties defined - No old data retained
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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO.  5
*******************************************************************
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
*******************************************************************

Line
 No.   Point      X          Y

  1 - Unit weight of water =   62.40   PHREATIC
  1       1    -500.000    80.000   PHREATIC
  1       2    1000.000    80.000   PHREATIC

All new piezometric lines defined - No old lines retained
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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 15
*********************************
* NEW ANALYSIS/COMPUTATION DATA *
*********************************

Noncircular Shear Surface(s)

Computations Performed for Single Shear Surface


Shear Surface Coordinates -

    Point        X            Y

      1        80.452       96.113
      2       128.039       80.250
      3       235.769       81.328
      4       276.402      141.000

Initial trial estimate for the factor of safety =   3.000

Maximum number of iterations allowed for
calculating the factor of safety =  100

Short form of output will be used for search

------------------------------------------------------------------
THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination =  15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence =     100.000

Allowed moment imbalance for convergence =     100.000

Number of increments for slice subdivision =   30

Depth of water in crack =        .000

Unit weight of water in crack =    62.400

Seismic coefficient =  .000

Conventional (single-stage) computations to be performed

Procedure used to compute the factor of safety: SPENCER
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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 16
**************************
* NEW SLOPE GEOMETRY DATA *
**************************

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

   Point       X           Y

     1    -500.000      80.000
     2        .000      80.000
     3      48.000      96.000
     4      80.000      96.000
     5      80.904      96.226
     6     408.369     178.000
     7    1200.000     178.000
1 UTEXAS3 - VER. 1.206 -  6/ 4/96 - (C) 1985-1996 S. G. WRIGHT
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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 26
***********************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure    *
*  Information for Individual Slices for Conventional      *
*  Computations or First Stage of Multi-Stage Computations. *
*  (Information is for the Critical Shear Surface in the   *
*  Case of an Automatic Search.)                           *
***********************************************************

Slice                      Slice   Matl.              Friction    Pore
 No.      X        Y       Weight  Type   Cohesion      Angle    Pressure

         80.5     96.1
   1     80.7     96.0        6.6    4   NONLINEAR ENVELOPE          .0
         80.9     96.0
   2     83.1     95.2      800.9    4   NONLINEAR ENVELOPE          .0
         85.4     94.5
   3     87.6     93.7     2144.1    4   NONLINEAR ENVELOPE          .0
         89.8     93.0
   4     92.9     92.0     4658.0    4   NONLINEAR ENVELOPE          .0
         96.0     90.9
   5     99.1     89.9     6162.2    4   NONLINEAR ENVELOPE          .0
        102.2     88.9
   6    105.3     87.8     7666.4    4   NONLINEAR ENVELOPE          .0
        108.4     86.8
   7    110.8     86.0     7142.4    4   NONLINEAR ENVELOPE          .0
        113.3     85.2
   8    115.7     84.4     8063.5    4   NONLINEAR ENVELOPE          .0
        118.2     83.5
   9    120.6     82.7     8984.6    4   NONLINEAR ENVELOPE          .0
        123.1     81.9
  10    125.5     81.1     9905.7    4   NONLINEAR ENVELOPE          .0
        128.0     80.3
  11    128.0     80.3       82.4    4   NONLINEAR ENVELOPE          .0
        128.0     80.3
  12    128.1     80.3       84.5    4   NONLINEAR ENVELOPE          .0
        128.1     80.3
  13    128.2     80.3      665.9    4   NONLINEAR ENVELOPE          .0
        128.4     80.3
  14    131.2     80.3    12317.6    4   NONLINEAR ENVELOPE          .0
        134.1     80.3
  15    137.0     80.3    12809.1    4   NONLINEAR ENVELOPE          .0
        139.8     80.4
  16    142.7     80.4    13300.6    4   NONLINEAR ENVELOPE          .0
        145.5     80.4
  17    148.4     80.5    13792.1    4   NONLINEAR ENVELOPE          .0
        151.2     80.5
  18    154.1     80.5    14283.7    4   NONLINEAR ENVELOPE          .0
        156.9     80.5
  19    159.8     80.6    14775.2    4   NONLINEAR ENVELOPE          .0
        162.7     80.6
  20    165.5     80.6    15266.8    4   NONLINEAR ENVELOPE          .0
        168.4     80.7
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TABLE NO. 26
***********************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure    *
*  Information for Individual Slices for Conventional      *
*  Computations or First Stage of Multi-Stage Computations. *
*  (Information is for the Critical Shear Surface in the   *
*  Case of an Automatic Search.)                           *
***********************************************************

Slice                      Slice   Matl.              Friction    Pore
 No.      X        Y       Weight  Type   Cohesion      Angle    Pressure

        168.4     80.7
  21    171.4     80.7    16548.9    4   NONLINEAR ENVELOPE          .0
        174.4     80.7
  22    177.4     80.7    17050.1    4   NONLINEAR ENVELOPE          .0
        180.4     80.8
  23    183.4     80.8    17551.3    4   NONLINEAR ENVELOPE          .0
        186.4     80.8
  24    189.4     80.9    18052.5    4   NONLINEAR ENVELOPE          .0
        192.4     80.9
  25    195.4     80.9    18553.7    4   NONLINEAR ENVELOPE          .0
        198.4     81.0
  26    201.4     81.0    19054.8    4   NONLINEAR ENVELOPE          .0
        204.4     81.0
  27    207.4     81.0    19556.0    4   NONLINEAR ENVELOPE          .0
        210.4     81.1
```

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28	213.4	81.1	20057.2	4	NONLINEAR ENVELOPE		.0
	216.4	81.1					
29	219.4	81.2	20558.4	4	NONLINEAR ENVELOPE		.0
	222.4	81.2					
30	225.4	81.2	21059.6	4	NONLINEAR ENVELOPE		.0
	228.4	81.3					
31	230.2	81.3	13227.8	4	NONLINEAR ENVELOPE		.0
	233.1	81.3					
32	233.9	81.3	13401.0	4	NONLINEAR ENVELOPE		.0
	235.8	81.3					
33	235.9	81.5	662.3	4	NONLINEAR ENVELOPE		.0
	236.0	81.6					
34	236.6	82.6	4822.6	5	.00	35.00	.0
	237.3	83.6					
35	238.7	85.7	9196.4	7	NONLINEAR ENVELOPE		.0
	240.1	87.7					
36	241.5	89.8	8528.4	7	NONLINEAR ENVELOPE		.0
	242.9	91.8					
37	244.3	93.9	7860.3	7	NONLINEAR ENVELOPE		.0
	245.7	95.9					
38	247.1	98.0	7192.3	7	NONLINEAR ENVELOPE		.0
	248.5	100.0					
39	250.2	102.5	7908.6	8	NONLINEAR ENVELOPE		.0
	251.9	105.0					
40	253.6	107.5	6988.8	8	NONLINEAR ENVELOPE		.0
	255.3	110.0					

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NON-CIRCULAR; RS 03/18/2002

TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	255.3	110.0					
41	257.0	112.5	6069.0	8	NONLINEAR ENVELOPE		.0
	258.7	115.0					
42	260.4	117.5	5188.3	9	NONLINEAR ENVELOPE		.0
	262.1	120.0					
43	263.8	122.5	4346.8	9	NONLINEAR ENVELOPE		.0
	265.5	125.0					
44	267.2	127.5	3505.3	9	NONLINEAR ENVELOPE		.0
	268.9	130.0					
45	270.2	131.8	2059.0	10	NONLINEAR ENVELOPE		.0
	271.4	133.7					
46	272.7	135.5	1653.2	10	NONLINEAR ENVELOPE		.0
	273.9	137.3					
47	275.2	139.2	1247.3	10	NONLINEAR ENVELOPE		.0
	276.4	141.0					

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TABLE NO. 27
****
* Seismic Forces and Forces Due to Surface Pressures for *
* Individual Slices for Conventional Computations or the *
* First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

				FORCES DUE TO SURFACE PRESSURES			
Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
1	80.7	0.	96.1	0.	0.	.0	.0
2	83.1	0.	96.0	0.	0.	.0	.0
3	87.6	0.	95.9	0.	0.	.0	.0
4	92.9	0.	95.7	0.	0.	.0	.0
5	99.1	0.	95.5	0.	0.	.0	.0
6	105.3	0.	95.3	0.	0.	.0	.0
7	110.8	0.	95.1	0.	0.	.0	.0
8	115.7	0.	94.9	0.	0.	.0	.0
9	120.6	0.	94.7	0.	0.	.0	.0
10	125.5	0.	94.5	0.	0.	.0	.0
11	128.0	0.	94.4	0.	0.	.0	.0
12	128.1	0.	94.4	0.	0.	.0	.0
13	128.2	0.	94.4	0.	0.	.0	.0
14	131.2	0.	94.8	0.	0.	.0	.0
15	137.0	0.	95.5	0.	0.	.0	.0
16	142.7	0.	96.3	0.	0.	.0	.0
17	148.4	0.	97.0	0.	0.	.0	.0
18	154.1	0.	97.7	0.	0.	.0	.0
19	159.8	0.	98.5	0.	0.	.0	.0
20	165.5	0.	99.2	0.	0.	.0	.0
21	171.4	0.	99.9	0.	0.	.0	.0
22	177.4	0.	100.7	0.	0.	.0	.0
23	183.4	0.	101.4	0.	0.	.0	.0
24	189.4	0.	102.1	0.	0.	.0	.0
25	195.4	0.	102.9	0.	0.	.0	.0
26	201.4	0.	103.6	0.	0.	.0	.0
27	207.4	0.	104.4	0.	0.	.0	.0
28	213.4	0.	105.1	0.	0.	.0	.0
29	219.4	0.	105.9	0.	0.	.0	.0
30	225.4	0.	106.6	0.	0.	.0	.0
31	230.2	0.	107.2	0.	0.	.0	.0
32	233.9	0.	107.6	0.	0.	.0	.0
33	235.9	0.	108.0	0.	0.	.0	.0
34	236.6	0.	109.0	0.	0.	.0	.0
35	238.7	0.	111.1	0.	0.	.0	.0
36	241.5	0.	113.6	0.	0.	.0	.0
37	244.3	0.	116.1	0.	0.	.0	.0
38	247.1	0.	118.6	0.	0.	.0	.0
39	250.2	0.	121.4	0.	0.	.0	.0

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TABLE NO. 27
****
* Seismic Forces and Forces Due to Surface Pressures for *
* Individual Slices for Conventional Computations or the *
* First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

				FORCES DUE TO SURFACE PRESSURES			
Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
40	253.6	0.	124.4	0.	0.	.0	.0
41	257.0	0.	127.4	0.	0.	.0	.0
42	260.4	0.	130.4	0.	0.	.0	.0
43	263.8	0.	133.3	0.	0.	.0	.0
44	267.2	0.	136.2	0.	0.	.0	.0
45	270.2	0.	138.7	0.	0.	.0	.0
46	272.7	0.	140.7	0.	0.	.0	.0
47	275.2	0.	142.5	0.	0.	.0	.0

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TABLE NO. 29
****
* Information Generated During Iterative Solution for the Factor *
* of Safety and Side Force Inclination by Spencer's Procedure *
****

```
        Trial     Trial
        Factor   Side Force   Force      Moment                Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F    Theta
ation  Safety   (degrees)     (lbs.)    (ft.-lbs.)           (degrees)

   1  3.00000    15.0000   .1494E+05  -.3022E+05
First-order corrections to F and THETA .........  -.112E+01 -.317E+01
Values factored by  .445E+00 - Deltas too large   -.500E+00 -.141E+01

   2  2.50000    13.5894   .6686E+04   .8805E+05
First-order corrections to F and THETA .........  -.418E+00 -.287E+01
Second-order correction - Iteration   1 ........  -.365E+00 -.287E+01
Second-order correction - Iteration   2 ........  -.364E+00 -.287E+01
Second-order correction - Iteration   3 ........  -.364E+00 -.287E+01

   3  2.13603    10.7227  -.2113E+03   .8788E+05
First-order corrections to F and THETA .........  -.186E-01 -.764E+00
Second-order correction - Iteration   1 ........  -.184E-01 -.764E+00
Second-order correction - Iteration   2 ........  -.184E-01 -.764E+00

   4  2.11762     9.9590   .4246E-01  -.5522E+03
First-order corrections to F and THETA .........   .175E-03  .544E-02
Second-order correction - Iteration   1 ........   .175E-03  .545E-02

   5  2.11779     9.9645  -.2792E-02   .3142E+00
First-order corrections to F and THETA .........   .351E-07 -.156E-05
```

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was 41.482 - at slice 41
Material: 8 Normal stress: 1173.706
Strength from previous trial: 501.240
Estimated strength for new trial: 856.563

TABLE NO. 29
****
* Information Generated During Iterative Solution for the Factor *
* of Safety and Side Force Inclination by Spencer's Procedure *
****

```
        Trial     Trial
        Factor   Side Force   Force      Moment                Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F    Theta
ation  Safety   (degrees)     (lbs.)    (ft.-lbs.)           (degrees)

   1  2.11779     9.9645  -.1992E+04   .1387E+06
First-order corrections to F and THETA .........   .526E-01 -.301E+00
Second-order correction - Iteration   1 ........   .538E-01 -.301E+00
Second-order correction - Iteration   2 ........   .538E-01 -.301E+00

   2  2.17160     9.6633   .1006E+01  -.2379E+04
First-order corrections to F and THETA .........   .684E-03  .239E-01
Second-order correction - Iteration   1 ........   .684E-03  .239E-01

   3  2.17229     9.6872   .6520E-02   .2388E+00
First-order corrections to F and THETA .........  -.398E-06 -.629E-05
```

For trial number 3 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 38
Material: 7 Normal stress: 1538.605
Strength from previous trial: 1093.528
Estimated strength for new trial: 1093.529

TABLE NO. 29
****
* Information Generated During Iterative Solution for the Factor *
* of Safety and Side Force Inclination by Spencer's Procedure *
****

```
        Trial     Trial
        Factor   Side Force   Force      Moment                Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F    Theta
ation  Safety   (degrees)     (lbs.)    (ft.-lbs.)           (degrees)

   1  2.17229     9.6872   .6520E-02   .2388E+00
First-order corrections to F and THETA .........  -.398E-06 -.629E-05
```

Factor of Safety - - - - - - - - 2.172
Side Force Inclination - - - - - 9.69
Number of Iterations - - - - - - 1

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TABLE NO. 38
****
* Final Results for Stresses Along the Shear Surface *
* (Results for Critical Shear Surface in Case of a Search.) *
****

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 2.172 Side Force Inclination = 9.69 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	80.7	96.0	16.2	16.2	1.6
2	83.1	95.2	201.1	201.1	19.8
3	87.6	93.7	538.4	538.4	53.0
4	92.9	92.0	843.2	843.2	83.0
5	99.1	89.9	1115.4	1115.4	109.9
6	105.3	87.8	1387.7	1387.7	136.7
7	110.8	86.0	1628.9	1628.9	160.4
8	115.7	84.4	1839.0	1839.0	181.1
9	120.6	82.7	2048.0	2048.0	199.8
10	125.5	81.1	2253.0	2253.0	211.1
11	128.0	80.3	2356.3	2356.3	216.7
12	128.1	80.1	2143.1	2143.1	205.1
13	128.2	80.3	2143.1	2143.1	205.1
14	131.2	80.3	2186.5	2186.5	207.4
15	137.0	80.3	2273.2	2273.2	212.2
16	142.7	80.4	2359.9	2359.9	216.9
17	148.4	80.5	2446.6	2446.6	221.7
18	154.1	80.5	2533.3	2533.3	226.4
19	159.8	80.6	2620.0	2620.0	231.2
20	265.5	80.6	2706.6	2706.6	235.9
21	171.4	80.7	2792.0	2792.0	240.6
22	177.4	80.7	2878.2	2876.2	245.2
23	183.4	80.8	2960.3	2960.3	249.8

24	189.4	80.9	3044.4	3044.4	254.4
25	195.4	80.9	3128.6	3128.6	259.0
26	201.4	81.0	3212.7	3212.7	263.7
27	207.4	81.0	3296.8	3296.8	268.3
28	213.4	81.1	3380.9	3380.9	272.9
29	219.4	81.2	3465.1	3465.1	277.5
30	225.4	81.2	3549.2	3549.2	282.1
31	230.2	81.3	3614.8	3614.8	285.7
32	233.9	81.3	3662.0	3662.0	288.3
33	235.9	81.5	2661.6	2661.6	233.5
34	236.6	82.6	2107.2	2107.2	679.2
35	238.7	85.7	1976.9	1976.9	634.4
36	241.5	89.8	1830.8	1830.8	590.8
37	244.3	93.9	1684.7	1684.7	547.1
38	247.1	98.0	1538.6	1538.6	503.4
39	250.2	102.5	1383.1	1383.1	456.9

1

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
40	253.6	107.5	1218.2	1218.2	407.6
41	257.0	112.5	1053.4	1053.4	358.3
42	260.4	117.5	895.5	895.5	311.2
43	263.8	122.5	744.7	744.7	266.1
44	267.2	127.5	583.7	583.7	230.7
45	270.2	131.0	419.9	419.9	230.7
46	272.7	135.5	290.0	290.0	230.7
47	275.2	139.2	160.0	160.0	230.7

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =        .01  (=  .110E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION   =        .03  (=  .258E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN  =       -.04  (= -.417E-01)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM    =        .00  (=  .248E-02)
     SHOULD NOT EXCEED      .100E+03
```

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TABLE NO. 39

```
*****************************************************************
*  Final Results for Side Forces and Stresses Between Slices.   *
*  (Results for Critical Shear Surface in Case of a Search.)    *
*****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 2.172 Side Force Inclination = 9.69 Degrees

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	80.9	3.	96.1	.432	7.1	16.9
2	85.4	396.	95.6	.396	51.2	221.5
3	89.8	1447.	94.7	.319	-22.9	545.3
4	96.0	3731.	93.8	.313	-49.5	860.8
5	102.2	6753.	92.9	.315	-58.8	1109.4
6	108.4	10512.	91.9	.315	-71.5	1344.7
7	113.3	14014.	91.2	.314	-84.6	1528.1
8	118.2	17968.	90.4	.313	-98.3	1708.4
9	123.1	22362.	89.7	.312	-112.1	1885.3
10	128.0	27152.	88.9	.312	-123.6	2054.4
11	128.0	27192.	88.9	.312	-123.7	2055.8
12	128.1	27199.	88.9	.312	-123.5	2055.4
13	128.4	27258.	88.9	.312	-121.7	2052.5
14	134.1	28333.	89.6	.317	-92.5	2005.3
15	139.8	29430.	90.2	.321	-69.2	1967.2
16	145.5	30550.	90.8	.324	-50.8	1936.6
17	151.2	31692.	91.4	.327	-36.4	1912.3
18	156.9	32857.	91.9	.329	-25.3	1893.4
19	162.7	34045.	92.5	.330	-16.9	1878.9
20	168.4	35255.	93.1	.331	-10.7	1868.4
21	174.4	36549.	93.6	.332	-6.2	1860.8
22	180.4	37867.	94.2	.333	-3.4	1856.2
23	186.4	39207.	94.7	.333	-1.9	1854.2
24	192.4	40570.	95.3	.333	-1.6	1854.5
25	198.4	41956.	95.8	.333	-2.4	1856.8
26	204.4	43366.	96.3	.333	-3.9	1860.7
27	210.4	44798.	96.8	.332	-6.2	1866.2
28	216.4	46253.	97.4	.332	-9.1	1873.0
29	222.4	47731.	97.9	.331	-12.5	1881.1
30	228.4	49231.	98.4	.330	-16.3	1890.1
31	232.1	50168.	98.7	.330	-18.8	1896.2
32	235.8	51112.	99.0	.330	-21.5	1902.5
33	236.0	50433.	99.2	.331	-13.7	1877.4
34	237.3	47073.	100.7	.330	-16.3	1812.1
35	240.1	40651.	103.6	.328	-24.1	1684.2
36	242.9	34712.	106.4	.326	-32.4	1557.4
37	245.7	29258.	109.3	.323	-41.6	1432.4
38	248.5	24287.	112.2	.319	-52.2	1309.0
39	251.9	18849.	115.6	.313	-66.9	1162.4
40	255.3	14078.	119.0	.304	-82.4	1014.5

1

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
41	258.7	9972.	122.4	.291	-98.6	865.8
42	262.1	6505.	125.8	.271	-112.0	709.1
43	265.5	3646.	129.2	.244	-111.4	526.3
44	268.9	1482.	132.7	.209	-83.1	304.9
45	271.4	505.	135.4	.167	-49.1	147.3
46	273.9	11.	139.0	.229	-.9	3.9
47	276.4	0.	107.0	BELOW	.0	.0

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =        .01  (=  .110E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION   =        .03  (=  .258E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN  =       -.04  (= -.417E-01)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM    =        .00  (=  .248E-02)
     SHOULD NOT EXCEED      .100E+03
```

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED

B_NC.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175


MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80


ANAlysis/computation data follow -
NonCircular
80.452 96.113 FIX
128.039 80.250 FIX
309.18 82.06
399.54 165

FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

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```
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          TABLE NO. 1
          ******************************************
          * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
          * Originally Coded By Stephen G. Wright  *
          * Version No. 1.206                      *
          * Last Revision Date  6/ 4/96            *
          * (C) Copyright 1985-1996 S. G. Wright   *
          * All Rights Reserved                    *
          ******************************************

          ***************************************************************
          *                                                             *
          *      RESULTS OF COMPUTATIONS PERFORMED USING THIS COMPUTER *
          * PROGRAM SHOULD NOT BE USED FOR DESIGN PURPOSES UNLESS THEY *
          * HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL    *
          * DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE    *
          * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER   *
          * PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS       *
          * PROGRAM BEFORE ATTEMPTING ITS USE.                          *
          *                                                             *
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          * MAKE OR ASSUME LIABILITY FOR ANY WARRANTIES, EXPRESSED OR   *
          * IMPLIED, CONCERNING THE ACCURACY, RELIABILITY, USEFULNESS   *
          * OR ADAPTABILITY OF THIS COMPUTER PROGRAM.                   *
          *                                                             *
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          OAK HAMMOCK DISPOSAL FACILITY
          STABILITY ANALYSES - 98 FEET
          NON-CIRCULAR; RS 03/18/2002

          TABLE NO.  2
          **************************
          * NEW PROFILE LINE DATA *
          **************************

          PROFILE LINE  1 - MATERIAL TYPE =  1
          HAWTHORNE - MAT. 1

               Point       X              Y

                 1       -500.000        -80.000
                 2       1200.000        -80.000

          PROFILE LINE  2 - MATERIAL TYPE =  2
          SAND - MAT. 2

               Point       X              Y

                 1       -500.000         80.000
                 2       1200.000         80.000

          PROFILE LINE  3 - MATERIAL TYPE =  3
          BERM - MAT. 3

               Point       X              Y

                 1           .000         80.000
                 2         48.000         96.000
                 3         80.000         96.000
                 4        128.000         80.000
                 5       1200.000         90.880

          PROFILE LINE  4 - MATERIAL TYPE =  4
          LINER - MAT. 4

               Point       X              Y

                 1         80.000         96.000
                 2         80.904         96.226
                 3        128.079         80.501
                 4       1200.000         91.380

          PROFILE LINE  5 - MATERIAL TYPE =  5
          PROTECTIVE LAYER - MAT. 5

               Point       X              Y

                 1         80.904         96.226
                 2         89.819         95.362
                 3        128.394         82.504
                 4       1200.000         93.380

          PROFILE LINE  6 - MATERIAL TYPE =  6
          FINAL COVER - MAT. 6

               Point       X              Y

                 1         80.904         96.226
                 2        408.369        178.000
                 3       1200.000        178.000

          PROFILE LINE  7 - MATERIAL TYPE =  7
          MSW A - MAT. 7

               Point       X              Y

                 1         89.819         95.362
                 2        108.369        100.000
                 3       1200.000        100.000

          PROFILE LINE  8 - MATERIAL TYPE =  8
          MSW B - MAT. 8

               Point       X              Y

                 1        108.369        100.000
                 2        168.369        115.000
                 3       1200.000        115.000

          PROFILE LINE  9 - MATERIAL TYPE =  9
          MSW C - MAT. 9

               Point       X              Y

                 1        168.369        115.000
                 2        228.369        130.000
                 3       1200.000        130.000

          PROFILE LINE 10 - MATERIAL TYPE = 10
          MSW D - MAT. 10

               Point       X              Y

                 1        228.369        130.000
                 2        288.369        145.000
                 3       1200.000        145.000

          PROFILE LINE 11 - MATERIAL TYPE = 11
          MSW E - MAT. 11

               Point       X              Y

                 1        288.369        145.000
                 2        348.369        160.000
                 3       1200.000        160.000

          PROFILE LINE 12 - MATERIAL TYPE = 12
          MSW F - MAT. 12

               Point       X              Y

                 1        348.369        160.000
                 2        408.369        175.000
                 3       1200.000        175.000

          All new profile lines defined - No old lines retained
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          STABILITY ANALYSES - 98 FEET
          NON-CIRCULAR; RS 03/18/2002

          TABLE NO.  3
          ***********************************************************************
          * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
          ***********************************************************************

          DATA FOR MATERIAL TYPE  1
          HAWTHORNE - MAT. 1

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  2
          SAND - MAT. 2

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  3
          BERM - MAT. 3

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  4
          LINER - MAT. 4

               Unit weight of material =  110.000

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1          -1000.000              .000
                 2               .000              .000
                 3           2005.000           429.000
                 4           5013.000           787.000
                 5          10025.000          1143.000
                 6          15038.000          1594.000
                 7          18000.000          1908.000

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  5
          PROTECTIVE LAYER - MAT. 5

               Unit weight of material =  110.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  6
          FINAL COVER - MAT. 6

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  7
          MSW A - MAT. 7

               Unit weight of material =   67.500

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1          -1000.000              .000
                 2             -1.000              .000
                 3               .000           501.240
                 4            208.850           501.240
                 5            417.700           501.240
                 6            626.550           501.240
                 7            835.400           636.867
                 8           5221.250          3485.038

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  8
          MSW B - MAT. 8

               Unit weight of material =   63.100

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1          -1000.000              .000
                 2           -100.000              .000
                 3               .000           501.240
                 4            208.850           501.240
                 5            417.700           501.240
                 6            626.550           501.240
```

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```
      7             835.400            636.867
      8            5221.250           3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE  9
MSW C - MAT. 9

     Unit weight of material =   58.500

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point      Normal Stress       Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

     Unit weight of material =   53.400

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point      Normal Stress       Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

     Unit weight of material =   48.100

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point      Normal Stress       Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

     Unit weight of material =   22.600

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point      Normal Stress       Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

All new material properties defined - No old data retained
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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO.  5
*******************************************************************
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
*******************************************************************

Line
 No.    Point        X              Y

  1 - Unit weight of water =   62.40   PHREATIC
  1        1     -500.000      80.000   PHREATIC
  1        2     1000.000      80.000   PHREATIC

All new piezometric lines defined - No old lines retained
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TABLE NO. 15
*********************************
* NEW ANALYSIS/COMPUTATION DATA *
*********************************

Noncircular Shear Surface(s)

Computations Performed for Single Shear Surface


Shear Surface Coordinates -

     Point          X              Y

       1         80.452         96.113
       2        128.039         80.250
       3        309.180         82.060
       4        399.540        165.000

Initial trial estimate for the factor of safety =   3.000

Maximum number of iterations allowed for
calculating the factor of safety =  100
```

```
Short form of output will be used for search

---------------------------------------------------------------------
THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination =  15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence =      100.000

Allowed moment imbalance for convergence =      100.000

Number of increments for slice subdivision =   30

Depth of water in crack =          .000

Unit weight of water in crack =     62.400

Seismic coefficient =   .000

Conventional (single-stage) computations to be performed

Procedure used to compute the factor of safety: SPENCER
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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 16
**************************
* NEW SLOPE GEOMETRY DATA *
**************************

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

     Point          X           Y

       1       -500.000      80.000
       2           .000      80.000
       3         48.000      96.000
       4         80.000      96.000
       5         80.904      96.226
       6        408.369     178.000
       7       1200.000     178.000
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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 26
**********************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure     *
*  Information for Individual Slices for Conventional       *
*  Computations or First Stage of Multi-Stage Computations. *
*  (Information is for the Critical Shear Surface in the    *
*  Case of an Automatic Search.)                            *
**********************************************************

Slice                          Slice   Matl.              Friction    Pore
 No.       X          Y       Weight   Type   Cohesion     Angle   Pressure

         80.5       96.1
   1     80.7       96.0         6.6     4   NONLINEAR ENVELOPE         .0
         80.9       96.0
   2     85.4       94.5      2945.0     4   NONLINEAR ENVELOPE         .0
         89.8       93.0
   3     94.5       91.4      7551.1     4   NONLINEAR ENVELOPE         .0
         99.1       89.9
   4    103.7       88.4     10935.5     4   NONLINEAR ENVELOPE         .0
        108.4       86.8
   5    113.3       85.2     15205.6     4   NONLINEAR ENVELOPE         .0
        118.2       83.5
   6    123.1       81.9     18890.3     4   NONLINEAR ENVELOPE         .0
        128.0       80.3
   7    128.0       80.3        82.4     4   NONLINEAR ENVELOPE         .0
        128.0       80.3
   8    128.1       80.3        84.5     4   NONLINEAR ENVELOPE         .0
        128.1       80.3
   9    128.2       80.3       665.9     4   NONLINEAR ENVELOPE         .0
        128.4       80.3
  10    133.4       80.3     21678.4     4   NONLINEAR ENVELOPE         .0
        138.4       80.4
  11    143.4       80.4     23383.8     4   NONLINEAR ENVELOPE         .0
        148.4       80.5
  12    153.4       80.5     24889.3     4   NONLINEAR ENVELOPE         .0
        158.4       80.6
  13    163.4       80.6     26394.8     4   NONLINEAR ENVELOPE         .0
        168.4       80.7
  14    173.4       80.7     27860.7     4   NONLINEAR ENVELOPE         .0
        178.4       80.8
  15    183.4       80.8     29253.0     4   NONLINEAR ENVELOPE         .0
        188.4       80.9
  16    193.4       80.9     30645.3     4   NONLINEAR ENVELOPE         .0
        198.4       81.0
  17    203.4       81.0     32037.7     4   NONLINEAR ENVELOPE         .0
        208.4       81.1
  18    213.4       81.1     33430.0     4   NONLINEAR ENVELOPE         .0
        218.4       81.2
  19    223.4       81.2     34822.4     4   NONLINEAR ENVELOPE         .0
        228.4       81.3
  20    233.4       81.3     36150.9     4   NONLINEAR ENVELOPE         .0
        238.4       81.4
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TABLE NO. 26
**********************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure     *
*  Information for Individual Slices for Conventional       *
*  Computations or First Stage of Multi-Stage Computations. *
*  (Information is for the Critical Shear Surface in the    *
*  Case of an Automatic Search.)                            *
**********************************************************

Slice                          Slice   Matl.              Friction    Pore
 No.       X          Y       Weight   Type   Cohesion     Angle   Pressure

        238.4       81.4
  21    243.4       81.4     37415.8     4   NONLINEAR ENVELOPE         .0
        248.4       81.5
  22    253.4       81.5     38680.6     4   NONLINEAR ENVELOPE         .0
        258.4       81.6
  23    263.4       81.6     39945.5     4   NONLINEAR ENVELOPE         .0
        268.4       81.7
  24    273.4       81.7     41210.3     4   NONLINEAR ENVELOPE         .0
        278.4       81.8
  25    283.4       81.8     42475.1     4   NONLINEAR ENVELOPE         .0
        288.4       81.9
  26    293.6       81.9     45468.5     4   NONLINEAR ENVELOPE         .0
        298.8       82.0
  27    304.0       82.0     46694.7     4   NONLINEAR ENVELOPE         .0
        309.2       82.1
```

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Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
28	309.3	82.2	1393.3	4	NONLINEAR ENVELOPE		.0
	309.5	82.3					
29	310.6	83.4	9741.3	5	.00	35.00	.0
	311.7	84.4					
30	314.5	87.0	23747.6	7	NONLINEAR ENVELOPE		.0
	317.4	89.6					
31	320.2	92.2	22136.6	7	NONLINEAR ENVELOPE		.0
	323.0	94.8					
32	325.9	97.4	20525.6	7	NONLINEAR ENVELOPE		.0
	328.7	100.0					
33	331.4	102.5	18237.0	8	NONLINEAR ENVELOPE		.0
	334.2	105.0					
34	336.9	107.5	16874.2	8	NONLINEAR ENVELOPE		.0
	339.6	110.0					
35	342.3	112.5	15511.3	8	NONLINEAR ENVELOPE		.0
	345.1	115.0					
36	346.7	116.5	8762.4	9	NONLINEAR ENVELOPE		.0
	348.4	118.0					
37	351.6	121.0	15830.2	9	NONLINEAR ENVELOPE		.0
	354.9	124.0					
38	358.1	127.0	13786.3	9	NONLINEAR ENVELOPE		.0
	361.4	130.0					
39	364.1	132.5	10020.7	10	NONLINEAR ENVELOPE		.0
	366.9	135.0					
40	369.6	137.5	8732.9	10	NONLINEAR ENVELOPE		.0
	372.3	140.0					

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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 26

```
******************************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure          *
*  Information for Individual Slices for Conventional            *
*  Computations or First Stage of Multi-Stage Computations.      *
*  (Information is for the Critical Shear Surface in the         *
*  Case of an Automatic Search.)                                 *
******************************************************************
```

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	372.3	140.0					
41	375.0	142.5	7445.1	10	NONLINEAR ENVELOPE		.0
	377.8	145.0					
42	380.5	147.5	6229.5	11	NONLINEAR ENVELOPE		.0
	383.2	150.0					
43	385.9	152.5	5066.0	11	NONLINEAR ENVELOPE		.0
	388.6	155.0					
44	391.4	157.5	3942.6	11	NONLINEAR ENVELOPE		.0
	394.1	160.0					
45	396.8	162.5	3146.5	12	NONLINEAR ENVELOPE		.0
	399.5	165.0					

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NON-CIRCULAR; RS 03/18/2002

TABLE NO. 27

```
******************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for        *
*  Individual Slices for Conventional  Computations or the       *
*  First Stage of Multi-Stage Computations.                      *
*  (Information is for the Critical Shear Surface in the         *
*  Case of an Automatic Search.)                                 *
******************************************************************
```

Slice No.	X	Seismic Force	Y for Seismic Force	FORCES DUE TO SURFACE PRESSURES Normal Force	Shear Force	X	Y
1	80.7	0.	96.1	0.	0.	.0	.0
2	85.4	0.	95.9	0.	0.	.0	.0
3	94.5	0.	95.7	0.	0.	.0	.0
4	103.7	0.	95.4	0.	0.	.0	.0
5	113.3	0.	95.0	0.	0.	.0	.0
6	123.1	0.	94.6	0.	0.	.0	.0
7	128.0	0.	94.4	0.	0.	.0	.0
8	128.1	0.	94.4	0.	0.	.0	.0
9	128.2	0.	94.4	0.	0.	.0	.0
10	133.4	0.	95.1	0.	0.	.0	.0
11	143.4	0.	96.4	0.	0.	.0	.0
12	153.4	0.	97.6	0.	0.	.0	.0
13	163.4	0.	98.9	0.	0.	.0	.0
14	173.4	0.	100.2	0.	0.	.0	.0
15	183.4	0.	101.4	0.	0.	.0	.0
16	193.4	0.	102.6	0.	0.	.0	.0
17	203.4	0.	103.9	0.	0.	.0	.0
18	213.4	0.	105.1	0.	0.	.0	.0
19	223.4	0.	106.4	0.	0.	.0	.0
20	233.4	0.	107.6	0.	0.	.0	.0
21	243.4	0.	108.8	0.	0.	.0	.0
22	253.4	0.	109.9	0.	0.	.0	.0
23	263.4	0.	111.1	0.	0.	.0	.0
24	273.4	0.	112.3	0.	0.	.0	.0
25	283.4	0.	113.6	0.	0.	.0	.0
26	293.6	0.	114.7	0.	0.	.0	.0
27	304.0	0.	115.9	0.	0.	.0	.0
28	309.3	0.	116.7	0.	0.	.0	.0
29	310.6	0.	117.8	0.	0.	.0	.0
30	314.5	0.	120.5	0.	0.	.0	.0
31	320.2	0.	123.9	0.	0.	.0	.0
32	325.9	0.	127.5	0.	0.	.0	.0
33	331.4	0.	130.9	0.	0.	.0	.0
34	336.9	0.	134.3	0.	0.	.0	.0
35	342.3	0.	137.7	0.	0.	.0	.0
36	346.7	0.	140.4	0.	0.	.0	.0
37	351.6	0.	143.2	0.	0.	.0	.0
38	358.1	0.	147.0	0.	0.	.0	.0
39	364.1	0.	150.5	0.	0.	.0	.0

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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 27

```
******************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for        *
*  Individual Slices for Conventional  Computations or the       *
*  First Stage of Multi-Stage Computations.                      *
*  (Information is for the Critical Shear Surface in the         *
*  Case of an Automatic Search.)                                 *
******************************************************************
```

Slice No.	X	Seismic Force	Y for Seismic Force	FORCES DUE TO SURFACE PRESSURES Normal Force	Shear Force	X	Y
40	369.6	0.	153.7	0.	0.	.0	.0
41	375.0	0.	157.0	0.	0.	.0	.0
42	380.5	0.	160.4	0.	0.	.0	.0
43	385.9	0.	163.8	0.	0.	.0	.0
44	391.4	0.	167.7	0.	0.	.0	.0
45	396.8	0.	171.2	0.	0.	.0	.0

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 29

```
*********************************************************************
*  Information Generated During Iterative Solution for the Factor  *
*  of Safety and Side Force Inclination by Spencer's Procedure     *
*********************************************************************

        Trial     Trial
        Factor  Side Force   Force      Moment                  Delta
Iter-    of     Inclination Imbalance  Imbalance   Delta-F      Theta
ation   Safety   (degrees)   (lbs.)    (ft.-lbs.)             (degrees)

   1  3.00000   15.0000   .4678E+05   .5965E+05
First-order corrections to F and THETA .........  -.165E+01 -.239E+01
Values factored by  .303E+00 - Deltas too large   -.500E+00 -.722E+00

   2  2.50000   14.2779   .3103E+05   .1764E+06
First-order corrections to F and THETA .........  -.762E+00 -.253E+01
Values factored by  .656E+00 - Deltas too large   -.500E+00 -.166E+01

   3  2.00000   12.6207   .5399E+04   .4219E+06
First-order corrections to F and THETA .........  -.114E+00 -.235E+01
Second-order correction - Iteration   1 ........  -.108E+00 -.235E+01
Second-order correction - Iteration   2 ........  -.108E+00 -.235E+01

   4  1.89225   10.2672  -.2263E+02   .7169E+05
First-order corrections to F and THETA .........  -.359E-02 -.311E+00
Second-order correction - Iteration   1 ........  -.358E-02 -.311E+00
Second-order correction - Iteration   2 ........  -.356E-02 -.311E+00

   5  1.88668    9.9564   .1273E-01   .4857E+02
First-order corrections to F and THETA .........  -.267E-05 -.217E-03
```

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was 19.643 - at slice 42
Material: 11 Normal stress: 815.221
Strength from previous trial: 501.240
Estimated strength for new trial: 623.763

TABLE NO. 29

```
*********************************************************************
*  Information Generated During Iterative Solution for the Factor  *
*  of Safety and Side Force Inclination by Spencer's Procedure     *
*********************************************************************

        Trial     Trial
        Factor  Side Force   Force      Moment                  Delta
Iter-    of     Inclination Imbalance  Imbalance   Delta-F      Theta
ation   Safety   (degrees)   (lbs.)    (ft.-lbs.)             (degrees)

   1  1.88668    9.9564  -.3797E+03   .3246E+05
First-order corrections to F and THETA .........   .431E-02 -.630E-01
Second-order correction - Iteration   1 ........   .432E-02 -.630E-01
Second-order correction - Iteration   2 ........   .432E-02 -.630E-01

   2  1.89299    9.8935   .1167E-01  -.1184E+03
First-order corrections to F and THETA .........   .611E-05  .525E-03
Second-order correction - Iteration   1 ........   .614E-05  .528E-03

   3  1.89300    9.8940  -.1859E-01   .1669E+02
First-order corrections to F and THETA .........   .208E-06 -.339E-05
```

For trial number 3 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 15
Material: 4 Normal stress: 2967.339
Strength from previous trial: 543.534
Estimated strength for new trial: 543.534

TABLE NO. 29

```
*********************************************************************
*  Information Generated During Iterative Solution for the Factor  *
*  of Safety and Side Force Inclination by Spencer's Procedure     *
*********************************************************************

        Trial     Trial
        Factor  Side Force   Force      Moment                  Delta
Iter-    of     Inclination Imbalance  Imbalance   Delta-F      Theta
ation   Safety   (degrees)   (lbs.)    (ft.-lbs.)             (degrees)

   1  1.89300    9.8940  -.1859E-01   .1669E+01
First-order corrections to F and THETA .........   .208E-06 -.339E-05
```

Factor of Safety - - - - - - - - - 1.893
Side Force Inclination - - - - - 9.89
Number of Iterations - - - - - - - 1

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TABLE NO. 38

```
*******************************************************************
*  Final Results for Stresses Along the Shear Surface             *
*  (Results for Critical Shear Surface in Case of a Search.)      *
*******************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 1.893 Side Force Inclination = 9.89 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	80.7	96.0	16.4	16.4	1.9
2	85.4	94.5	373.5	373.5	42.2
3	94.5	91.4	920.5	920.5	104.0
4	103.7	88.4	1333.0	1333.0	150.7
5	113.3	85.2	1751.5	1751.5	198.0
6	123.1	81.9	2171.2	2171.2	237.1
7	128.0	80.3	2378.2	2378.2	250.1
8	128.1	80.3	2148.8	2148.8	235.7
9	128.2	80.3	2148.8	2148.8	235.7
10	133.4	80.3	2224.9	2224.9	240.4
11	143.4	80.4	2376.8	2376.8	250.0
12	153.4	80.5	2528.8	2528.8	259.6
13	163.4	80.6	2680.7	2680.7	269.1
14	173.4	80.7	2826.9	2826.9	278.3
15	183.4	80.8	2967.3	2967.3	287.1
16	193.4	80.9	3107.8	3107.8	296.0
17	203.4	81.0	3248.2	3248.2	304.8
18	213.4	81.1	3388.7	3388.7	313.6
19	223.4	81.2	3529.1	3529.1	322.4
20	233.4	81.3	3663.1	3663.1	330.9
21	243.4	81.4	3790.7	3790.7	338.9
22	253.4	81.5	3918.3	3918.3	346.9
23	263.4	81.6	4045.9	4045.9	354.9
24	273.4	81.7	4173.4	4173.4	363.0
25	283.4	81.8	4301.0	4301.0	371.0
26	293.6	81.9	4424.2	4424.2	378.7
27	304.0	82.0	4543.1	4543.1	386.2
28	309.3	82.2	3694.0	3694.0	332.8
29	310.6	83.4	3081.1	3081.1	1139.7
30	314.5	87.0	2929.2	2929.2	1054.7

31	320.2	92.2	2728.7	2728.7	985.9
32	325.9	97.4	2528.2	2528.2	917.2
33	331.4	102.5	2339.6	2339.6	852.4
34	336.9	107.5	2162.8	2162.8	791.8
35	342.3	112.5	1986.0	1986.0	731.1
36	346.7	116.5	1848.9	1848.9	684.1
37	351.6	121.0	1689.5	1689.5	629.4
38	358.1	127.0	1468.0	1468.0	553.5
39	364.1	132.5	1273.7	1273.7	486.8

1

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
40	369.6	137.5	1106.7	1106.7	429.5
41	375.0	142.5	939.6	939.6	372.2
42	380.5	147.5	781.9	781.9	318.1
43	385.9	152.5	633.6	633.6	267.2
44	391.4	157.5	454.2	454.2	264.8
45	396.8	162.5	328.2	328.2	264.8

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION    =        .02  (=  .209E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION  =        .04  (=  .440E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN =       -.82  (= -.821E+00)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM   =        .00  (=  .477E-02)
     SHOULD NOT EXCEED      .100E+03
```

1
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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 39

```
***************************************************************
*  Final Results for Side Forces and Stresses Between Slices.  *
*  (Results for Critical Shear Surface in Case of a Search.)   *
***************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 1.893 Side Force Inclination = 9.89 Degrees

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	80.9	3.	96.1	.435	7.7	17.4
2	89.8	1512.	95.3	.415	134.3	411.2
3	99.1	5381.	93.6	.336	8.3	967.0
4	108.4	10983.	92.1	.326	-31.2	1360.6
5	118.2	18773.	90.6	.320	-65.1	1746.3
6	128.0	28346.	89.1	.318	-93.7	2108.2
7	128.0	28388.	89.1	.318	-93.8	2109.6
8	128.1	28396.	89.1	.318	-93.7	2109.4
9	128.4	28465.	89.1	.318	-92.2	2107.3
10	138.4	30678.	90.2	.324	-55.2	2054.8
11	148.4	32974.	91.2	.328	-31.6	2023.0
12	158.4	35350.	92.1	.330	-17.5	2006.4
13	168.4	37809.	93.1	.332	-10.2	2001.2
14	178.4	40347.	94.0	.332	-7.6	2004.4
15	188.4	42961.	94.9	.332	-8.5	2013.9
16	198.4	45650.	95.7	.331	-12.0	2028.3
17	208.4	48414.	96.6	.330	-17.4	2046.7
18	218.4	51254.	97.4	.329	-24.2	2068.4
19	228.4	54169.	98.2	.328	-32.2	2092.6
20	238.4	57156.	99.1	.327	-40.9	2118.8
21	248.4	60212.	99.9	.325	-50.1	2146.4
22	258.4	63336.	100.7	.324	-59.7	2175.1
23	268.4	66528.	101.4	.322	-69.5	2204.8
24	278.4	69790.	102.2	.321	-79.5	2235.3
25	288.4	73119.	103.0	.320	-89.7	2266.5
26	298.8	76652.	103.8	.318	-100.3	2299.4
27	309.2	80252.	104.6	.317	-110.8	2332.4
28	309.5	79298.	104.9	.318	-99.9	2301.5
29	311.7	75522.	106.4	.317	-104.7	2245.9
30	317.4	66104.	110.2	.314	-113.2	2095.6
31	323.0	57351.	114.0	.311	-121.9	1947.2
32	328.7	49262.	117.9	.307	-131.0	1801.2
33	334.2	42101.	121.5	.303	-139.6	1662.4
34	339.6	35502.	125.1	.298	-147.2	1523.2
35	345.1	29465.	128.8	.292	-153.5	1383.7
36	348.4	26070.	131.0	.288	-156.1	1297.8
37	354.9	19972.	135.3	.278	-159.6	1128.1
38	361.4	14717.	139.6	.266	-162.2	961.6
39	366.9	10944.	143.2	.252	-161.9	822.7
40	372.3	7702.	146.8	.233	-157.0	680.3

1

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
41	377.8	4991.	150.3	.209	-145.0	532.6
42	383.2	2781.	153.8	.177	-118.6	370.9
43	388.6	1043.	157.8	.155	-60.7	174.4
44	394.1	202.	162.0	.140	-16.0	43.5
45	399.5	0.	124.6	BELOW	.0	.0

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION    =        .02  (=  .209E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION  =        .04  (=  .440E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN =       -.82  (= -.821E+00)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM   =        .00  (=  .477E-02)
     SHOULD NOT EXCEED      .100E+03
```

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED

C_NC.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175


MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    825.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80


ANAlysis/computation data follow -
NonCircular
80.452 96.113
128.039 80.250
386.460 82.835
446.291 170

FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

C_NC.OUT

```
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      TABLE NO. 1
      ****************************************
      * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
      * Originally Coded By Stephen G. Wright  *
      * Version No. 1.206                      *
      * Last Revision Date  6/ 4/96            *
      * (C) Copyright 1985-1996 S. G. Wright   *
      * All Rights Reserved                    *
      ****************************************

      ***************************************************************
      *                                                             *
      *      RESULTS OF COMPUTATIONS PERFORMED USING THIS COMPUTER *
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      * HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL    *
      * DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE    *
      * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER   *
      * PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS       *
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      *                                                             *
      ***************************************************************
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      STABILITY ANALYSES - 98 FEET
      NON-CIRCULAR; RS 03/18/2002

      TABLE NO.  2
      *************************
      * NEW PROFILE LINE DATA *
      *************************

      PROFILE LINE  1 - MATERIAL TYPE =  1
      HAWTHORNE - MAT. I

           Point       X             Y

             1      -500.000       -80.000
             2      1200.000       -80.000

      PROFILE LINE  2 - MATERIAL TYPE =  2
      SAND - MAT. 2

           Point       X             Y

             1      -500.000        80.000
             2      1200.000        80.000

      PROFILE LINE  3 - MATERIAL TYPE =  3
      BERM - MAT. 3

           Point       X             Y

             1          .000        80.000
             2        48.000        96.000
             3        80.000        96.000
             4       128.000        80.000
             5      1200.000        90.880

      PROFILE LINE  4 - MATERIAL TYPE =  4
      LINER - MAT. 4

           Point       X             Y

             1        80.000        96.000
             2        80.904        96.226
             3       128.079        80.501
             4      1200.000        91.380

      PROFILE LINE  5 - MATERIAL TYPE =  5
      PROTECTIVE LAYER - MAT. 5

           Point       X             Y

             1        80.904        96.226
             2        89.819        95.362
             3       128.394        82.504
             4      1200.000        93.380

      PROFILE LINE  6 - MATERIAL TYPE =  6
      FINAL COVER - MAT. 6

           Point       X             Y

             1        80.904        96.226
             2       408.369       178.000
             3      1200.000       178.000

      PROFILE LINE  7 - MATERIAL TYPE =  7
      MSW A - MAT. 7

           Point       X             Y

             1        89.819        95.362
             2       108.369       100.000
             3      1200.000       100.000

      PROFILE LINE  8 - MATERIAL TYPE =  8
      MSW B - MAT. 8

           Point       X             Y

             1       108.369       100.000
             2       168.369       115.000
             3      1200.000       115.000

      PROFILE LINE  9 - MATERIAL TYPE =  9
      MSW C - MAT. 9

           Point       X             Y

             1       168.369       115.000
             2       228.369       130.000
             3      1200.000       130.000

      PROFILE LINE 10 - MATERIAL TYPE = 10
      MSW D - MAT. 10

           Point       X             Y

             1       228.369       130.000
             2       288.369       145.000
             3      1200.000       145.000

      PROFILE LINE 11 - MATERIAL TYPE = 11
      MSW E - MAT. 11

           Point       X             Y

             1       288.369       145.000
             2       348.369       160.000
             3      1200.000       160.000

      PROFILE LINE 12 - MATERIAL TYPE = 12
      MSW F - MAT. 12

           Point       X             Y

             1       348.369       160.000
             2       408.369       175.000
             3      1200.000       175.000

      All new profile lines defined - No old lines retained
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      STABILITY ANALYSES - 98 FEET
      NON-CIRCULAR; RS 03/18/2002

      TABLE NO.  3
      *******************************************************************
      * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
      *******************************************************************

      DATA FOR MATERIAL TYPE  1
      HAWTHORNE - MAT. 1

           Unit weight of material =  115.000

           CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
           Cohesion - - - - - - - -          .000
           Friction angle - - - - -  30.000 degrees

           Pore water pressures defined by piezometric line
           Number of the piezometric line used =  1
           Negative pore pressures set to zero

      DATA FOR MATERIAL TYPE  2
      SAND - MAT. 2

           Unit weight of material =  115.000

           CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
           Cohesion - - - - - - - -          .000
           Friction angle - - - - -  30.000 degrees

           Pore water pressures defined by piezometric line
           Number of the piezometric line used =  1
           Negative pore pressures set to zero

      DATA FOR MATERIAL TYPE  3
      BERM - MAT. 3

           Unit weight of material =  120.000

           CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
           Cohesion - - - - - - - -          .000
           Friction angle - - - - -  35.000 degrees

           Pore water pressures defined by piezometric line
           Number of the piezometric line used =  1
           Negative pore pressures set to zero

      DATA FOR MATERIAL TYPE  4
      LINER - MAT. 4

           Unit weight of material =  110.000

           ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
           Point     Normal Stress     Shear Stress

             1         -1000.000            .000
             2              .000            .000
             3          2005.000         429.000
             4          5013.000         787.000
             5         10025.000        1143.000
             6         15038.000        1594.000
             7         18000.000        1908.000

           Pore water pressures defined by piezometric line
           Number of the piezometric line used =  1
           Negative pore pressures set to zero

      DATA FOR MATERIAL TYPE  5
      PROTECTIVE LAYER - MAT. 5

           Unit weight of material =  110.000

           CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
           Cohesion - - - - - - - -          .000
           Friction angle - - - - -  35.000 degrees

           Pore water pressures defined by piezometric line
           Number of the piezometric line used =  1
           Negative pore pressures set to zero

      DATA FOR MATERIAL TYPE  6
      FINAL COVER - MAT. 6

           Unit weight of material =  120.000

           CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
           Cohesion - - - - - - - -          .000
           Friction angle - - - - -  35.000 degrees

           Pore water pressures defined by piezometric line
           Number of the piezometric line used =  1
           Negative pore pressures set to zero

      DATA FOR MATERIAL TYPE  7
      MSW A - MAT. 7

           Unit weight of material =   67.500

           ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
           Point     Normal Stress     Shear Stress

             1         -1000.000            .000
             2            -1.000            .000
             3              .000         501.240
             4           208.850         501.240
             5           417.700         501.240
             6           626.550         501.240
             7           835.400         636.867
             8          5221.250        3485.038

           Pore water pressures defined by piezometric line
           Number of the piezometric line used =  1
           Negative pore pressures set to zero

      DATA FOR MATERIAL TYPE  8
      MSW B - MAT. 8

           Unit weight of material =   63.100

           ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
           Point     Normal Stress     Shear Stress

             1         -1000.000            .000
             2          -100.000            .000
             3              .000         501.240
             4           208.850         501.240
             5           417.700         501.240
             6           626.550         501.240
```

C_NC.OUT

```
      7            835.400          636.867
      8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE  9
MSW C - MAT. 9

     Unit weight of material =   58.500

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point     Normal Stress     Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

     Unit weight of material =   53.400

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point     Normal Stress     Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

     Unit weight of material =   48.100

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point     Normal Stress     Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

     Unit weight of material =   22.600

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point     Normal Stress     Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

All new material properties defined - No old data retained
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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO.  5
******************************************************************
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
******************************************************************

Line
 No.    Point       X           Y

  1 - Unit weight of water =   62.40   PHREATIC
  1        1    -500.000      80.000   PHREATIC
  1        2    1000.000      80.000   PHREATIC

All new piezometric lines defined - No old lines retained
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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 15
********************************
* NEW ANALYSIS/COMPUTATION DATA *
********************************

Noncircular Shear Surface(s)

Computations Performed for Single Shear Surface


Shear Surface Coordinates -

     Point         X             Y

       1         80.452        96.113
       2        128.039        80.250
       3        386.460        82.835
       4        446.291       170.000

Initial trial estimate for the factor of safety =   3.000

Maximum number of iterations allowed for
calculating the factor of safety =  100

Short form of output will be used for search

-----------------------------------------------------------------
THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination =  15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence =     100.000

Allowed moment imbalance for convergence =     100.000

Number of increments for slice subdivision =   30

Depth of water in crack =        .000

Unit weight of water in crack =    62.400

Seismic coefficient =  .000

Conventional (single-stage) computations to be performed

Procedure used to compute the factor of safety: SPENCER
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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 16
**************************
* NEW SLOPE GEOMETRY DATA *
**************************

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

     Point        X            Y

        1    -500.000      80.000
        2        .000      80.000
        3      48.000      96.000
        4      60.000      96.000
        5      80.904      96.226
        6     408.369     178.000
        7    1200.000     178.000
1 UTEXAS3 - VER. 1.206 -  6/ 4/96 - (C) 1985-1996 S. G. WRIGHT
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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 26
*************************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure      *
*  Information for Individual Slices for Conventional        *
*  Computations or First Stage of Multi-Stage Computations.  *
*  (Information is for the Critical Shear Surface in the     *
*  Case of an Automatic Search.)                             *
*************************************************************

Slice                      Slice   Matl.              Friction   Pore
 No.      X        Y      Weight   Type   Cohesion     Angle   Pressure

         80.5     96.1
   1     80.7     96.0       6.6     4   NONLINEAR ENVELOPE         .0
         80.9     96.0
   2     85.4     94.5    2945.0     4   NONLINEAR ENVELOPE         .0
         89.8     93.0
   3     94.5     91.4    7551.1     4   NONLINEAR ENVELOPE         .0
         99.1     89.9
   4    103.7     88.4   10935.5     4   NONLINEAR ENVELOPE         .0
        108.4     86.8
   5    113.3     85.2   15205.8     4   NONLINEAR ENVELOPE         .0
        118.2     83.5
   6    123.1     81.9   18890.3     4   NONLINEAR ENVELOPE         .0
        128.0     80.3
   7    128.0     80.3      82.4     4   NONLINEAR ENVELOPE         .0
        128.0     80.3
   8    128.1     80.3      84.5     4   NONLINEAR ENVELOPE         .0
        128.1     80.3
   9    128.2     80.3     665.9     4   NONLINEAR ENVELOPE         .0
        128.4     80.3
  10    133.4     80.3   21878.4     4   NONLINEAR ENVELOPE         .0
        138.4     80.4
  11    143.4     80.4   23383.7     4   NONLINEAR ENVELOPE         .0
        148.4     80.5
  12    153.4     80.5   24889.0     4   NONLINEAR ENVELOPE         .0
        158.4     80.6
  13    163.4     80.6   26394.4     4   NONLINEAR ENVELOPE         .0
        168.4     80.7
  14    174.4     80.7   33599.2     4   NONLINEAR ENVELOPE         .0
        180.4     80.8
  15    186.4     80.8   35604.0     4   NONLINEAR ENVELOPE         .0
        192.4     80.9
  16    198.4     81.0   37608.8     4   NONLINEAR ENVELOPE         .0
        204.4     81.0
  17    210.4     81.1   39613.6     4   NONLINEAR ENVELOPE         .0
        216.4     81.1
  18    222.4     81.2   41618.4     4   NONLINEAR ENVELOPE         .0
        228.4     81.3
  19    234.4     81.3   43531.4     4   NONLINEAR ENVELOPE         .0
        240.4     81.4
  20    246.4     81.4   45352.6     4   NONLINEAR ENVELOPE         .0
        252.4     81.5
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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 26
*************************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure      *
*  Information for Individual Slices for Conventional        *
*  Computations or First Stage of Multi-Stage Computations.  *
*  (Information is for the Critical Shear Surface in the     *
*  Case of an Automatic Search.)                             *
*************************************************************

Slice                      Slice   Matl.              Friction   Pore
 No.      X        Y      Weight   Type   Cohesion     Angle   Pressure

        252.4     81.5
  21    258.4     81.6   47173.7     4   NONLINEAR ENVELOPE         .0
        264.4     81.6
  22    270.4     81.7   48995.0     4   NONLINEAR ENVELOPE         .0
        276.4     81.7
  23    282.4     81.8   50816.2     4   NONLINEAR ENVELOPE         .0
        288.4     81.9
  24    294.4     81.9   52542.0     4   NONLINEAR ENVELOPE         .0
        300.4     82.0
  25    306.4     82.0   54172.4     4   NONLINEAR ENVELOPE         .0
        312.4     82.1
  26    318.4     82.2   55802.8     4   NONLINEAR ENVELOPE         .0
        324.4     82.2
  27    330.4     82.3   57433.2     4   NONLINEAR ENVELOPE         .0
        336.4     82.3
```

Attachment 1

CASE 1

UTEXAS3 Computer Data Files

Final Configuration Circular Shear Surfaces

- Surface 1-A: File A_CIR.DAT
- Surface 1-B: File B_CIR.DAT
- Surface 1-C: File C_CIR.DAT

A_CIR.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175


MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW B - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80


ANAlysis/computation data follow -
Circle
127.986 250.156 170.047
PROCEDURE
SPENCER
FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

A_CIR.OUT

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TABLE NO. 1

```
******************************************
* COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
* Originally Coded By Stephen G. Wright  *
* Version No. 1.206                      *
* Last Revision Date  6/ 4/96            *
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******************************************
```

```
***************************************************************
*                                                             *
*       RESULTS OF COMPUTATIONS PERFORMED USING THIS COMPUTER *
* PROGRAM SHOULD NOT BE USED FOR DESIGN PURPOSES UNLESS THEY  *
* HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL    *
* DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE    *
* ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER   *
* PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS       *
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*                                                             *
***************************************************************
```

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 2

```
*************************
* NEW PROFILE LINE DATA *
*************************
```

PROFILE LINE 1 - MATERIAL TYPE = 1
HAWTHORNE - MAT. 1

Point	X	Y
1	-500.000	-80.000
2	1200.000	-80.000

PROFILE LINE 2 - MATERIAL TYPE = 2
SAND - MAT. 2

Point	X	Y
1	-500.000	80.000
2	1200.000	80.000

PROFILE LINE 3 - MATERIAL TYPE = 3
BERM - MAT. 3

Point	X	Y
1	.000	80.000
2	48.000	96.000
3	80.000	96.000
4	128.000	80.000
5	1200.000	90.880

PROFILE LINE 4 - MATERIAL TYPE = 4
LINER - MAT. 4

Point	X	Y
1	80.000	96.000
2	80.904	96.226
3	128.079	80.501
4	1200.000	91.380

PROFILE LINE 5 - MATERIAL TYPE = 5
PROTECTIVE LAYER - MAT. 5

Point	X	Y
1	80.904	96.226
2	89.619	95.362
3	128.394	82.504
4	1200.000	93.380

PROFILE LINE 6 - MATERIAL TYPE = 6
FINAL COVER - MAT. 6

Point	X	Y
1	80.904	96.226
2	408.369	178.000
3	1200.000	178.000

PROFILE LINE 7 - MATERIAL TYPE = 7
MSW A - MAT. 7

Point	X	Y
1	89.819	95.362
2	108.369	100.000
3	1200.000	100.000

PROFILE LINE 8 - MATERIAL TYPE = 8
MSW B - MAT. 8

Point	X	Y
1	108.369	100.000
2	168.369	115.000
3	1200.000	115.000

PROFILE LINE 9 - MATERIAL TYPE = 9
MSW C - MAT. 9

Point	X	Y
1	168.369	115.000
2	228.369	130.000
3	1200.000	130.000

PROFILE LINE 10 - MATERIAL TYPE = 10
MSW D - MAT. 10

Point	X	Y
1	228.369	130.000
2	288.369	145.000
3	1200.000	145.000

PROFILE LINE 11 - MATERIAL TYPE = 11
MSW E - MAT. 11

Point	X	Y
1	288.369	145.000
2	348.369	160.000
3	1200.000	160.000

PROFILE LINE 12 - MATERIAL TYPE = 12
MSW F - MAT. 12

Point	X	Y
1	348.369	160.000
2	408.369	175.000
3	1200.000	175.000

All new profile lines defined - No old lines retained

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CIRCULAR; RS 03/18/2002

TABLE NO. 3

```
*******************************************************************
* NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
*******************************************************************
```

DATA FOR MATERIAL TYPE 1
HAWTHORNE - MAT. 1

Unit weight of material = 115.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 30.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 2
SAND - MAT. 2

Unit weight of material = 115.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 30.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 3
BERM - MAT. 3

Unit weight of material = 120.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 35.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 4
LINER - MAT. 4

Unit weight of material = 110.000

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	.000	.000
3	2005.000	429.000
4	5013.000	787.000
5	10025.000	1143.000
6	15038.000	1594.000
7	18000.000	1908.000

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 5
PROTECTIVE LAYER - MAT. 5

Unit weight of material = 110.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 35.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 6
FINAL COVER - MAT. 6

Unit weight of material = 120.000

CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
Cohesion - - - - - - - - .000
Friction angle - - - - - 35.000 degrees

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 7
MSW A - MAT. 7

Unit weight of material = 67.500

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-1.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 8
MSW B - MAT. 8

Unit weight of material = 63.100

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240

7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 9
MSW C - MAT. 9

Unit weight of material = 58.500

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

Unit weight of material = 53.400

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

Unit weight of material = 48.100

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

Unit weight of material = 22.600

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

All new material properties defined - No old data retained
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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 5
****
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
****

Line No.	Point	X	Y	
1 - Unit weight of water = 62.40				PHREATIC
1	1	-500.000	80.000	PHREATIC
1	2	1000.000	80.000	PHREATIC

All new piezometric lines defined - No old lines retained
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TABLE NO. 15
****
* NEW ANALYSIS/COMPUTATION DATA *
****

Circular Shear Surface(s)

Computations Performed for Single Shear Surface

Center Coordinates for Center of Circle -

X = 127.986
Y = 250.156
Radius = 170.047

Procedure used to compute the factor of safety: SPENCER

Initial trial estimate for the factor of safety = 3.000

Maximum number of iterations allowed for
calculating the factor of safety = 100

Short form of output will be used for search

THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination = 15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence = 100.000

Allowed moment imbalance for convergence = 100.000

Maximum subtended angle to be used for subdivision of the
circle into slices = 3.00 degrees

Depth of crack = .000

Depth of water in crack = .000

Unit weight of water in crack = 62.400

Seismic coefficient = .000

Conventional (single-stage) computations to be performed
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TABLE NO. 16
****
* NEW SLOPE GEOMETRY DATA *
****

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

Point	X	Y
1	-500.000	80.000
2	.000	80.000
3	48.000	96.000
4	80.000	96.000
5	80.904	96.226
6	408.369	178.000
7	1200.000	178.000

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	56.2	96.0					
1	60.3	94.2	1737.1	3	.00	35.00	.0
	64.4	92.5					
2	68.5	90.9	5106.2	3	.00	35.00	.0
	72.7	89.3					
3	76.4	88.2	6834.4	3	.00	35.00	.0
	80.0	87.0					
4	80.5	86.9	998.3	3	.00	35.00	.0
	80.9	86.8					
5	85.2	85.6	11927.7	3	.00	35.00	.0
	89.5	84.5					
6	89.7	84.5	491.9	3	.00	35.00	.0
	89.8	84.4					
7	94.2	83.6	15334.3	3	.00	35.00	.0
	98.5	82.7					
8	102.9	82.0	17053.4	3	.00	35.00	.0
	107.3	81.4					
9	107.9	81.3	2059.1	3	.00	35.00	.0
	108.4	81.2					
10	112.8	80.8	18321.7	3	.00	35.00	.0
	117.2	80.4					
11	121.7	80.3	18844.3	3	.00	35.00	.0
	126.1	80.1					
12	126.9	80.1	3278.3	3	.00	35.00	.0
	127.7	80.1					
13	127.8	80.1	668.3	4	NONLINEAR ENVELOPE		.0
	128.0	80.1					
14	128.0	80.1	29.8	4	NONLINEAR ENVELOPE		.0
	128.0	80.1					
15	128.0	80.1	168.2	4	NONLINEAR ENVELOPE		.0
	128.1	80.1					
16	128.2	80.1	670.6	4	NONLINEAR ENVELOPE		.0
	128.4	80.1					
17	132.8	80.2	19468.3	4	NONLINEAR ENVELOPE		.0
	137.3	80.4					
18	139.3	80.5	9207.3	4	NONLINEAR ENVELOPE		.0
	141.4	80.6					
19	145.8	81.1	20379.9	5	.00	35.00	.0
	150.2	81.6					
20	154.2	82.2	18400.9	5	.00	35.00	.0
	158.2	82.8					

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	158.2	82.8					
21	162.5	83.7	20240.7	7	NONLINEAR ENVELOPE		.0
	166.9	84.6					
22	167.6	84.8	3494.7	7	NONLINEAR ENVELOPE		.0
	168.4	85.0					
23	172.7	86.1	19864.3	7	NONLINEAR ENVELOPE		.0
	177.0	87.3					
24	181.2	88.7	19142.5	7	NONLINEAR ENVELOPE		.0
	185.4	90.1					
25	189.6	91.7	18116.9	7	NONLINEAR ENVELOPE		.0
	193.7	93.3					
26	197.8	95.2	16810.9	7	NONLINEAR ENVELOPE		.0
	201.8	97.0					
27	204.8	98.5	11617.9	7	NONLINEAR ENVELOPE		.0
	207.8	100.0					
28	211.7	102.2	14011.5	8	NONLINEAR ENVELOPE		.0
	215.5	104.4					

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29	219.3	106.8	12242.2	8	NONLINEAR ENVELOPE	.0
	223.1	109.2				
30	225.7	111.0	7737.9	8	NONLINEAR ENVELOPE	.0
	228.4	112.9				
31	229.8	113.9	3733.5	8	NONLINEAR ENVELOPE	.0
	231.2	115.0				
32	234.6	117.8	8067.4	9	NONLINEAR ENVELOPE	.0
	238.1	120.6				
33	241.4	123.6	6079.3	9	NONLINEAR ENVELOPE	.0
	244.7	126.5				
34	246.5	128.3	2533.6	9	NONLINEAR ENVELOPE	.0
	248.3	130.0				
35	251.4	133.2	3061.1	10	NONLINEAR ENVELOPE	.0
	254.4	136.5				
36	254.5	136.5	23.3	10	NONLINEAR ENVELOPE	.0
	254.5	136.5				
37	256.2	138.5	618.6	6	.00 35.00	.0
	257.9	140.4				

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TABLE NO. 27
```
*****************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for      *
*  Individual Slices for Conventional  Computations or the    *
*  First Stage of Multi-Stage Computations.                    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                                *
*****************************************************************
```

FORCES DUE TO SURFACE PRESSURES

Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
1	60.3	0.	95.1	0.	0.	.0	.0
2	68.5	0.	93.4	0.	0.	.0	.0
3	76.4	0.	92.1	0.	0.	.0	.0
4	80.5	0.	91.5	0.	0.	.0	.0
5	85.2	0.	91.4	0.	0.	.0	.0
6	89.7	0.	91.4	0.	0.	.0	.0
7	94.2	0.	91.3	0.	0.	.0	.0
8	102.9	0.	91.3	0.	0.	.0	.0
9	107.9	0.	91.5	0.	0.	.0	.0
10	112.8	0.	91.9	0.	0.	.0	.0
11	121.7	0.	93.1	0.	0.	.0	.0
12	126.9	0.	94.0	0.	0.	.0	.0
13	127.8	0.	94.2	0.	0.	.0	.0
14	128.0	0.	94.3	0.	0.	.0	.0
15	128.0	0.	94.3	0.	0.	.0	.0
16	128.2	0.	94.3	0.	0.	.0	.0
17	132.8	0.	95.0	0.	0.	.0	.0
18	139.3	0.	95.9	0.	0.	.0	.0
19	145.8	0.	97.2	0.	0.	.0	.0
20	154.2	0.	99.0	0.	0.	.0	.0
21	162.5	0.	101.0	0.	0.	.0	.0
22	167.6	0.	102.2	0.	0.	.0	.0
23	172.7	0.	103.5	0.	0.	.0	.0
24	181.2	0.	105.8	0.	0.	.0	.0
25	189.6	0.	108.4	0.	0.	.0	.0
26	197.8	0.	111.2	0.	0.	.0	.0
27	204.8	0.	113.8	0.	0.	.0	.0
28	211.7	0.	116.5	0.	0.	.0	.0
29	219.3	0.	119.8	0.	0.	.0	.0
30	225.7	0.	122.8	0.	0.	.0	.0
31	229.8	0.	124.8	0.	0.	.0	.0
32	234.6	0.	127.3	0.	0.	.0	.0
33	241.4	0.	130.9	0.	0.	.0	.0
34	246.5	0.	333.8	0.	0.	.0	.0
35	251.4	0.	136.5	0.	0.	.0	.0
36	254.5	0.	138.0	0.	0.	.0	.0
37	256.2	0.	139.2	0.	0.	.0	.0

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TABLE NO. 29
```
**********************************************************************
*  Information Generated During Iterative Solution for the Factor  *
*  of Safety and Side Force Inclination by Spencer's Procedure     *
**********************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment                  Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F     Theta
ation  Safety   (degrees)     (lbs.)    (ft.-lbs.)             (degrees)

   1   3.00000    15.0000  -.2360E+05   .1552E+07
First-order corrections to F and THETA .........   .335E+00 -.169E+02
Values factored by  .508E+00 - Deltas too large    .170E+00 -.859E+01

   2   3.17049     6.4056  -.1298E+05   .5919E+06
First-order corrections to F and THETA .........   .724E+00  .722E+01
Values factored by  .690E+00 - Deltas too large    .500E+00  .498E+01

   3   3.67049    11.3884  -.5578E+04   .4110E+06
First-order corrections to F and THETA .........   .263E+00 -.113E+01
Second-order correction - Iteration   1 ........   .288E+00 -.113E+01
Second-order correction - Iteration   2 ........   .288E+00 -.113E+01

   4   3.95887    10.2609   .3783E+02  -.2045E+05
First-order corrections to F and THETA .........   .532E-02  .201E+00
Second-order correction - Iteration   1 ........   .534E-02  .201E+00
Second-order correction - Iteration   2 ........   .534E-02  .201E+00

   5   3.96421    10.4623   .1440E-01  -.3420E+01
First-order corrections to F and THETA .........   .170E-06  .282E-04
```

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was 9.709 - at slice 33
Material: 9 Normal stress: 709.550
Strength from previous trial: 501.240
Estimated strength for new trial: 555.140

TABLE NO. 29
```
**********************************************************************
*  Information Generated During Iterative Solution for the Factor  *
*  of Safety and Side Force Inclination by Spencer's Procedure     *
**********************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment                  Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F     Theta
ation  Safety   (degrees)     (lbs.)    (ft.-lbs.)             (degrees)

   1   3.96421    10.4623  -.1289E+03   .1001E+05
First-order corrections to F and THETA .........   .732E-02 -.225E-01
Second-order correction - Iteration   1 ........   .733E-02 -.234E-01
Second-order correction - Iteration   2 ........   .734E-02 -.234E-01

   2   2.97154    10.4390   .2686E-02  -.7143E-01
First-order corrections to F and THETA ......... -.211E-06 -.105E-05
```

For trial number 3 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 33
Material: 9 Normal stress: 702.308
Strength from previous trial: 550.437
Estimated strength for new trial: 550.437

TABLE NO. 29
```
**********************************************************************
*  Information Generated During Iterative Solution for the Factor  *
*  of Safety and Side Force Inclination by Spencer's Procedure     *
**********************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment                  Delta
Iter-    of     Inclination  Imbalance  Imbalance   Delta-F     Theta
ation  Safety   (degrees)     (lbs.)    (ft.-lbs.)             (degrees)

   1   3.97154    10.4390   .2686E-02  -.7143E-01
First-order corrections to F and THETA ......... -.211E-06 -.105E-05
```

Factor of Safety - - - - - - - - - 3.972
Side Force Inclination - - - - - 10.44
Number of Iterations - - - - - - - 1

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 38
```
*****************************************************************
*  Final Results for Stresses Along the Shear Surface          *
*  (Results for Critical Shear Surface in Case of a Search.)   *
*****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 3.972 Side Force Inclination = 10.44 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE--------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	60.3	94.2	262.3	262.3	46.2
2	68.5	90.9	735.0	735.0	129.6
3	76.4	88.2	1100.5	1100.5	194.0
4	80.5	86.9	1280.3	1280.3	225.7
5	85.2	85.6	1584.3	1584.3	279.3
6	89.7	84.5	1861.6	1861.6	328.2
7	94.2	83.6	1965.2	1965.2	346.5
8	102.9	82.0	2119.3	2119.3	373.6
9	107.9	81.3	2184.2	2184.2	385.1
10	112.8	80.8	2209.5	2209.5	389.5
11	121.7	80.3	2220.0	2220.0	391.4
12	126.9	80.1	2206.1	2206.1	389.0
13	127.8	80.1	2150.1	2150.1	112.4
14	128.0	80.1	2149.9	2149.9	112.4
15	128.0	80.1	2149.8	2149.8	112.4
16	128.2	80.1	2149.5	2149.5	112.3
17	132.8	80.2	2193.8	2193.8	113.7
18	139.3	80.5	2249.4	2249.4	115.3
19	145.8	81.1	2289.3	2289.3	403.6
20	154.2	82.2	2264.5	2264.5	399.2
21	162.5	83.7	2227.8	2227.8	388.0
22	167.6	84.8	2210.3	2210.3	385.2
23	172.7	86.1	2170.3	2170.3	378.6
24	181.2	88.7	2084.4	2084.4	364.6
25	189.6	91.7	1971.4	1971.4	346.1
26	197.8	95.2	1832.8	1832.8	323.4
27	204.8	98.5	1693.4	1693.4	300.6
28	211.7	102.2	1542.2	1542.2	275.9
29	219.3	106.8	1359.4	1359.4	246.0
30	225.7	111.0	1188.4	1188.4	218.1
31	229.8	113.9	1069.5	1069.5	198.6
32	234.6	117.8	919.1	919.1	174.0
33	241.4	123.6	702.3	702.3	138.6
34	246.5	128.3	517.3	517.3	126.2
35	251.4	133.2	326.5	326.5	126.2
36	254.5	136.5	207.0	207.0	126.2
37	256.2	138.5	132.2	132.2	23.3

CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION = .01 (= .105E-01)
SHOULD NOT EXCEED .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION = .02 (= .210E-01)
SHOULD NOT EXCEED .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN = .64 (= .641E+00)
SHOULD NOT EXCEED .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM = .00 (= .262E-02)
SHOULD NOT EXCEED .100E+03

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 39
```
*****************************************************************
*  Final Results for Side Forces and Stresses Between Slices.  *
*  (Results for Critical Shear Surface in Case of a Search.)   *
*****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 3.972 Side Force Inclination = 10.44 Degrees

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	64.4	1330.	95.0	.712	838.4	-100.7
2	72.7	4755.	93.0	.553	924.9	479.7
3	80.0	8790.	91.8	.536	1171.0	754.3
4	80.9	9340.	91.7	.522	1100.9	839.2
5	89.5	15396.	90.6	.438	688.4	1496.3
6	89.8	15627.	90.6	.436	677.8	1517.0
7	98.5	22238.	89.8	.399	482.2	1954.1
8	107.3	28410.	89.6	.383	390.1	2213.3
9	108.4	29079.	89.6	.382	382.5	2236.3
10	117.2	34378.	89.7	.374	333.7	2387.4
11	126.1	38663.	90.2	.370	302.1	2473.2
12	127.7	39294.	90.4	.369	297.5	2483.0
13	128.0	39331.	90.4	.370	302.8	2472.5
14	128.0	39332.	90.4	.370	303.1	2472.0
15	128.1	39341.	90.4	.370	304.4	2469.4
16	128.4	39376.	90.5	.371	309.6	2458.9
17	137.3	39837.	92.0	.388	431.0	2185.8
18	141.4	39693.	92.8	.396	476.7	2067.4
19	150.2	41156.	94.0	.388	414.7	2117.6
20	158.2	41528.	95.3	.383	368.6	2128.5
21	166.9	40871.	97.1	.378	327.0	2103.2
22	168.4	40651.	97.5	.378	320.5	2095.6
23	177.0	38794.	99.6	.374	285.7	2033.7
24	185.4	36023.	102.1	.372	255.3	1943.5
25	193.7	32479.	104.8	.370	228.5	1827.5
26	201.8	28338.	107.9	.369	204.2	1688.8
27	207.8	24960.	110.3	.369	186.9	1571.9
28	215.5	20261.	113.8	.368	164.8	1400.2
29	223.1	15530.	117.5	.369	145.0	1209.1
30	228.4	12195.	120.4	.371	133.1	1057.3
31	231.2	10479.	122.0	.372	128.1	971.1

32	238.1	6485.	126.2	.379	116.5	739.7
33	244.7	3177.	130.9	.409	133.5	455.3
34	248.3	1809.	133.7	.466	176.4	266.6
35	254.4	449.	138.1	.537	174.6	110.6
36	254.5	442.	138.2	.536	173.8	112.2
37	257.9	0.	247.2	ABOVE	.0	.0

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =        .01  (=  .105E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION   =        .02  (=  .210E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN  =        .64  (=  .641E+00)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM    =        .00  (=  .262E-02)
     SHOULD NOT EXCEED      .100E+03

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED
```

B_CIR.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.269 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.169 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175

MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 15
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80

ANAlysis/computation data follow -
Circle
144.579 422.318 342.868
PROCEDURE
SPENCER
FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

B_CIR.OUT

```
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          TABLE NO. 1
          ****************************************
          * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
          * Originally Coded By Stephen G. Wright  *
          * Version No. 1.206                      *
          * Last Revision Date  6/ 4/96            *
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          ****************************************

          ***************************************************************
          *                                                             *
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          * HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL    *
          * DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE    *
          * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER   *
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          STABILITY ANALYSES - 98 FEET
          CIRCULAR; RS 03/18/2002

          TABLE NO.  2
          *************************
          * NEW PROFILE LINE DATA *
          *************************

          PROFILE LINE  1 - MATERIAL TYPE =  1
          HAWTHORNE - MAT. 1

               Point       X              Y

                 1      -500.000        -80.000
                 2      1200.000        -80.000

          PROFILE LINE  2 - MATERIAL TYPE =  2
          SAND - MAT. 2

               Point       X              Y

                 1      -500.000         80.000
                 2      1200.000         80.000

          PROFILE LINE  3 - MATERIAL TYPE =  3
          BERM - MAT. 3

               Point       X              Y

                 1          .000         80.000
                 2        48.000         96.000
                 3        80.000         96.000
                 4       128.000         80.000
                 5      1200.000         90.880

          PROFILE LINE  4 - MATERIAL TYPE =  4
          LINER - MAT. 4

               Point       X              Y

                 1        80.000         96.000
                 2        80.904         96.226
                 3       128.079         80.501
                 4      1200.000         91.380

          PROFILE LINE  5 - MATERIAL TYPE =  5
          PROTECTIVE LAYER - MAT. 5

               Point       X              Y

                 1        80.904         96.226
                 2        69.819         95.362
                 3       128.394         82.504
                 4      1200.000         93.380

          PROFILE LINE  6 - MATERIAL TYPE =  6
          FINAL COVER - MAT. 6

               Point       X              Y

                 1        80.904         96.226
                 2       408.369        178.000
                 3      1200.000        178.000

          PROFILE LINE  7 - MATERIAL TYPE =  7
          MSW A - MAT. 7

               Point       X              Y

                 1        89.819         95.362
                 2       108.369        100.000
                 3      1200.000        100.000

          PROFILE LINE  8 - MATERIAL TYPE =  8
          MSW B - MAT. 8

               Point       X              Y

                 1       108.369        100.000
                 2       168.369        115.000
                 3      1200.000        115.000

          PROFILE LINE  9 - MATERIAL TYPE =  9
          MSW C - MAT. 9

               Point       X              Y

                 1       168.369        115.000
                 2       228.369        130.000
                 3      1200.000        130.000

          PROFILE LINE 10 - MATERIAL TYPE = 10
          MSW D - MAT. 10

               Point       X              Y

                 1       228.369        130.000
                 2       288.369        145.000
                 3      1200.000        145.000

          PROFILE LINE 11 - MATERIAL TYPE = 11
          MSW E - MAT. 11

               Point       X              Y

                 1       288.369        145.000
                 2       348.369        160.000
                 3      1200.000        160.000

          PROFILE LINE 12 - MATERIAL TYPE = 12
          MSW F - MAT. 12

               Point       X              Y

                 1       348.369        160.000
                 2       408.369        175.000
                 3      1200.000        175.000

          All new profile lines defined - No old lines retained
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          STABILITY ANALYSES - 98 FEET
          CIRCULAR; RS 03/18/2002

          TABLE NO.  3
          *********************************************************************
          * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
          *********************************************************************

          DATA FOR MATERIAL TYPE  1
          HAWTHORNE - MAT. 1

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  2
          SAND - MAT. 2

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  3
          BERM - MAT. 3

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  4
          LINER - MAT. 4

               Unit weight of material =  110.000

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1          -1000.000             .000
                 2               .000             .000
                 3           2005.000          429.000
                 4           5013.000          767.000
                 5          10025.000         1143.000
                 6          15038.000         1594.000
                 7          18000.000         1908.000

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  5
          PROTECTIVE LAYER - MAT. 5

               Unit weight of material =  110.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  6
          FINAL COVER - MAT. 6

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  7
          MSW A - MAT. 7

               Unit weight of material =   67.500

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1          -1000.000             .000
                 2             -1.000             .000
                 3               .000          501.240
                 4            208.850          501.240
                 5            417.700          501.240
                 6            626.550          501.240
                 7            835.400          636.867
                 8           5221.250         3485.038

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  8
          MSW B - MAT. 8

               Unit weight of material =   63.100

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1          -1000.000             .000
                 2           -100.000             .000
                 3               .000          501.240
                 4            208.850          501.240
                 5            417.700          501.240
                 6            626.550          501.240
```

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7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 9
MSW C - MAT. 9

Unit weight of material = 56.500

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

Unit weight of material = 53.400

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

Unit weight of material = 48.100

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

Unit weight of material = 22.600

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

All new material properties defined - No old data retained
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TABLE NO. 5
****
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
****

Line No.	Point	X	Y	
1 - Unit weight of water =		62.40		PHREATIC
1	1	-500.000	80.000	PHREATIC
1	2	1000.000	80.000	PHREATIC

All new piezometric lines defined - No old lines retained
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TABLE NO. 15
****
* NEW ANALYSIS/COMPUTATION DATA *
****

Circular Shear Surface(s)

Computations Performed for Single Shear Surface

Center Coordinates for Center of Circle -
X = 144.579
Y = 422.318
Radius = 342.868

Procedure used to compute the factor of safety: SPENCER

Initial trial estimate for the factor of safety = 3.000

Maximum number of iterations allowed for
calculating the factor of safety = 100

Short form of output will be used for search

THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination = 15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence = 100.000

Allowed moment imbalance for convergence = 100.000

Maximum subtended angle to be used for subdivision of the
circle into slices = 3.00 degrees

Depth of crack = .000

Depth of water in crack = .000

Unit weight of water in crack = 62.400

Seismic coefficient = .000

Conventional (single-stage) computations to be performed
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TABLE NO. 16
****
* NEW SLOPE GEOMETRY DATA *
****

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

Point	X	Y
1	-500.000	80.000
2	.000	80.000
3	48.000	96.000
4	80.000	96.000
5	80.904	96.226
6	408.369	178.000
7	1200.000	178.000

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	43.8	94.6					
1	45.9	94.0	673.2	3	.00	35.00	.0
	48.0	93.3					
2	56.7	91.0	10344.7	3	.00	35.00	.0
	65.4	88.7					
3	72.7	87.2	15544.0	3	.00	35.00	.0
	80.0	85.6					
4	80.5	85.5	1148.9	3	.00	35.00	.0
	80.9	85.4					
5	85.4	84.6	13452.2	3	.00	35.00	.0
	89.8	83.9					
6	98.7	82.7	33159.4	3	.00	35.00	.0
	107.6	81.4					
7	108.0	81.4	1527.2	3	.00	35.00	.0
	108.4	81.4					
8	116.8	80.7	34918.7	3	.00	35.00	.0
	125.2	80.0					
9	126.6	79.9	6099.4	2	.00	30.00	4.6
	128.0	79.9					
10	128.0	79.8	170.5	2	.00	30.00	9.4
	128.1	79.8					
11	128.2	79.8	680.4	2	.00	30.00	10.0
	128.4	79.8					
12	136.5	79.6	37464.9	2	.00	30.00	22.4
	144.6	79.4					
13	153.6	79.7	46430.2	2	.00	30.00	19.7
	162.5	79.9					
14	163.3	80.0	3985.7	2	.00	30.00	2.5
	164.0	80.0					
15	166.2	80.1	11993.8	3	.00	35.00	.0
	168.4	80.3					
16	169.4	80.4	5900.0	3	.00	35.00	.0
	170.5	80.4					
17	173.8	80.7	18508.3	4	NONLINEAR ENVELOPE		.0
	177.1	81.0					
18	186.0	82.1	50328.1	5	.00	35.00	.0
	195.0	83.2					
19	195.0	83.2	188.0	5	.00	35.00	.0
	195.0	83.2					
20	203.9	84.7	50617.6	7	NONLINEAR ENVELOPE		.0
	212.7	86.3					

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	212.7	86.3					
21	220.5	88.1	45155.8	7	NONLINEAR ENVELOPE		.0
	228.4	89.8					
22	237.0	92.3	48869.3	7	NONLINEAR ENVELOPE		.0
	245.7	94.7					
23	253.6	97.3	42852.4	7	NONLINEAR ENVELOPE		.0
	261.5	100.0					
24	269.9	103.3	42364.1	8	NONLINEAR ENVELOPE		.0
	278.2	106.6					
25	283.3	108.8	24044.1	8	NONLINEAR ENVELOPE		.0
	288.4	111.1					
26	292.5	113.0	18270.1	8	NONLINEAR ENVELOPE		.0
	296.6	115.0					
27	304.6	119.2	31616.4	9	NONLINEAR ENVELOPE		.0
	312.5	123.4					
28	318.1	126.7	19352.2	9	NONLINEAR ENVELOPE		.0
	323.8	130.0					

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29	331.3	134.9	21355.8	10	NONLINEAR ENVELOPE			.0
	338.8	139.8						
30	342.5	142.4	8512.1	10	NONLINEAR ENVELOPE			.0
	346.2	145.0						
31	347.3	145.8	2233.7	11	NONLINEAR ENVELOPE			.0
	348.4	146.6						
32	355.4	152.1	11057.7	11	NONLINEAR ENVELOPE			.0
	362.5	157.6						
33	363.9	158.8	1442.3	11	NONLINEAR ENVELOPE			.0
	365.4	160.0						
34	368.8	163.0	2830.0	12	NONLINEAR ENVELOPE			.0
	372.3	166.0						
35	374.6	168.1	830.2	6		.00	35.00	.0
	376.9	170.1						

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TABLE No. 27

****

* Seismic Forces and Forces Due to Surface Pressures for *
* Individual Slices for Conventional Computations or the *
* First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *

****

				FORCES DUE TO SURFACE PRESSURES			
Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
1	45.9	0.	94.6	0.	0.	.0	.0
2	56.7	0.	93.5	0.	0.	.0	.0
3	72.7	0.	91.6	0.	0.	.0	.0
4	80.5	0.	90.6	0.	0.	.0	.0
5	85.4	0.	90.9	0.	0.	.0	.0
6	96.7	0.	91.2	0.	0.	.0	.0
7	108.0	0.	91.6	0.	0.	.0	.0
8	116.8	0.	92.5	0.	0.	.0	.0
9	126.6	0.	93.8	0.	0.	.0	.0
10	128.0	0.	94.1	0.	0.	.0	.0
11	128.2	0.	94.1	0.	0.	.0	.0
12	136.5	0.	95.0	0.	0.	.0	.0
13	153.6	0.	97.0	0.	0.	.0	.0
14	163.3	0.	98.4	0.	0.	.0	.0
15	166.2	0.	98.9	0.	0.	.0	.0
16	169.4	0.	99.4	0.	0.	.0	.0
17	173.8	0.	100.2	0.	0.	.0	.0
18	186.0	0.	102.7	0.	0.	.0	.0
19	195.0	0.	104.6	0.	0.	.0	.0
20	203.9	0.	106.5	0.	0.	.0	.0
21	220.5	0.	110.3	0.	0.	.0	.0
22	237.0	0.	114.4	0.	0.	.0	.0
23	252.6	0.	119.1	0.	0.	.0	.0
24	269.9	0.	124.2	0.	0.	.0	.0
25	283.3	0.	128.7	0.	0.	.0	.0
26	292.5	0.	132.1	0.	0.	.0	.0
27	304.6	0.	136.7	0.	0.	.0	.0
28	318.1	0.	142.3	0.	0.	.0	.0
29	331.3	0.	148.2	0.	0.	.0	.0
30	342.5	0.	153.4	0.	0.	.0	.0
31	347.3	0.	155.7	0.	0.	.0	.0
32	355.4	0.	159.6	0.	0.	.0	.0
33	363.9	0.	164.1	0.	0.	.0	.0
34	368.8	0.	166.3	0.	0.	.0	.0
35	374.6	0.	168.8	0.	0.	.0	.0

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TABLE NO. 29

****

* Information Generated During Iterative Solution for the Factor *
* of Safety and Side Force Inclination by Spencer's Procedure *

****

Iter-ation	Trial Factor of Safety	Trial Side Force Inclination (degrees)	Force Imbalance (lbs.)	Moment Imbalance (ft.-lbs.)	Delta-F	Delta Theta (degrees)
1	3.00000	15.0000	-.3057E+05	.2119E+07		
First-order corrections to F and THETA					.429E+00	-.802E+01
Second-order correction - Iteration 1					.595E+00	-.802E+01
Second-order correction - Iteration 2					.613E+00	-.802E+01
Second-order correction - Iteration 3					.613E+00	-.802E+01
Values factored by .815E+00 - Deltas too large					.500E+00	-.654E+01
2	3.50000	8.4599	-.2858E+04	-.3639E+06		
First-order corrections to F and THETA					.126E+00	.265E+01
Second-order correction - Iteration 1					.130E+00	.265E+01
Second-order correction - Iteration 2					.130E+00	.265E+01
3	3.63021	11.1125	.6558E+01	.3327E+05		
First-order corrections to F and THETA					-.327E-02	-.152E+00
Second-order correction - Iteration 1					-.327E-02	-.152E+00
4	3.62695	10.9606	-.1373E-02	.2455E+02		
First-order corrections to F and THETA					-.220E-05	-.111E-03

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 31
Material: 11 Normal stress: 822.239
Strength from previous trial: 628.321
Estimated strength for new trial: 628.321

TABLE NO. 29

****

* Information Generated During Iterative Solution for the Factor *
* of Safety and Sida Force Inclination by Spencer's Procedure *

****

Iter-ation	Trial Factor of Safety	Trial Side Force Inclination (degrees)	Force Imbalance (lbs.)	Moment Imbalance (ft.-lbs.)	Delta-F	Delta Theta (degrees)
1	3.62695	10.9606	-.1373E-02	.2455E+02		
First-order corrections to F and THETA					-.220E-05	-.111E-03

Factor of Safety - - - - - - - - 3.627
Side Force Inclination - - - - - 10.96
Number of Iterations - - - - - - 1

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TABLE NO. 38

****

* Final Results for Stresses Along the Shear Surface *
* (Results for Critical Shear Surface in Case of a Search.) *

****

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 3.627 Side Force Inclination = 10.96 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	45.9	94.0	189.0	189.0	36.5
2	56.7	91.0	693.3	693.3	133.8
3	72.7	87.2	1206.2	1206.2	232.9
4	80.5	85.5	1429.6	1429.6	276.0
5	85.4	84.6	1686.4	1686.4	325.6
6	98.7	82.7	2047.5	2047.5	395.3
7	108.0	81.4	2178.8	2178.8	420.6
8	116.8	80.7	2232.6	2232.6	431.0
9	126.6	79.9	2263.8	2259.2	359.6
10	128.0	79.8	2266.7	2257.3	359.3
11	128.2	79.8	2267.7	2257.7	359.4
12	136.5	79.6	2408.3	2385.9	379.8
13	153.6	79.7	2644.0	2624.4	417.8
14	163.3	80.0	2745.5	2743.0	436.6
15	166.2	80.1	2776.2	2776.2	536.0
16	169.4	80.4	2791.9	2791.9	539.0
17	173.8	80.7	2761.2	2761.2	143.1
18	186.0	82.1	2797.2	2797.2	540.0
19	195.0	83.2	2783.0	2783.0	537.3
20	203.9	84.7	2778.0	2778.0	523.4
21	220.5	88.1	2743.3	2743.3	517.2
22	237.0	92.3	2640.9	2640.9	498.9
23	253.6	97.3	2477.6	2477.6	469.6
24	269.9	103.3	2276.1	2276.1	433.6
25	283.3	108.8	2087.2	2087.2	399.7
26	292.5	113.0	1931.6	1931.6	371.9
27	304.6	119.2	1706.4	1706.4	331.5
28	318.1	126.7	1440.2	1440.2	283.9
29	331.2	134.9	1165.1	1165.1	234.6
20	342.5	142.4	927.2	927.2	192.0
31	347.3	145.8	822.2	822.2	173.2
32	355.4	152.1	608.4	608.4	138.2
33	362.9	158.8	360.2	360.2	138.2
34	368.8	163.0	271.2	271.2	138.2
35	374.6	168.1	137.6	117.6	26.6

CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION = .02 (= .177E-01)
SHOULD NOT EXCEED .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION = .02 (= .201E-01)
SHOULD NOT EXCEED .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN = -25.49 (= -.255E+02)
SHOULD NOT EXCEED .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM = .00 (= .474E-02)
SHOULD NOT EXCEED .100E+03

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TABLE NO. 39

****

* Final Results for Side Forces and Stresses Between Slices. *
* (Results for Critical Shear Surface in Case of a Search.) *

****

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 3.627 Side Force Inclination = 10.96 Degrees

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	48.0	400.	94.4	.390	49.9	244.5
2	65.4	6016.	93.0	.594	1268.6	356.2
3	80.0	13352.	91.9	.603	2038.7	479.0
4	80.9	13857.	91.8	.591	1948.4	568.2
5	89.8	19499.	91.2	.504	1342.0	1280.2
6	107.6	31671.	90.7	.431	853.9	2045.8
7	108.4	32178.	90.7	.430	842.4	2067.0
8	125.2	42662.	91.1	.407	675.6	2195.2
9	128.0	44044.	91.3	.406	673.2	2400.6
10	128.1	44082.	91.3	.406	673.1	2400.7
11	128.4	44232.	91.3	.406	672.8	2401.2
12	144.6	51431.	92.6	.402	638.5	2451.9
13	162.5	57801.	94.5	.396	583.0	2510.5
14	164.0	58230.	94.6	.396	578.5	2513.8
15	168.4	59838.	95.1	.392	543.9	2565.1
16	170.5	60568.	95.3	.390	528.0	2587.8
17	177.1	59939.	96.8	.401	611.7	2386.2
16	195.0	63553.	99.3	.388	489.9	2514.5
19	195.0	63561.	99.3	.388	489.5	2514.8
20	212.7	64202.	102.5	.379	407.0	2534.7
21	228.4	62508.	106.0	.374	348.5	2492.3
22	245.7	58269.	110.5	.370	295.8	2384.9
23	261.5	52438.	115.2	.367	254.8	2236.8
24	278.2	44607.	120.8	.366	217.3	2032.2
25	288.4	39184.	124.6	.365	198.0	1882.8
26	296.6	34550.	127.8	.365	183.1	1750.1
27	312.5	25350.	134.6	.365	152.5	1470.0
28	323.8	18897.	139.8	.365	131.7	1249.1
29	338.8	10890.	147.4	.366	101.6	923.7
30	346.2	7403.	151.6	.375	104.1	727.7
31	348.4	6457.	152.8	.381	110.7	660.9
32	362.5	1605.	162.0	.486	162.3	191.0
33	365.4	1137.	163.9	.542	192.3	115.0
34	372.3	458.	167.7	.560	203.7	95.3
35	376.9	0.	16417.4	ABOVE	.0	.0

CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION = .02 (= .177E-01)
SHOULD NOT EXCEED .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION = .02 (= .201E-01)
SHOULD NOT EXCEED .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN = -25.49 (= -.255E+02)
SHOULD NOT EXCEED .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM = .00 (= .474E-02)
SHOULD NOT EXCEED .100E+03

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED

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```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.360

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175


MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80


ANAlysis/computation data follow -
Circle
214.324 296.218 277.114
PROCEDURE
SPENCER
FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

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```
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          TABLE NO. 1
          ****************************************
          * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
          * Originally Coded By Stephen G. Wright  *
          * Version No. 1.206                      *
          * Last Revision Date  6/ 4/96            *
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          ****************************************

          ***********************************************************
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          * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER *
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          CIRCULAR; RS 03/18/2002

          TABLE NO.  2
          ************************
          * NEW PROFILE LINE DATA *
          ************************

          PROFILE LINE  1 - MATERIAL TYPE =  1
          HAWTHORNE - MAT. 1

               Point       X              Y

                 1       -500.000        -80.000
                 2       1200.000        -80.000

          PROFILE LINE  2 - MATERIAL TYPE =  2
          SAND - MAT. 2

               Point       X              Y

                 1       -500.000         80.000
                 2       1200.000         80.000

          PROFILE LINE  3 - MATERIAL TYPE =  3
          BERM - MAT. 3

               Point       X              Y

                 1           .000         80.000
                 2         48.000         96.000
                 3         80.000         96.000
                 4        128.000         80.000
                 5       1200.000         90.880

          PROFILE LINE  4 - MATERIAL TYPE =  4
          LINER - MAT. 4

               Point       X              Y

                 1         80.000         96.000
                 2         80.904         96.226
                 3        128.079         80.501
                 4       1200.000         91.380

          PROFILE LINE  5 - MATERIAL TYPE =  5
          PROTECTIVE LAYER - MAT. 5

               Point       X              Y

                 1         80.904         96.226
                 2         89.819         95.362
                 3        128.394         82.504
                 4       1200.000         93.380

          PROFILE LINE  6 - MATERIAL TYPE =  6
          FINAL COVER - MAT. 6

               Point       X              Y

                 1         80.904         96.226
                 2        408.369        178.000
                 3       1200.000        178.000

          PROFILE LINE  7 - MATERIAL TYPE =  7
          MSW A - MAT. 7

               Point       X              Y

                 1         89.819         95.362
                 2        108.369        100.000
                 3       1200.000        100.000

          PROFILE LINE  8 - MATERIAL TYPE =  8
          MSW B - MAT. 8

               Point       X              Y

                 1        108.369        100.000
                 2        168.369        115.000
                 3       1200.000        115.000

          PROFILE LINE  9 - MATERIAL TYPE =  9
          MSW C - MAT. 9

               Point       X              Y

                 1        168.369        115.000
                 2        228.369        130.000
                 3       1200.000        130.000

          PROFILE LINE 10 - MATERIAL TYPE = 10
          MSW D - MAT. 10

               Point       X              Y

                 1        228.369        130.000
                 2        288.369        145.000
                 3       1200.000        145.000

          PROFILE LINE 11 - MATERIAL TYPE = 11
          MSW E - MAT. 11

               Point       X              Y

                 1        288.369        145.000
                 2        348.369        160.000
                 3       1200.000        160.000

          PROFILE LINE 12 - MATERIAL TYPE = 12
          MSW F - MAT. 12

               Point       X              Y

                 1        348.369        160.000
                 2        408.369        175.000
                 3       1200.000        175.000

          All new profile lines defined - No old lines retained
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          TABLE NO.  3
          ******************************************************************
          * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
          ******************************************************************

          DATA FOR MATERIAL TYPE  1
          HAWTHORNE - MAT. 1

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  2
          SAND - MAT. 2

               Unit weight of material =  115.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  30.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  3
          BERM - MAT. 3

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  4
          LINER - MAT. 4

               Unit weight of material =  110.000

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1           -1000.000            .000
                 2                .000            .000
                 3            2005.000         429.000
                 4            5013.000         767.000
                 5           10025.000        1143.000
                 6           15038.000        1594.000
                 7           18000.000        1908.000

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  5
          PROTECTIVE LAYER - MAT. 5

               Unit weight of material =  110.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  6
          FINAL COVER - MAT. 6

               Unit weight of material =  120.000

               CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
               Cohesion - - - - - - - -          .000
               Friction angle - - - - -  35.000 degrees

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  7
          MSW A - MAT. 7

               Unit weight of material =   67.500

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1           -1000.000            .000
                 2              -1.000            .000
                 3                .000         501.240
                 4             208.850         501.240
                 5             417.700         501.240
                 6             626.550         501.240
                 7             835.400         636.867
                 8            5221.250        3485.036

               Pore water pressures defined by piezometric line
               Number of the piezometric line used =  1
               Negative pore pressures set to zero

          DATA FOR MATERIAL TYPE  8
          MSW B - MAT. 8

               Unit weight of material =   63.100

               ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
               Point      Normal Stress      Shear Stress

                 1           -1000.000            .000
                 2            -100.000            .000
                 3                .000         501.240
                 4             208.850         501.240
                 5             417.700         501.240
                 6             626.550         501.240
```

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7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 9
MSW C - MAT. 9

Unit weight of material = 58.500

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

Unit weight of material = 53.400

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

Unit weight of material = 48.100

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

Unit weight of material = 22.600

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

All new material properties defined - No old data retained
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TABLE NO. 5
****
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
****

Line No.	Point	X	Y	
1 - Unit weight of water =			62.40	PHREATIC
1	1	-500.000	80.000	PHREATIC
1	2	1000.000	80.000	PHREATIC

All new piezometric lines defined - No old lines retained
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TABLE NO. 15
****
* NEW ANALYSIS/COMPUTATION DATA *
****

Circular Shear Surface(s)

Computations Performed for Single Shear Surface

Center Coordinates for Center of Circle -
X = 214.324
Y = 296.218
Radius = 277.114

Procedure used to compute the factor of safety: SPENCER

Initial trial estimate for the factor of safety = 3.000

Maximum number of iterations allowed for
calculating the factor of safety = 100

Short form of output will be used for search

THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination = 15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence = 100.000

Allowed moment imbalance for convergence = 100.000

Maximum subtended angle to be used for subdivision of the
circle into slices = 3.00 degrees

Depth of crack = .000

Depth of water in crack = .000

Unit weight of water in crack = 62.400

Seismic coefficient = .000

Conventional (single-stage) computations to be performed
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TABLE NO. 16
****
* NEW SLOPE GEOMETRY DATA *
****

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

Point	X	Y
1	-500.000	80.000
2	.000	80.000
3	48.000	96.000
4	80.000	96.000
5	80.904	96.226
6	408.369	178.000
7	1200.000	178.000

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	29.4	89.8					
1	35.0	85.1	8676.3	3	.00	35.00	.0
	40.5	80.4					
2	40.7	80.2	828.1	3	.00	35.00	.0
	41.0	80.0					
3	44.5	77.3	14650.4	2	.00	30.00	169.5
	48.0	74.6					
4	53.9	70.4	35811.9	2	.00	30.00	601.0
	59.8	66.2					
5	66.0	62.3	48486.3	2	.00	30.00	1105.6
	72.1	58.4					
6	76.0	56.1	36960.5	2	.00	30.00	1490.3
	80.0	53.8					
7	80.5	53.6	4491.5	2	.00	30.00	1648.2
	80.9	53.3					
8	85.4	51.0	48147.5	2	.00	30.00	1810.1
	89.8	48.6					
9	96.4	45.6	80657.3	2	.00	30.00	2149.1
	102.9	42.5					
10	105.7	41.3	35930.9	2	.00	30.00	2413.9
	108.4	40.2					
11	115.1	37.6	95420.4	2	.00	30.00	2648.1
	121.9	35.0					
12	125.0	33.9	45298.9	2	.00	30.00	2874.8
	128.0	32.9					
13	128.0	32.9	597.2	2	.00	30.00	2940.3
	128.1	32.9					
14	128.2	32.8	2383.9	2	.00	30.00	2944.3
	128.4	32.8					
15	135.3	30.7	110204.1	2	.00	30.00	3076.6
	142.3	28.6					
16	149.4	26.9	121096.5	2	.00	30.00	3311.8
	156.4	25.2					
17	162.4	24.1	109193.6	2	.00	30.00	3489.2
	168.4	22.9					
18	175.6	21.9	137612.0	2	.00	30.00	3623.8
	182.7	20.9					
19	190.0	20.3	144338.5	2	.00	30.00	3727.0
	197.2	19.6					
20	204.4	19.4	149477.2	2	.00	30.00	3783.0
	211.7	19.1					

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	211.7	19.1					
21	213.0	19.1	27632.7	2	.00	30.00	3799.5
	214.3	19.1					
22	221.3	19.3	148542.3	2	.00	30.00	3788.8
	228.4	19.5					
23	235.6	20.0	154747.9	2	.00	30.00	3742.9
	242.8	20.6					
24	250.0	21.5	154317.5	2	.00	30.00	3649.8
	257.2	22.4					
25	264.4	23.8	152203.7	2	.00	30.00	3509.7
	271.5	25.1					
26	278.5	26.7	148450.5	2	.00	30.00	3321.0
	285.6	28.4					
27	287.0	28.8	28761.1	2	.00	30.00	3194.6
	288.4	29.2					
28	295.3	31.3	141768.6	2	.00	30.00	3038.9
	302.2	33.4					

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29	309.1	35.9	134440.6	2	.00	30.00	2751.7
	315.9	38.4					
30	322.6	41.2	125790.1	2	.00	30.00	2420.1
	329.2	44.1					
31	335.8	47.2	115960.5	2	.00	30.00	2044.8
	342.3	50.4					
32	345.3	52.0	51578.5	2	.00	30.00	1744.4
	348.4	53.7					
33	354.6	57.4	99137.3	2	.00	30.00	1413.0
	360.9	61.0					
34	366.9	65.0	86190.3	2	.00	30.00	934.4
	373.0	69.0					
35	378.8	73.3	72800.9	2	.00	30.00	416.3
	384.7	77.6					
36	386.2	78.8	16896.9	2	.00	30.00	73.7
	387.7	80.0					
37	389.3	81.3	17611.5	3	.00	35.00	.0
	390.9	82.7					
38	391.2	82.9	3173.4	4	NONLINEAR	ENVELOPE	.0
	391.5	83.2					
39	392.7	84.2	12190.8	5	.00	35.00	.0
	393.9	85.2					
40	399.3	90.0	50391.2	7	NONLINEAR	ENVELOPE	.0
	404.7	94.9					

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TABLE NO. 26

```
*****************************************************************
*  Coordinate, Height, Strength and Pore Water Pressure         *
*  Information for Individual Slices for Conventional           *
*  Computations or First Stage of Multi-Stage Computations.     *
*  (Information is for the Critical Shear Surface in the        *
*  Case of an Automatic Search.)                                *
*****************************************************************
```

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	404.7	94.9					
41	406.6	96.6	15462.2	7	NONLINEAR	ENVELOPE	.0
	408.4	98.4					
42	409.2	99.2	6703.8	7	NONLINEAR	ENVELOPE	.0
	410.0	100.0					
43	415.0	105.3	37143.2	8	NONLINEAR	ENVELOPE	.0
	420.0	110.5					
44	422.0	112.8	12854.8	8	NONLINEAR	ENVELOPE	.0
	424.0	115.0					
45	428.6	120.6	25482.8	9	NONLINEAR	ENVELOPE	.0
	433.2	126.2					
46	434.6	128.1	6726.3	9	NONLINEAR	ENVELOPE	.0
	436.1	130.0					
47	440.3	135.9	15997.9	10	NONLINEAR	ENVELOPE	.0
	444.4	141.8					
48	445.5	143.4	3151.5	10	NONLINEAR	ENVELOPE	.0
	446.5	145.0					
49	450.3	151.2	8531.9	11	NONLINEAR	ENVELOPE	.0
	454.1	157.4					
50	454.9	158.7	1150.6	11	NONLINEAR	ENVELOPE	.0
	455.6	160.0					
51	459.0	166.4	3767.5	12	NONLINEAR	ENVELOPE	.0
	462.4	172.8					
52	463.0	173.9	413.1	12	NONLINEAR	ENVELOPE	.0
	463.5	175.0					
53	464.2	176.5	258.7	6	.00	35.00	.0
	465.0	178.0					

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 27

```
*****************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for       *
*  Individual Slices for Conventional  Computations or the      *
*  First Stage of Multi-Stage Computations.                     *
*  (Information is for the Critical Shear Surface in the        *
*  Case of an Automatic Search.)                                *
*****************************************************************
```

Slice No.	X	Seismic Force	Y for Seismic Force	FORCES DUE TO SURFACE PRESSURES: Normal Force	Shear Force	X	Y
1	35.0	0.	88.4	0.	0.	.0	.0
2	40.7	0.	86.9	0.	0.	.0	.0
3	44.5	0.	86.1	0.	0.	.0	.0
4	53.9	0.	83.3	0.	0.	.0	.0
5	66.0	0.	79.3	0.	0.	.0	.0
6	76.0	0.	76.3	0.	0.	.0	.0
7	80.5	0.	75.1	0.	0.	.0	.0
8	85.4	0.	74.3	0.	0.	.0	.0
9	96.4	0.	72.3	0.	0.	.0	.0
10	105.7	0.	70.4	0.	0.	.0	.0
11	115.1	0.	68.9	0.	0.	.0	.0
12	125.0	0.	67.5	0.	0.	.0	.0
13	128.0	0.	67.1	0.	0.	.0	.0
14	128.2	0.	67.1	0.	0.	.0	.0
15	135.3	0.	66.7	0.	0.	.0	.0
16	149.4	0.	66.0	0.	0.	.0	.0
17	162.4	0.	65.7	0.	0.	.0	.0
18	175.6	0.	65.8	0.	0.	.0	.0
19	190.0	0.	66.2	0.	0.	.0	.0
20	204.4	0.	67.0	0.	0.	.0	.0
21	213.0	0.	67.6	0.	0.	.0	.0
22	221.3	0.	68.5	0.	0.	.0	.0
23	235.6	0.	70.2	0.	0.	.0	.0
24	250.0	0.	72.2	0.	0.	.0	.0
25	264.4	0.	74.7	0.	0.	.0	.0
26	278.5	0.	77.6	0.	0.	.0	.0
27	287.0	0.	79.6	0.	0.	.0	.0
28	295.3	0.	81.7	0.	0.	.0	.0
29	309.1	0.	85.5	0.	0.	.0	.0
30	322.6	0.	89.8	0.	0.	.0	.0
31	335.8	0.	94.7	0.	0.	.0	.0
32	345.3	0.	98.6	0.	0.	.0	.0
33	354.6	0.	102.6	0.	0.	.0	.0
34	366.9	0.	108.5	0.	0.	.0	.0
35	378.8	0.	115.2	0.	0.	.0	.0
36	386.2	0.	120.1	0.	0.	.0	.0
37	389.3	0.	122.5	0.	0.	.0	.0
38	391.2	0.	124.1	0.	0.	.0	.0
39	392.7	0.	125.3	0.	0.	.0	.0

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 27

```
*****************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for       *
*  Individual Slices for Conventional  Computations or the      *
*  First Stage of Multi-Stage Computations.                     *
*  (Information is for the Critical Shear Surface in the        *
*  Case of an Automatic Search.)                                *
*****************************************************************
```

Slice No.	X	Seismic Force	Y for Seismic Force	FORCES DUE TO SURFACE PRESSURES: Normal Force	Shear Force	X	Y
40	399.3	0.	129.4	0.	0.	.0	.0
41	406.6	0.	133.8	0.	0.	.0	.0
42	409.2	0.	135.4	0.	0.	.0	.0
43	415.0	0.	138.9	0.	0.	.0	.0
44	422.0	0.	143.2	0.	0.	.0	.0
45	428.6	0.	147.7	0.	0.	.0	.0
46	434.6	0.	152.1	0.	0.	.0	.0
47	440.3	0.	156.6	0.	0.	.0	.0
48	445.5	0.	161.2	0.	0.	.0	.0
49	450.3	0.	165.9	0.	0.	.0	.0
50	454.9	0.	171.1	0.	0.	.0	.0
51	459.0	0.	174.5	0.	0.	.0	.0
52	463.0	0.	176.4	0.	0.	.0	.0
53	464.2	0.	177.3	0.	0.	.0	.0

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 29

```
*********************************************************************
*  Information Generated During Iterative Solution for the Factor   *
*  of Safety and Side Force Inclination by Spencer's Procedure      *
*********************************************************************

        Trial     Trial
        Factor  Side Force    Force      Moment                Delta
 Iter-    of    Inclination Imbalance  Imbalance   Delta-F     Theta
 ation  Safety   (degrees)    (lbs.)   (ft.-lbs.)            (degrees)

    1  3.00000    15.0000  -.2955E+06  .1847E+06
 First-order corrections to F and THETA .........  .442E+00 -.137E+02
 Values factored by  .628E+00 - Deltas too large   .278E+00 -.859E+01

    2  3.27776     6.4056  -.1411E+06  .3616E+07
 First-order corrections to F and THETA .........  .934E+00 -.336E+00
 Values factored by  .535E+00 - Deltas too large   .500E+00 -.180E+00

    3  3.77776     6.2257  -.7554E+05  .1847E+07
 First-order corrections to F and THETA .........  .677E+00 -.874E-01
 Values factored by  .739E+00 - Deltas too large   .500E+00 -.646E-01

    4  4.27776     6.1611  -.2622E+05  .6126E+06
 First-order corrections to F and THETA .........  .304E+00 -.121E-01
 Second-order correction - Iteration   1 ........  .329E+00 -.121E-01
 Second-order correction - Iteration   2 ........  .329E+00 -.121E-01

    5  4.60713     6.1490   .1582E+03 -.4790E+04
 First-order corrections to F and THETA ......... -.207E-02  .526E-03
 Second-order correction - Iteration   1 ........ -.207E-02  .533E-03

    6  4.60506     6.1495  -.1094E+00  .1553E+02
 First-order corrections to F and THETA .........  .751E-06 -.550E-05

 For trial number  2 with a nonlinear strength envelope the maximum
 percent change in shear strength was     40.987 - at slice  48
 Material: 10      Normal stress:        1162.631
 Strength from previous trial:          501.240
 Estimated strength for new trial:        849.371
```

TABLE NO. 29

```
*********************************************************************
*  Information Generated During Iterative Solution for the Factor   *
*  of Safety and Side Force Inclination by Spencer's Procedure      *
*********************************************************************

        Trial     Trial
        Factor  Side Force    Force      Moment                Delta
 Iter-    of    Inclination Imbalance  Imbalance   Delta-F     Theta
 ation  Safety   (degrees)    (lbs.)   (ft.-lbs.)            (degrees)

    1  4.60506     6.1495  -.9176E+03  .9090E+05
 First-order corrections to F and THETA .........  .849E-02 -.297E-01
 Second-order correction - Iteration   1 ........  .851E-02 -.297E-01
 Second-order correction - Iteration   2 ........  .851E-02 -.297E-01

    2  4.61357     6.1198   .8578E-01 -.7510E+02
 First-order corrections to F and THETA .........  .289E-05  .309E-04

 For trial number  3 with a nonlinear strength envelope the maximum
 percent change in shear strength was       .000 - at slice  49
 Material: 11      Normal stress:         786.596
 Strength from previous trial:          605.174
 Estimated strength for new trial:        605.174
```

TABLE NO. 29

```
*********************************************************************
*  Information Generated During Iterative Solution for the Factor   *
*  of Safety and Side Force Inclination by Spencer's Procedure      *
*********************************************************************

        Trial     Trial
        Factor  Side Force    Force      Moment                Delta
 Iter-    of    Inclination Imbalance  Imbalance   Delta-F     Theta
 ation  Safety   (degrees)    (lbs.)   (ft.-lbs.)            (degrees)

    1  4.61357     6.1198   .8578E-01 -.7510E+02
 First-ordar corrections to F and THETA .........  .289E-05  .309E-04

 Factor of Safety - - - - - - - -      4.614
 Side Force Inclination - - - - -       6.12
 Number of Iterations - - - - - -      1
```

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STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 38

```
*****************************************************************
*  Final Results for Stresses Along the Shear Surface           *
*  (Results for Critical Shear Surface in Case of a Search.)    *
*****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 4.614 Side Force Inclination = 6.12 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	35.0	85.1	1027.6	1027.6	156.0
2	40.7	80.2	2069.0	2069.0	314.0
3	44.5	77.3	2571.5	2402.1	300.6
4	53.9	70.4	3610.5	3009.5	376.6
5	66.0	62.3	4593.5	3488.0	436.5
6	76.0	56.1	5323.0	3832.6	479.6
7	80.5	53.6	5629.9	3981.7	498.3
8	85.4	51.0	6082.2	4272.1	534.6
9	96.4	45.6	6826.8	4677.7	585.4

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10	105.7	41.3	7284.3	4870.4	609.5
11	115.1	37.6	7667.5	5019.4	628.1
12	125.0	33.9	8026.7	5151.9	644.7
13	128.0	32.9	8127.9	5187.6	649.2
14	128.2	32.8	8134.8	5190.5	649.5
15	135.3	30.7	8468.1	5391.5	674.7
16	149.4	26.9	9072.3	5760.5	720.9
17	162.4	24.1	9546.8	6057.6	758.1
18	175.6	21.9	9926.0	6302.2	788.7
19	190.0	20.3	10244.0	6517.0	815.6
20	204.4	19.4	10469.4	6686.4	836.7
21	213.0	19.1	10570.0	6770.5	847.3
22	221.3	19.3	10617.3	6828.5	854.5
23	235.6	20.0	10636.2	6893.3	862.6
24	250.0	21.5	10559.4	6909.6	864.7
25	264.4	23.8	10395.9	6886.2	861.7
26	278.5	26.7	10147.6	6824.6	854.0
27	287.0	28.8	9969.3	6774.6	847.8
28	295.3	31.3	9722.9	6694.0	837.7
29	309.1	35.9	9288.8	6537.0	818.1
30	322.6	41.2	8768.0	6347.9	794.4
31	335.8	47.2	8173.5	6128.7	767.0
32	345.3	52.0	7696.3	5952.0	744.8
33	354.6	57.4	7132.0	5719.0	715.7
34	366.9	65.0	6301.2	5366.8	671.6
35	378.8	73.3	5413.7	4997.5	625.4
36	386.2	78.8	4833.8	4760.1	595.7
37	389.3	81.3	4498.3	4498.3	682.7
38	391.2	82.9	4666.0	4666.0	161.6
39	392.7	84.2	4217.2	4217.2	640.0

1

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
40	399.3	90.0	3851.7	3851.7	562.6
41	406.6	96.6	3468.7	3468.7	508.7
42	409.2	99.2	3318.3	3318.3	487.5
43	415.0	105.3	2966.4	2966.4	438.0
44	422.0	112.8	2544.0	2544.0	378.5
45	428.6	120.6	2134.5	2134.5	320.9
46	434.6	128.1	1761.6	1761.6	268.4
47	440.3	135.9	1408.1	1408.1	218.7
48	445.5	143.4	1085.5	1085.5	173.2
49	450.3	151.2	786.6	786.6	131.2
50	454.9	158.7	491.9	491.9	108.6
51	459.0	166.4	300.3	300.3	108.6
52	463.0	173.9	144.1	144.1	108.6
53	464.2	176.5	118.1	118.1	17.9

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =          .08  (=  .795E-01)
     SHOULD NOT EXCEED       .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION   =          .25  (=  .246E+00)
     SHOULD NOT EXCEED       .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN  =        82.63  (=  .826E+02)
     SHOULD NOT EXCEED       .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM    =          .02  (=  .226E-01)
     SHOULD NOT EXCEED       .100E+03
```

1

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
CIRCULAR; RS 03/18/2002

TABLE NO. 39

```
****************************************************************
*  Final Results for Side Forces and Stresses Between Slices.  *
*  (Results for Critical Shear Surface in Case of a Search.)   *
****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 4.614 Side Force Inclination = 6.12 Degrees

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	40.5	11443.	85.7	.404	371.1	1368.7
2	41.0	12469.	85.3	.380	298.7	1515.7
3	48.0	28633.	81.3	.315	-147.4	2804.2
4	59.8	63619.	76.2	.337	44.0	4196.8
5	72.1	104895.	71.8	.356	378.9	5168.4
6	80.0	133136.	69.2	.365	595.1	5684.0
7	80.9	136413.	68.9	.364	579.3	5745.6
8	89.8	169885.	66.3	.354	415.9	6367.4
9	102.9	220023.	62.8	.343	213.6	7169.9
10	108.4	240283.	61.5	.340	147.3	7446.3
11	121.9	288896.	58.8	.334	12.6	8022.1
12	128.0	309578.	57.8	.332	-39.4	8237.4
13	228.1	309841.	57.8	.332	-40.0	8240.1
14	128.4	310889.	57.7	.332	-42.6	8350.5
15	142.3	355551.	55.7	.327	-163.6	8689.4
16	156.4	396824.	54.2	.322	-293.0	9075.2
17	168.4	427873.	53.2	.318	-400.6	9345.2
18	182.7	459539.	52.6	.314	-521.9	9592.8
19	197.2	484539.	52.4	.310	-632.3	9754.4
20	211.7	502193.	52.8	.307	-730.1	9828.0
21	214.3	504576.	52.9	.306	-746.4	9831.9
22	228.4	512843.	53.8	.303	-824.9	9803.1
23	242.8	513472.	55.4	.300	-890.4	9686.2
24	257.2	506126.	57.4	.297	-939.0	9482.2
25	271.5	491097.	60.0	.294	-969.8	9193.4
26	285.6	468892.	63.1	.292	-981.6	8822.8
27	288.4	463715.	63.8	.291	-981.6	8740.2
28	302.2	433889.	67.6	.289	-969.7	8277.0
29	315.9	398755.	71.9	.287	-937.4	7742.8
30	329.2	359441.	76.7	.286	-884.4	7144.1
31	342.3	317223.	82.2	.286	-810.4	6489.3
32	348.4	296470.	84.9	.206	-767.7	6159.9
33	360.9	252769.	91.2	.287	-669.1	5451.2
34	373.0	210297.	97.9	.288	-566.7	4742.7
35	384.7	170732.	105.0	.289	-475.2	4070.1
36	387.7	161033.	106.9	.289	-455.0	3904.8
37	390.9	151210.	108.9	.288	-448.2	3753.4
38	391.5	148934.	109.3	.289	-436.8	3705.0
39	393.9	141896.	110.9	.288	-433.6	3597.0
40	404.7	110470.	118.1	.282	-408.7	3081.1

1

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
41	408.4	100137.	120.7	.281	-395.7	2896.8
42	410.0	95542.	121.9	.281	-380.5	2816.3
43	420.0	68592.	129.8	.285	-290.2	2311.3
44	424.0	58615.	133.1	.288	-252.2	2102.5
45	433.2	37495.	141.5	.294	-169.0	1609.0
46	436.1	31578.	144.3	.298	-139.5	1447.8
47	444.4	16668.	153.2	.311	-60.6	977.1
48	446.5	13574.	155.5	.320	-33.8	851.8
49	454.1	4798.	165.1	.374	57.0	405.3
50	455.6	3657.	167.3	.404	85.8	318.3
51	462.4	529.	175.3	.474	85.7	117.3
52	463.5	330.	176.2	.415	53.9	165.0
53	465.0	0.	655.7	ABOVE	.0	.0

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION     =          .08  (=  .795E-01)
     SHOULD NOT EXCEED       .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION   =          .25  (=  .246E+00)
     SHOULD NOT EXCEED       .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN  =        82.63  (=  .826E+02)
     SHOULD NOT EXCEED       .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM    =          .02  (=  .226E-01)
     SHOULD NOT EXCEED       .100E+03
```

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED

Attachment 2

CASE 2

UTEXAS3 Computer Data Files

Final Configuration Non-Circular Shear Surfaces

- Surface 2-A: File A_NC.DAT
- Surface 2-B: File B_NC.DAT
- Surface 2-C: File C_NC.DAT

A_NC.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175

MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 616.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80

ANAlysis/computation data follow -
NonCircular
80.452 96.113
128.039 80.250
235.769 81.328
276.402 141

FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

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```
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     TABLE NO. 1
     ****************************************
     * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
     * Originally Coded By Stephen G. Wright  *
     * Version No. 1.206                      *
     * Last Revision Date  6/ 4/96            *
     * (C) Copyright 1985-1996 S. G. Wright   *
     * All Rights Reserved                    *
     ****************************************

     ***************************************************************
     *                                                             *
     *       RESULTS OF COMPUTATIONS PERFORMED USING THIS COMPUTER *
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     * HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL    *
     * DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE    *
     * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER   *
     * PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS       *
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     *                                                             *
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     ***************************************************************
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     TABLE NO.  2
     ************************
     * NEW PROFILE LINE DATA *
     ************************

     PROFILE LINE  1 - MATERIAL TYPE =  1
     HAWTHORNE - MAT. 1

          Point       X              Y

            1      -500.000        -80.000
            2      1200.000        -80.000

     PROFILE LINE  2 - MATERIAL TYPE =  2
     SAND - MAT. 2

          Point       X              Y

            1      -500.000         80.000
            2      1200.000         80.000

     PROFILE LINE  3 - MATERIAL TYPE =  3
     BERM - MAT. 3

          Point       X              Y

            1          .000         80.000
            2        48.000         96.000
            3        80.000         96.000
            4       128.000         80.000
            5      1200.000         90.880

     PROFILE LINE  4 - MATERIAL TYPE =  4
     LINER - MAT. 4

          Point       X              Y

            1        80.000         96.000
            2        80.904         96.226
            3       128.079         80.501
            4      1200.000         91.380

     PROFILE LINE  5 - MATERIAL TYPE =  5
     PROTECTIVE LAYER - MAT. 5

          Point       X              Y

            1        80.904         96.226
            2        89.819         95.362
            3       128.394         82.504
            4      1200.000         93.380

     PROFILE LINE  6 - MATERIAL TYPE =  6
     FINAL COVER - MAT. 6

          Point       X              Y

            1        80.904         96.226
            2       408.369        178.000
            3      1200.000        178.000

     PROFILE LINE  7 - MATERIAL TYPE =  7
     MSW A - MAT. 7

          Point       X              Y

            1        89.819         95.362
            2       108.369        100.000
            3      1200.000        100.000

     PROFILE LINE  8 - MATERIAL TYPE =  8
     MSW B - MAT. 8

          Point       X              Y

            1       108.369        100.000
            2       168.369        115.000
            3      1200.000        115.000

     PROFILE LINE  9 - MATERIAL TYPE =  9
     MSW C - MAT. 9

          Point       X              Y

            1       168.369        115.000
            2       228.369        130.000
            2      1200.000        130.000

     PROFILE LINE 10 - MATERIAL TYPE = 10
     MSW D - MAT. 10

          Point       X              Y

            1       228.369        130.000
            2       288.369        145.000
            3      1200.000        145.000

     PROFILE LINE 11 - MATERIAL TYPE = 11
     MSW E - MAT. 11

          Point       X              Y

            1       288.369        145.000
            2       348.369        160.000
            3      1200.000        160.000

     PROFILE LINE 12 - MATERIAL TYPE = 12
     MSW F - MAT. 12

          Point       X              Y

            1       348.369        160.000
            2       408.369        175.000
            3      1200.000        175.000

     All new profile lines defined - No old lines retained
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     TABLE NO.  3
     *******************************************************************
     * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
     *******************************************************************

     DATA FOR MATERIAL TYPE  1
     HAWTHORNE - MAT. 1

          Unit weight of material =  115.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -  30.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  2
     SAND - MAT. 2

          Unit weight of material =  115.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -  30.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  3
     BERM - MAT. 3

          Unit weight of material =  120.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -  35.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  4
     LINER - MAT. 4

          Unit weight of material =  110.000

          ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
          Point      Normal Stress      Shear Stress

            1           -1000.000              .000
            2                .000              .000
            3            2005.000           429.000
            4            5013.000           787.000
            5           10025.000          1143.000
            6           15038.000          1594.000
            7           18000.000          1908.000

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  5
     PROTECTIVE LAYER - MAT. 5

          Unit weight of material =  110.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -  35.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  6
     FINAL COVER - MAT. 6

          Unit weight of material =  120.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -  35.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  7
     MSW A - MAT. 7

          Unit weight of material =   67.500

          ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
          Point      Normal Stress      Shear Stress

            1           -1000.000              .000
            2              -1.000              .000
            3                .000           501.240
            4             208.850           501.240
            5             417.700           501.240
            6             626.550           501.240
            7             835.400           636.867
            8            5221.250          3485.038

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  8
     MSW B - MAT. 8

          Unit weight of material =   63.100

          ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
          Point      Normal Stress      Shear Stress

            1           -1000.000              .000
            2            -100.000              .000
            3                .000           501.240
            4             208.850           501.240
            5             417.700           501.240
            6             626.550           501.240
```

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```
      7            835.400          636.867
      8           5221.250         3485.038

    Pore water pressures defined by piezometric line
    Number of the piezometric line used =  1
    Negative pore pressures set to zero

DATA FOR MATERIAL TYPE  9
MSW C - MAT. 9

     Unit weight of material =   58.500

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point      Normal Stress      Shear Stress

       1          -1000.000            .000
       2           -100.000            .000
       3               .000         501.240
       4            208.850         501.240
       5            417.700         501.240
       6            626.550         501.240
       7            835.400         636.867
       8           5221.250        3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

     Unit weight of material =   53.400

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point      Normal Stress      Shear Stress

       1          -1000.000            .000
       2           -100.000            .000
       3               .000         501.240
       4            208.850         501.240
       5            417.700         501.240
       6            626.550         501.240
       7            835.400         636.867
       8           5221.250        3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

     Unit weight of material =   48.100

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point      Normal Stress      Shear Stress

       1          -1000.000            .000
       2           -100.000            .000
       3               .000         501.240
       4            208.850         501.240
       5            417.700         501.240
       6            626.550         501.240
       7            835.400         636.867
       8           5221.250        3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

     Unit weight of material =   22.600

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point      Normal Stress      Shear Stress

       1          -1000.000            .000
       2           -100.000            .000
       3               .000         501.240
       4            208.850         501.240
       5            417.700         501.240
       6            626.550         501.240
       7            835.400         636.867
       8           5221.250        3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

All new material properties defined - No old data retained
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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO.  5
*******************************************************************
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
*******************************************************************

Line
 No.    Point       X            Y

  1 - Unit weight of water =   62.40   PHREATIC
  1         1    -500.000     80.000   PHREATIC
  1         2    1000.000     80.000   PHREATIC

All new piezometric lines defined - No old lines retained
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TABLE NO. 15
*********************************
* NEW ANALYSIS/COMPUTATION DATA *
*********************************

Noncircular Shear Surface(s)

Computations Performed for Single Shear Surface


Shear Surface Coordinates -

     Point          X              Y

        1         80.452         96.113
        2        128.039         80.250
        3        235.769         81.328
        4        276.402        141.000

Initial trial estimate for the factor of safety =   3.000

Maximum number of iterations allowed for
calculating the factor of safety =  100

Short form of output will be used for search

--------------------------------------------------------------------
THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination =  15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence =     100.000

Allowed moment imbalance for convergence =     100.000

Number of increments for slice subdivision =   30

Depth of water in crack =         .000

Unit weight of water in crack =    62.400

Seismic coefficient =  .000

Conventional (single-stage) computations to be performed

Procedure used to compute the factor of safety: SPENCER
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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 16
**************************
* NEW SLOPE GEOMETRY DATA *
**************************

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

     Point       X            Y

        1    -500.000      80.000
        2        .000      80.000
        3      48.000      96.000
        4      80.000      96.000
        5      80.904      96.226
        6     408.369     178.000
        7    1200.000     178.000
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TABLE NO. 26
**************************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure      *
*  Information for Individual Slices for Conventional        *
*  Computations or First Stage of Multi-Stage Computations.  *
*  (Information is for the Critical Shear Surface in the     *
*  Case of an Automatic Search.)                             *
**************************************************************

Slice                     Slice   Matl.              Friction    Pore
 No.      X        Y      Weight  Type   Cohesion     Angle    Pressure

         80.5     96.1
  1      80.7     96.0       6.6     4   NONLINEAR ENVELOPE          .0
         80.9     96.0
  2      83.1     95.2     800.9     4   NONLINEAR ENVELOPE          .0
         85.4     94.5
  3      87.6     93.7    2144.1     4   NONLINEAR ENVELOPE          .0
         89.8     93.0
  4      92.9     92.0    4658.0     4   NONLINEAR ENVELOPE          .0
         96.0     90.9
  5      99.1     89.9    6162.2     4   NONLINEAR ENVELOPE          .0
        102.2     88.9
  6     105.3     87.8    7666.4     4   NONLINEAR ENVELOPE          .0
        108.4     86.8
  7     110.8     86.0    7142.4     4   NONLINEAR ENVELOPE          .0
        113.3     85.2
  8     115.7     84.4    8063.5     4   NONLINEAR ENVELOPE          .0
        118.2     83.5
  9     120.6     82.7    8984.6     4   NONLINEAR ENVELOPE          .0
        123.1     81.9
 10     125.5     81.1    9905.7     4   NONLINEAR ENVELOPE          .0
        128.0     80.3
 11     128.0     80.3      82.4     4   NONLINEAR ENVELOPE          .0
        128.0     80.3
 12     128.1     80.3      84.5     4   NONLINEAR ENVELOPE          .0
        128.1     80.3
 13     128.2     80.3     665.9     4   NONLINEAR ENVELOPE          .0
        128.4     80.3
 14     131.2     80.3   12317.6     4   NONLINEAR ENVELOPE          .0
        134.1     80.3
 15     137.0     80.3   12809.1     4   NONLINEAR ENVELOPE          .0
        139.8     80.4
 16     142.7     80.4   13300.6     4   NONLINEAR ENVELOPE          .0
        145.5     80.4
 17     148.4     80.5   13792.1     4   NONLINEAR ENVELOPE          .0
        151.2     80.5
 18     154.1     80.5   14283.7     4   NONLINEAR ENVELOPE          .0
        156.9     80.5
 19     159.8     80.6   14775.2     4   NONLINEAR ENVELOPE          .0
        162.7     80.6
 20     165.5     80.6   15266.8     4   NONLINEAR ENVELOPE          .0
        168.4     80.7
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TABLE NO. 26
**************************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure      *
*  Information for Individual Slices for Conventional        *
*  Computations or First Stage of Multi-Stage Computations.  *
*  (Information is for the Critical Shear Surface in the     *
*  Case of an Automatic Search.)                             *
**************************************************************

Slice                     Slice   Matl.              Friction    Pore
 No.      X        Y      Weight  Type   Cohesion     Angle    Pressure

        168.4     80.7
 21     171.4     80.7   16548.9     4   NONLINEAR ENVELOPE          .0
        174.4     80.7
 22     177.4     80.7   17050.1     4   NONLINEAR ENVELOPE          .0
        180.4     80.8
 23     183.4     80.8   17551.3     4   NONLINEAR ENVELOPE          .0
        186.4     80.8
 24     189.4     80.9   18052.5     4   NONLINEAR ENVELOPE          .0
        192.4     80.9
 25     195.4     80.9   18553.7     4   NONLINEAR ENVELOPE          .0
        198.4     81.0
 26     201.4     81.0   19054.8     4   NONLINEAR ENVELOPE          .0
        204.4     81.0
 27     207.4     81.0   19556.0     4   NONLINEAR ENVELOPE          .0
        210.4     81.1
```

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28	213.4	81.1	20057.2	4	NONLINEAR ENVELOPE		.0
	216.4	81.1					
29	219.4	81.2	20558.4	4	NONLINEAR ENVELOPE		.0
	222.4	81.2					
30	225.4	81.2	21059.6	4	NONLINEAR ENVELOPE		.0
	228.4	81.3					
31	230.2	81.3	13227.8	4	NONLINEAR ENVELOPE		.0
	232.1	81.3					
32	233.9	81.3	13401.0	4	NONLINEAR ENVELOPE		.0
	235.8	81.3					
33	235.9	81.5	662.3	4	NONLINEAR ENVELOPE		.0
	236.0	81.6					
34	236.6	82.6	4822.6	5	.00	35.00	.0
	237.3	83.6					
35	238.7	85.7	9196.4	7	NONLINEAR ENVELOPE		.0
	240.1	87.7					
36	241.5	89.8	8528.4	7	NONLINEAR ENVELOPE		.0
	242.9	91.8					
37	244.3	93.9	7860.3	7	NONLINEAR ENVELOPE		.0
	245.7	95.9					
38	247.1	98.0	7192.3	7	NONLINEAR ENVELOPE		.0
	248.5	100.0					
39	250.2	102.5	7908.6	8	NONLINEAR ENVELOPE		.0
	251.9	105.0					
40	253.6	107.5	6988.8	8	NONLINEAR ENVELOPE		.0
	255.3	110.0					

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NON-CIRCULAR; RS 03/18/2002

TABLE NO. 26

* Coordinate, Weight, Strength and Pore Water Pressure
* Information for Individual Slices for Conventional
* Computations or First Stage of Multi-Stage Computations.
* (Information is for the Critical Shear Surface in the
* Case of an Automatic Search.)

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	255.3	110.0					
41	257.0	112.5	6069.0	8	NONLINEAR ENVELOPE		.0
	258.7	115.0					
42	260.4	117.5	5188.3	9	NONLINEAR ENVELOPE		.0
	262.1	120.0					
43	263.8	122.5	4346.8	9	NONLINEAR ENVELOPE		.0
	265.5	125.0					
44	267.2	127.5	3505.3	9	NONLINEAR ENVELOPE		.0
	268.9	130.0					
45	270.2	131.8	2059.0	10	NONLINEAR ENVELOPE		.0
	271.4	133.7					
46	272.7	135.5	1653.2	10	NONLINEAR ENVELOPE		.0
	273.9	137.3					
47	275.2	139.2	1247.3	10	NONLINEAR ENVELOPE		.0
	276.4	141.0					

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 27

* Seismic Forces and Forces Due to Surface Pressures for
* Individual Slices for Conventional Computations or the
* First Stage of Multi-Stage Computations.
* (Information is for the Critical Shear Surface in the
* Case of an Automatic Search.)

Slice No.	X	Seismic Force	Y for Seismic Force	FORCES DUE TO SURFACE PRESSURES Normal Force	Shear Force	X	Y
1	80.7	0.	96.1	0.	0.	.0	.0
2	83.1	0.	96.0	0.	0.	.0	.0
3	87.6	0.	95.9	0.	0.	.0	.0
4	92.9	0.	95.7	0.	0.	.0	.0
5	99.1	0.	95.5	0.	0.	.0	.0
6	105.3	0.	95.3	0.	0.	.0	.0
7	110.8	0.	95.1	0.	0.	.0	.0
8	115.7	0.	94.9	0.	0.	.0	.0
9	120.6	0.	94.7	0.	0.	.0	.0
10	125.5	0.	94.5	0.	0.	.0	.0
11	128.0	0.	94.4	0.	0.	.0	.0
12	128.1	0.	94.4	0.	0.	.0	.0
13	128.2	0.	94.4	0.	0.	.0	.0
14	131.2	0.	94.8	0.	0.	.0	.0
15	137.0	0.	95.5	0.	0.	.0	.0
16	142.7	0.	96.3	0.	0.	.0	.0
17	148.4	0.	97.0	0.	0.	.0	.0
18	154.1	0.	97.7	0.	0.	.0	.0
19	159.8	0.	98.5	0.	0.	.0	.0
20	165.5	0.	99.2	0.	0.	.0	.0
21	171.4	0.	99.9	0.	0.	.0	.0
22	177.4	0.	100.7	0.	0.	.0	.0
23	183.4	0.	101.4	0.	0.	.0	.0
24	189.4	0.	102.1	0.	0.	.0	.0
25	195.4	0.	102.9	0.	0.	.0	.0
26	201.4	0.	103.6	0.	0.	.0	.0
27	207.4	0.	104.4	0.	0.	.0	.0
28	213.4	0.	105.1	0.	0.	.0	.0
29	219.4	0.	105.9	0.	0.	.0	.0
30	225.4	0.	106.6	0.	0.	.0	.0
31	210.2	0.	107.2	0.	0.	.0	.0
32	233.9	0.	107.6	0.	0.	.0	.0
33	235.9	0.	108.0	0.	0.	.0	.0
34	236.6	0.	109.0	0.	0.	.0	.0
35	238.7	0.	111.1	0.	0.	.0	.0
36	241.5	0.	113.6	0.	0.	.0	.0
37	244.3	0.	116.1	0.	0.	.0	.0
38	247.1	0.	118.6	0.	0.	.0	.0
39	250.2	0.	121.4	0.	0.	.0	.0

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 27

* Seismic Forces and Forces Due to Surface Pressures for
* Individual Slices for Conventional Computations or the
* First Stage of Multi-Stage Computations.
* (Information is for the Critical Shear Surface in the
* Case of an Automatic Search.)

Slice No.	X	Seismic Force	Y for Seismic Force	FORCES DUE TO SURFACE PRESSURES Normal Force	Shear Force	X	Y
40	253.6	0.	124.4	0.	0.	.0	.0
41	257.0	0.	127.4	0.	0.	.0	.0
42	260.4	0.	130.4	0.	0.	.0	.0
43	263.8	0.	133.3	0.	0.	.0	.0
44	267.2	0.	136.2	0.	0.	.0	.0
45	270.2	0.	138.7	0.	0.	.0	.0
46	272.7	0.	140.7	0.	0.	.0	.0
47	275.2	0.	142.5	0.	0.	.0	.0

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 29

* Information Generated During Iterative Solution for the Factor
* of Safety and Side Force Inclination by Spencer's Procedure

Iter-ation	Trial Factor of Safety	Trial Side Force Inclination (degrees)	Force Imbalance (lbs.)	Moment Imbalance (ft.-lbs.)	Delta-F	Delta Theta (degrees)
1	3.00000	15.0000	.1494E+05	-.3022E+05		

```
First-order corrections to F and THETA .........   -.112E+01 -.317E+01
Values factored by  .445E+00 - Deltas too large    -.500E+00 -.141E+01

   2   2.50000    13.5894   .6686E+04   .8805E+05
First-order corrections to F and THETA .........   -.418E+00 -.287E+01
Second-order correction - Iteration   1 ........   -.365E+00 -.287E+01
Second-order correction - Iteration   2 ........   -.364E+00 -.287E+01
Second-order correction - Iteration   3 ........   -.364E+00 -.287E+01

   3   2.13603    10.7227  -.2113E+03   .8788E+05
First-order corrections to F and THETA .........   -.186E-01 -.764E+00
Second-order correction - Iteration   1 ........   -.184E-01 -.764E+00
Second-order correction - Iteration   2 ........   -.184E-01 -.764E+00

   4   2.11762     9.9590   .4246E-01  -.5522E+03
First-order corrections to F and THETA .........    .175E-03  .544E-02
Second-order correction - Iteration   1 ........    .175E-03  .545E-02

   5   2.11779     9.9645  -.2792E-02   .3142E+00
First-order corrections to F and THETA .........    .351E-07 -.156E-05
```

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was 41.482 - at slice 41
Material: 8 Normal stress: 1173.706
Strength from previous trial: 501.240
Estimated strength for new trial: 856.563

TABLE NO. 29

* Information Generated During Iterative Solution for the Factor
* of Safety and Side Force Inclination by Spencer's Procedure

Iter-ation	Trial Factor of Safety	Trial Side Force Inclination (degrees)	Force Imbalance (lbs.)	Moment Imbalance (ft.-lbs.)	Delta-F	Delta Theta (degrees)
1	2.11779	9.9645	-.1992E+04	.1387E+06		

```
First-order corrections to F and THETA .........    .526E-01 -.301E+00
Second-order correction - Iteration   1 ........    .538E-01 -.301E+00
Second-order correction - Iteration   2 ........    .538E-01 -.301E+00

   2   2.17160     9.6633   .1006E+01  -.2379E+04
First-order corrections to F and THETA .........    .684E-03  .239E-01
Second-order correction - Iteration   1 ........    .684E-03  .239E-01

   3   2.17229     9.6872   .6520E-02   .2388E+00
First-order corrections to F and THETA .........   -.398E-06 -.629E-05
```

For trial number 3 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 38
Material: 7 Normal stress: 1538.605
Strength from previous trial: 1093.528
Estimated strength for new trial: 1093.529

TABLE NO. 29

* Information Generated During Iterative Solution for the Factor
* of Safety and Side Force Inclination by Spencer's Procedure

Iter-ation	Trial Factor of Safety	Trial Side Force Inclination (degrees)	Force Imbalance (lbs.)	Moment Imbalance (ft.-lbs.)	Delta-F	Delta Theta (degrees)
1	2.17229	9.6872	.6520E-02	.2388E+00		

```
First-order corrections to F and THETA .........   -.398E-06 -.629E-05
```

Factor of Safety - - - - - - - - - 2.172
Side Force Inclination - - - - - 9.69
Number of Iterations - - - - - - - 1

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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 38

* Final Results for Stresses Along the Shear Surface
* (Results for Critical Shear Surface in Case of a Search.)

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 2.172 Side Force Inclination = 9.69 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	80.7	96.0	16.2	16.2	1.6
2	83.1	95.2	201.1	201.1	19.8
3	87.6	93.7	538.4	538.4	53.0
4	92.9	92.0	843.2	843.2	83.0
5	99.1	89.9	1115.4	1115.4	109.9
6	105.3	87.8	1387.7	1387.7	136.7
7	110.8	86.0	1628.9	1628.9	160.4
8	115.7	84.4	1839.0	1839.0	181.1
9	120.6	82.7	2048.0	2048.0	199.8
10	125.5	81.1	2253.0	2253.0	211.1
11	128.0	80.3	2356.3	2356.3	216.7
12	128.1	80.1	2143.1	2143.1	205.1
13	128.2	80.3	2143.1	2143.1	205.1
14	131.2	80.3	2186.5	2186.5	207.4
15	137.0	80.3	2273.2	2273.2	212.2
16	142.7	80.4	2359.9	2359.9	216.9
17	148.4	80.5	2446.6	2446.6	221.7
18	154.1	80.5	2533.3	2533.3	226.4
19	159.8	80.6	2620.0	2620.0	231.2
20	165.5	80.6	2706.6	2706.6	235.9
21	171.4	80.7	2792.0	2792.0	240.6
22	177.4	80.7	2878.2	2876.2	245.2
23	183.4	80.8	2960.3	2960.3	249.8

24	189.4	80.9	3044.4	3044.4	254.4
25	195.4	80.9	3128.6	3128.6	259.0
26	201.4	81.0	3212.7	3212.7	263.7
27	207.4	81.0	3296.8	3296.8	268.3
28	213.4	81.1	3380.9	3380.9	272.9
29	219.4	81.2	3465.1	3465.1	277.5
30	225.4	81.2	3549.2	3549.2	282.1
31	230.2	81.3	3614.8	3614.8	285.7
32	233.9	81.3	3662.0	3662.0	288.3
33	235.9	81.5	2661.6	2661.6	233.5
34	236.6	82.6	2107.2	2107.2	679.2
35	238.7	85.7	1976.9	1976.9	634.4
36	241.5	89.8	1830.8	1830.8	590.8
37	244.3	93.9	1684.7	1684.7	547.1
38	247.1	98.0	1538.6	1538.6	503.4
39	250.2	102.5	1383.1	1383.1	456.9

1

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
40	253.6	107.5	1218.2	1218.2	407.6
41	257.0	112.5	1053.4	1053.4	358.3
42	260.4	117.5	895.5	895.5	311.2
43	263.8	122.5	744.7	744.7	266.1
44	267.2	127.5	583.7	583.7	230.7
45	270.2	131.0	419.9	419.9	230.7
46	272.7	135.5	290.0	290.0	230.7
47	275.2	139.2	160.0	160.0	230.7

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION    =          .01  (=  .110E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION  =          .03  (=  .258E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN =         -.04  (= -.417E-01)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM   =          .00  (=  .248E-02)
     SHOULD NOT EXCEED      .100E+03
```

1

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 39

```
*****************************************************************
*  Final Results for Side Forces and Stresses Between Slices.   *
*  (Results for Critical Shear Surface in Case of a Search.)    *
*****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 2.172   Side Force Inclination = 9.69 Degrees

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	80.9	3.	96.1	.432	7.1	16.9
2	85.4	396.	95.6	.396	51.2	221.5
3	89.8	1447.	94.7	.319	-22.9	545.3
4	96.0	3731.	93.8	.313	-49.5	860.8
5	102.2	6753.	92.9	.315	-58.8	1109.4
6	108.4	10512.	91.9	.315	-71.5	1344.7
7	113.3	14014.	91.2	.314	-84.6	1528.1
8	118.2	17968.	90.4	.313	-98.3	1708.4
9	123.1	22362.	89.7	.312	-112.1	1885.3
10	128.0	27152.	88.9	.312	-123.6	2054.4
11	128.0	27192.	88.9	.312	-123.7	2055.8
12	128.1	27199.	88.9	.312	-123.5	2055.4
13	128.4	27258.	88.9	.312	-121.7	2052.5
14	134.1	28333.	89.6	.317	-92.5	2005.3
15	139.8	29430.	90.2	.321	-69.2	1967.2
16	145.5	30550.	90.8	.324	-50.8	1936.6
17	151.2	31692.	91.4	.327	-36.4	1912.3
18	156.9	32857.	91.9	.329	-25.3	1893.4
19	162.7	34045.	92.5	.330	-16.9	1878.9
20	168.4	35255.	93.1	.331	-10.7	1868.4
21	174.4	36549.	93.6	.332	-6.2	1860.8
22	180.4	37867.	94.2	.333	-3.4	1856.2
23	186.4	39207.	94.7	.333	-1.9	1854.2
24	192.4	40570.	95.3	.333	-1.6	1854.5
25	198.4	41956.	95.8	.333	-2.4	1856.8
26	204.4	43366.	96.3	.333	-3.9	1860.7
27	210.4	44798.	96.8	.332	-6.2	1866.2
28	216.4	46253.	97.4	.332	-9.1	1873.0
29	222.4	47731.	97.9	.331	-12.5	1881.1
30	228.4	49231.	98.4	.330	-16.3	1890.1
31	232.1	50168.	98.7	.330	-18.8	1896.2
32	235.8	51112.	99.0	.330	-21.5	1902.5
33	236.0	50433.	99.2	.331	-13.7	1877.4
34	237.3	47073.	100.7	.330	-16.3	1812.1
35	240.1	40651.	103.6	.328	-24.1	1684.2
36	242.9	34712.	106.4	.326	-32.4	1557.4
37	245.7	29258.	109.3	.323	-41.6	1432.4
38	248.5	24287.	112.2	.319	-52.2	1309.0
39	251.9	18849.	115.6	.313	-66.9	1162.4
40	255.3	14078.	119.0	.304	-82.4	1014.5

1

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
41	258.7	9972.	122.4	.291	-98.6	865.8
42	262.1	6505.	125.8	.271	-112.0	709.1
43	265.5	3646.	129.2	.244	-111.4	526.3
44	268.9	1482.	132.7	.209	-83.1	304.9
45	271.4	505.	135.4	.167	-49.1	147.3
46	273.9	11.	139.0	.229	-.9	3.9
47	276.4	0.	107.0	BELOW	.0	.0

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION    =          .01  (=  .110E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION  =          .03  (=  .258E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN =         -.04  (= -.417E-01)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM   =          .00  (=  .248E-02)
     SHOULD NOT EXCEED      .100E+03
```

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED

B_NC.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175

MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80

ANAlysis/computation data follow -
NonCircular
80.452 96.113 FIX
128.039 80.250 FIX
309.18 82.06
399.54 165

FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

B_NC.OUT

```
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     TABLE NO. 1
     ****************************************
     * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
     * Originally Coded By Stephen G. Wright  *
     * Version No. 1.206                      *
     * Last Revision Date  6/ 4/96            *
     * (C) Copyright 1985-1996 S. G. Wright   *
     * All Rights Reserved                    *
     ****************************************

     ***********************************************************
     *                                                         *
     *     RESULTS OF COMPUTATIONS PERFORMED USING THIS COMPUTER *
     * PROGRAM SHOULD NOT BE USED FOR DESIGN PURPOSES UNLESS THEY *
     * HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL *
     * DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE *
     * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER *
     * PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS    *
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     *                                                         *
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     TABLE NO. 2
     ************************
     * NEW PROFILE LINE DATA *
     ************************

     PROFILE LINE  1 - MATERIAL TYPE =  1
     HAWTHORNE - MAT. 1

          Point       X              Y

            1       -500.000       -80.000
            2       1200.000       -80.000

     PROFILE LINE  2 - MATERIAL TYPE =  2
     SAND - MAT. 2

          Point       X              Y

            1       -500.000        80.000
            2       1200.000        80.000

     PROFILE LINE  3 - MATERIAL TYPE =  3
     BERM - MAT. 3

          Point       X              Y

            1           .000        80.000
            2         48.000        96.000
            3         80.000        96.000
            4        128.000        80.000
            5       1200.000        90.880

     PROFILE LINE  4 - MATERIAL TYPE =  4
     LINER - MAT. 4

          Point       X              Y

            1         80.000        96.000
            2         80.904        96.226
            3        128.079        80.501
            4       1200.000        91.380

     PROFILE LINE  5 - MATERIAL TYPE =  5
     PROTECTIVE LAYER - MAT. 5

          Point       X              Y

            1         80.904        96.226
            2         89.819        95.362
            3        128.394        82.504
            4       1200.000        93.380

     PROFILE LINE  6 - MATERIAL TYPE =  6
     FINAL COVER - MAT. 6

          Point       X              Y

            1         80.904        96.226
            2        408.369       178.000
            3       1200.000       178.000

     PROFILE LINE  7 - MATERIAL TYPE =  7
     MSW A - MAT. 7

          Point       X              Y

            1         89.819        95.362
            2        108.369       100.000
            3       1200.000       100.000

     PROFILE LINE  8 - MATERIAL TYPE =  8
     MSW B - MAT. 8

          Point       X              Y

            1        108.369       100.000
            2        168.369       115.000
            3       1200.000       115.000

     PROFILE LINE  9 - MATERIAL TYPE =  9
     MSW C - MAT. 9

          Point       X              Y

            1        168.369       115.000
            2        228.369       130.000
            3       1200.000       130.000

     PROFILE LINE 10 - MATERIAL TYPE = 10
     MSW D - MAT. 10

          Point       X              Y

            1        228.369       130.000
            2        288.369       145.000
            3       1200.000       145.000

     PROFILE LINE 11 - MATERIAL TYPE = 11
     MSW E - MAT. 11

          Point       X              Y

            1        288.369       145.000
            2        348.369       160.000
            3       1200.000       160.000

     PROFILE LINE 12 - MATERIAL TYPE = 12
     MSW F - MAT. 12

          Point       X              Y

            1        348.369       160.000
            2        408.369       175.000
            3       1200.000       175.000

     All new profile lines defined - No old lines retained
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     TABLE NO. 3
     ******************************************************************
     * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
     ******************************************************************

     DATA FOR MATERIAL TYPE  1
     HAWTHORNE - MAT. 1

          Unit weight of material =  115.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -   30.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  2
     SAND - MAT. 2

          Unit weight of material =  115.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -   30.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  3
     BERM - MAT. 3

          Unit weight of material =  120.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -   35.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  4
     LINER - MAT. 4

          Unit weight of material =  110.000

          ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
          Point     Normal Stress      Shear Stress

            1        -1000.000             .000
            2             .000             .000
            3         2005.000          429.000
            4         5013.000          787.000
            5        10025.000         1143.000
            6        15038.000         1594.000
            7        18000.000         1908.000

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  5
     PROTECTIVE LAYER - MAT. 5

          Unit weight of material =  110.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -   35.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  6
     FINAL COVER - MAT. 6

          Unit weight of material =  120.000

          CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
          Cohesion - - - - - - - -          .000
          Friction angle - - - - -   35.000 degrees

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  7
     MSW A - MAT. 7

          Unit weight of material =   67.500

          ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
          Point     Normal Stress      Shear Stress

            1        -1000.000             .000
            2           -1.000             .000
            3             .000          501.240
            4          208.850          501.240
            5          417.700          501.240
            6          626.550          501.240
            7          835.400          636.867
            8         5221.250         3485.038

          Pore water pressures defined by piezometric line
          Number of the piezometric line used =  1
          Negative pore pressures set to zero

     DATA FOR MATERIAL TYPE  8
     MSW B - MAT. 8

          Unit weight of material =   63.100

          ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
          Point     Normal Stress      Shear Stress

            1        -1000.000             .000
            2         -100.000             .000
            3             .000          501.240
            4          208.850          501.240
            5          417.700          501.240
            6          626.550          501.240
```

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```
      7            835.400          636.867
      8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE  9
MSW C - MAT. 9

     Unit weight of material =   58.500

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point     Normal Stress     Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

     Unit weight of material =   53.400

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point     Normal Stress     Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

     Unit weight of material =   48.100

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point     Normal Stress     Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

     Unit weight of material =   22.600

     ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
     Point     Normal Stress     Shear Stress

       1          -1000.000             .000
       2           -100.000             .000
       3               .000          501.240
       4            208.850          501.240
       5            417.700          501.240
       6            626.550          501.240
       7            835.400          636.867
       8           5221.250         3485.038

     Pore water pressures defined by piezometric line
     Number of the piezometric line used =  1
     Negative pore pressures set to zero

All new material properties defined - No old data retained
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TABLE NO.  5
*******************************************************************
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
*******************************************************************

Line
 No.    Point       X           Y

  1 - Unit weight of water =   62.40   PHREATIC
  1         1    -500.000      80.000   PHREATIC
  1         2    1000.000      80.000   PHREATIC

All new piezometric lines defined - No old lines retained
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TABLE NO. 15
**********************************
* NEW ANALYSIS/COMPUTATION DATA *
**********************************

Noncircular Shear Surface(s)

Computations Performed for Single Shear Surface


Shear Surface Coordinates -

     Point          X              Y

       1         80.452          96.113
       2        128.039          80.250
       3        309.180          82.060
       4        399.540         165.000

Initial trial estimate for the factor of safety =   3.000

Maximum number of iterations allowed for
calculating the factor of safety =  100
```

```
Short form of output will be used for search

-------------------------------------------------------------------
THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination =  15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence =      100.000

Allowed moment imbalance for convergence =      100.000

Number of increments for slice subdivision =   30

Depth of water in crack =          .000

Unit weight of water in crack =    62.400

Seismic coefficient =  .000

Conventional (single-stage) computations to be performed

Procedure used to compute the factor of safety: SPENCER
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TABLE NO. 16
***************************
* NEW SLOPE GEOMETRY DATA *
***************************

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA
WERE GENERATED BY THE PROGRAM

Slope Coordinates -

     Point       X            Y

       1    -500.000      80.000
       2        .000      80.000
       3      48.000      96.000
       4      80.000      96.000
       5      80.904      96.226
       6     408.369     178.000
       7    1200.000     178.000
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TABLE NO. 26
***********************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure    *
*  Information for Individual Slices for Conventional      *
*  Computations or First Stage of Multi-Stage Computations. *
*  (Information is for the Critical Shear Surface in the   *
*  Case of an Automatic Search.)                           *
***********************************************************

Slice                       Slice  Matl.            Friction   Pore
 No.      X         Y      Weight  Type  Cohesion    Angle   Pressure

         80.5      96.1
   1     80.7      96.0       6.6    4  NONLINEAR ENVELOPE         .0
         80.9      96.0
   2     85.4      94.5    2945.0    4  NONLINEAR ENVELOPE         .0
         89.8      93.0
   3     94.5      91.4    7551.1    4  NONLINEAR ENVELOPE         .0
         99.1      89.9
   4    103.7      88.4   10935.5    4  NONLINEAR ENVELOPE         .0
        108.4      86.8
   5    113.3      85.2   15205.6    4  NONLINEAR ENVELOPE         .0
        118.2      83.5
   6    123.1      81.9   18890.3    4  NONLINEAR ENVELOPE         .0
        128.0      80.3
   7    128.0      80.3      82.4    4  NONLINEAR ENVELOPE         .0
        128.0      80.3
   8    128.1      80.3      84.5    4  NONLINEAR ENVELOPE         .0
        128.1      80.3
   9    128.2      80.3     665.9    4  NONLINEAR ENVELOPE         .0
        128.4      80.3
  10    133.4      80.3   21678.4    4  NONLINEAR ENVELOPE         .0
        138.4      80.4
  11    143.4      80.4   23383.8    4  NONLINEAR ENVELOPE         .0
        148.4      80.5
  12    153.4      80.5   24889.3    4  NONLINEAR ENVELOPE         .0
        158.4      80.6
  13    163.4      80.6   26394.8    4  NONLINEAR ENVELOPE         .0
        168.4      80.7
  14    173.4      80.7   27860.7    4  NONLINEAR ENVELOPE         .0
        178.4      80.8
  15    183.4      80.8   29253.0    4  NONLINEAR ENVELOPE         .0
        188.4      80.9
  16    193.4      80.9   30645.3    4  NONLINEAR ENVELOPE         .0
        198.4      81.0
  17    203.4      81.0   32037.7    4  NONLINEAR ENVELOPE         .0
        208.4      81.1
  18    213.4      81.1   33430.0    4  NONLINEAR ENVELOPE         .0
        218.4      81.2
  19    223.4      81.2   34822.4    4  NONLINEAR ENVELOPE         .0
        228.4      81.3
  20    233.4      81.3   36150.9    4  NONLINEAR ENVELOPE         .0
        238.4      81.4
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TABLE NO. 26
***********************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure    *
*  Information for Individual Slices for Conventional      *
*  Computations or First Stage of Multi-Stage Computations. *
*  (Information is for the Critical Shear Surface in the   *
*  Case of an Automatic Search.)                           *
***********************************************************

Slice                       Slice  Matl.            Friction   Pore
 No.      X         Y      Weight  Type  Cohesion    Angle   Pressure

        238.4      81.4
  21    243.4      81.4   37415.8    4  NONLINEAR ENVELOPE         .0
        248.4      81.5
  22    253.4      81.5   38680.6    4  NONLINEAR ENVELOPE         .0
        258.4      81.6
  23    263.4      81.6   39945.5    4  NONLINEAR ENVELOPE         .0
        268.4      81.7
  24    273.4      81.7   41210.3    4  NONLINEAR ENVELOPE         .0
        278.4      81.8
  25    283.4      81.8   42475.1    4  NONLINEAR ENVELOPE         .0
        288.4      81.9
  26    293.6      81.9   45468.5    4  NONLINEAR ENVELOPE         .0
        298.8      82.0
  27    304.0      82.0   46694.7    4  NONLINEAR ENVELOPE         .0
        309.2      82.1
```

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28	309.3	82.2	1393.3	4	NONLINEAR ENVELOPE		.0
	309.5	82.3					
29	310.6	83.4	9741.3	5	.00	35.00	.0
	311.7	84.4					
30	314.5	87.0	23747.6	7	NONLINEAR ENVELOPE		.0
	317.4	89.6					
31	320.2	92.2	22136.6	7	NONLINEAR ENVELOPE		.0
	323.0	94.8					
32	325.9	97.4	20525.6	7	NONLINEAR ENVELOPE		.0
	328.7	100.0					
33	331.4	102.5	18237.0	8	NONLINEAR ENVELOPE		.0
	334.2	105.0					
34	336.9	107.5	16874.2	8	NONLINEAR ENVELOPE		.0
	339.6	110.0					
35	342.3	112.5	15511.3	8	NONLINEAR ENVELOPE		.0
	345.1	115.0					
36	346.7	116.5	8762.4	9	NONLINEAR ENVELOPE		.0
	348.4	118.0					
37	351.6	121.0	15830.2	9	NONLINEAR ENVELOPE		.0
	354.9	124.0					
38	358.1	127.0	13786.3	9	NONLINEAR ENVELOPE		.0
	361.4	130.0					
39	364.1	132.5	10020.7	10	NONLINEAR ENVELOPE		.0
	366.9	135.0					
40	369.6	137.5	8732.9	10	NONLINEAR ENVELOPE		.0
	372.3	140.0					

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TABLE NO. 26

```
****************************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure        *
*  Information for Individual Slices for Conventional          *
*  Computations or First Stage of Multi-Stage Computations.    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                               *
****************************************************************
```

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	372.3	140.0					
41	375.0	142.5	7445.1	10	NONLINEAR ENVELOPE		.0
	377.8	145.0					
42	380.5	147.5	6229.5	11	NONLINEAR ENVELOPE		.0
	383.2	150.0					
43	385.9	152.5	5086.0	11	NONLINEAR ENVELOPE		.0
	388.6	155.0					
44	391.4	157.5	3942.6	11	NONLINEAR ENVELOPE		.0
	394.1	160.0					
45	396.8	162.5	3146.5	12	NONLINEAR ENVELOPE		.0
	399.5	165.0					

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TABLE NO. 27

```
****************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for      *
*  Individual Slices for Conventional  Computations or the     *
*  First Stage of Multi-Stage Computations.                    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                               *
****************************************************************
```

				FORCES DUE TO SURFACE PRESSURES			
Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
1	80.7	0.	96.1	0.	0.	.0	.0
2	85.4	0.	95.9	0.	0.	.0	.0
3	94.5	0.	95.7	0.	0.	.0	.0
4	103.7	0.	95.4	0.	0.	.0	.0
5	113.3	0.	95.0	0.	0.	.0	.0
6	123.1	0.	94.6	0.	0.	.0	.0
7	128.0	0.	94.4	0.	0.	.0	.0
8	128.1	0.	94.4	0.	0.	.0	.0
9	128.2	0.	94.4	0.	0.	.0	.0
10	133.4	0.	95.1	0.	0.	.0	.0
11	143.4	0.	96.4	0.	0.	.0	.0
12	153.4	0.	97.6	0.	0.	.0	.0
13	163.4	0.	98.9	0.	0.	.0	.0
14	173.4	0.	100.2	0.	0.	.0	.0
15	183.4	0.	101.4	0.	0.	.0	.0
16	193.4	0.	102.6	0.	0.	.0	.0
17	203.4	0.	103.9	0.	0.	.0	.0
18	213.4	0.	105.1	0.	0.	.0	.0
19	223.4	0.	106.4	0.	0.	.0	.0
20	233.4	0.	107.6	0.	0.	.0	.0
21	243.4	0.	108.8	0.	0.	.0	.0
22	253.4	0.	109.9	0.	0.	.0	.0
23	263.4	0.	111.1	0.	0.	.0	.0
24	273.4	0.	112.3	0.	0.	.0	.0
25	283.4	0.	113.6	0.	0.	.0	.0
26	293.6	0.	114.7	0.	0.	.0	.0
27	304.0	0.	115.9	0.	0.	.0	.0
28	309.3	0.	116.7	0.	0.	.0	.0
29	310.6	0.	117.8	0.	0.	.0	.0
30	314.5	0.	120.5	0.	0.	.0	.0
31	320.2	0.	123.9	0.	0.	.0	.0
32	325.9	0.	127.5	0.	0.	.0	.0
33	331.4	0.	130.9	0.	0.	.0	.0
34	336.9	0.	134.3	0.	0.	.0	.0
35	342.3	0.	137.7	0.	0.	.0	.0
36	346.7	0.	140.4	0.	0.	.0	.0
37	351.6	0.	143.2	0.	0.	.0	.0
38	358.1	0.	147.0	0.	0.	.0	.0
39	364.1	0.	150.5	0.	0.	.0	.0

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 27

```
****************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for      *
*  Individual Slices for Conventional  Computations or the     *
*  First Stage of Multi-Stage Computations.                    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                               *
****************************************************************
```

				FORCES DUE TO SURFACE PRESSURES			
Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
40	369.6	0.	153.7	0.	0.	.0	.0
41	375.0	0.	157.0	0.	0.	.0	.0
42	380.5	0.	160.4	0.	0.	.0	.0
43	385.9	0.	163.8	0.	0.	.0	.0
44	391.4	0.	167.7	0.	0.	.0	.0
45	396.8	0.	171.2	0.	0.	.0	.0

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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 29

```
*******************************************************************
*  Information Generated During Iterative Solution for the Factor *
*  of Safety and Side Force Inclination by Spencer's Procedure    *
*******************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment                Delta
Iter-     of     Inclination  Imbalance  Imbalance   Delta-F    Theta
ation   Safety   (degrees)     (lbs.)    (ft.-lbs.)           (degrees)

   1   3.00000    15.0000   .4678E+05   .5965E+05
First-order corrections to F and THETA .........  -.165E+01 -.239E+01
Values factored by  .303E+00 - Deltas too large   -.500E+00 -.722E+00

   2   2.50000    14.2779   .3103E+05   .1764E+06
First-order corrections to F and THETA .........  -.762E+00 -.253E+01
Values factored by  .656E+00 - Deltas too large   -.500E+00 -.166E+01

   3   2.00000    12.6207   .5399E+04   .4219E+06
First-order corrections to F and THETA .........  -.114E+00 -.235E+01
Second-order correction - Iteration   1 ........  -.108E+00 -.235E+01
Second-order correction - Iteration   2 ........  -.108E+00 -.235E+01

   4   1.89225    10.2672  -.2263E+02   .7169E+05
First-order corrections to F and THETA .........  -.359E-02 -.311E+00
Second-order correction - Iteration   1 ........  -.358E-02 -.311E+00
Second-order correction - Iteration   2 ........  -.356E-02 -.311E+00

   5   1.88668     9.9564   .1273E-01   .4857E+02
First-order corrections to F and THETA .........  -.287E-05 -.217E-03
```

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was 19.643 - at slice 42
Material: 11 Normal stress: 815.221
Strength from previous trial: 501.240
Estimated strength for new trial: 623.763

TABLE NO. 29

```
*******************************************************************
*  Information Generated During Iterative Solution for the Factor *
*  of Safety and Side Force Inclination by Spencer's Procedure    *
*******************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment                Delta
Iter-     of     Inclination  Imbalance  Imbalance   Delta-F    Theta
ation   Safety   (degrees)     (lbs.)    (ft.-lbs.)           (degrees)

   1   1.88868     9.9564  -.3797E+03   .3246E+05
First-order corrections to F and THETA .........   .431E-02 -.630E-01
Second-order correction - Iteration   1 ........   .432E-02 -.630E-01
Second-order correction - Iteration   2 ........   .432E-02 -.630E-01

   2   1.89299     9.8935   .1167E-01  -.1184E+03
First-order corrections to F and THETA .........   .611E-05  .525E-03
Second-order correction - Iteration   1 ........   .614E-05  .528E-03

   3   1.89300     9.8940  -.1859E-01   .1669E+02
First-order corrections to F and THETA .........   .208E-06 -.339E-05
```

For trial number 3 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 15
Material: 4 Normal stress: 2967.339
Strength from previous trial: 543.534
Estimated strength for new trial: 543.534

TABLE NO. 29

```
*******************************************************************
*  Information Generated During Iterative Solution for the Factor *
*  of Safety and Side Force Inclination by Spencer's Procedure    *
*******************************************************************

        Trial     Trial
        Factor   Side Force    Force      Moment                Delta
Iter-     of     Inclination  Imbalance  Imbalance   Delta-F    Theta
ation   Safety   (degrees)     (lbs.)    (ft.-lbs.)           (degrees)

   1   1.89300     9.8940  -.1859E-01   .1669E+01
First-order corrections to F and THETA .........   .208E-06 -.339E-05
```

Factor of Safety - - - - - - - - 1.893
Side Force Inclination - - - - - 9.89
Number of Iterations - - - - - - 1

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STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 38

```
******************************************************************
*  Final Results for Stresses Along the Shear Surface            *
*  (Results for Critical Shear Surface in Case of a Search.)     *
******************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 1.893 Side Force Inclination = 9.89 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	80.7	96.0	16.4	16.4	1.9
2	85.4	94.5	373.5	373.5	42.2
3	94.5	91.4	920.5	920.5	104.0
4	103.7	88.4	1333.0	1333.0	150.7
5	113.3	85.2	1751.5	1751.5	198.0
6	123.1	81.9	2171.2	2171.2	237.1
7	128.0	80.3	2378.2	2378.2	250.1
8	128.1	80.3	2148.8	2148.8	235.7
9	128.2	80.3	2148.8	2148.8	235.7
10	133.4	80.3	2224.9	2224.9	240.4
11	143.4	80.4	2376.8	2376.8	250.0
12	153.4	80.5	2528.8	2528.8	259.6
13	163.4	80.6	2680.7	2680.7	269.1
14	173.4	80.7	2826.9	2826.9	278.3
15	183.4	80.8	2967.3	2967.3	287.1
26	193.4	80.9	3107.8	3107.8	296.0
17	203.4	81.0	3248.2	3248.2	304.8
18	213.4	81.1	3388.7	3388.7	313.6
19	223.4	81.2	3529.1	3529.1	322.4
20	233.4	81.3	3663.1	3663.1	330.9
21	243.4	81.4	3790.7	3790.7	338.9
22	253.4	81.5	3918.3	3918.3	346.9
23	263.4	81.6	4045.9	4045.9	354.9
24	273.4	81.7	4173.4	4173.4	363.0
25	283.4	81.8	4301.0	4301.0	371.0
26	293.6	81.9	4424.2	4424.2	378.7
27	304.0	82.0	4543.1	4543.1	386.2
28	309.3	82.2	3694.0	3694.0	332.8
29	310.6	83.4	3081.1	3081.1	1139.7
30	314.5	87.0	2929.2	2929.2	1054.7

31	320.2	92.2	2728.7	2728.7	985.9
32	325.9	97.4	2528.2	2528.2	917.2
33	331.4	102.5	2339.6	2339.6	852.4
34	336.9	107.5	2162.8	2162.8	791.8
35	342.3	112.5	1986.0	1986.0	731.1
36	346.7	116.5	1848.9	1848.9	684.1
37	351.6	121.0	1689.5	1689.5	629.4
38	358.1	127.0	1468.0	1468.0	553.5
39	364.1	132.5	1273.7	1273.7	486.8

1

-------- VALUES AT CENTER OF BASE OF SLICE--------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
40	369.6	137.5	1106.7	1106.7	429.5
41	375.0	142.5	939.6	939.6	372.2
42	380.5	147.5	781.9	781.9	318.1
43	385.9	152.5	633.6	633.6	267.2
44	391.4	157.5	454.2	454.2	264.8
45	396.8	162.5	328.2	328.2	264.8

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION    =          .02  (=  .209E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION  =          .04  (=  .440E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN =         -.82  (= -.821E+00)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM   =          .00  (=  .477E-02)
     SHOULD NOT EXCEED      .100E+03
```

1

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OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 39

```
**************************************************************
* Final Results for Side Forces and Stresses Between Slices. *
*  (Results for Critical Shear Surface in Case of a Search.) *
**************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 1.093 Side Force Inclination = 9.89 Degrees

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
1	80.9	3.	96.1	.435	7.7	17.4
2	89.8	1512.	95.3	.415	134.3	411.2
3	99.1	5381.	93.6	.336	8.3	967.0
4	108.4	10963.	92.1	.326	-31.2	1360.6
5	118.2	18773.	90.6	.320	-65.1	1746.3
6	128.0	28346.	89.1	.316	-93.7	2108.2
7	128.0	28388.	89.1	.318	-93.8	2109.6
8	128.1	28396.	89.1	.318	-93.7	2109.4
9	128.4	28465.	89.1	.318	-92.2	2107.3
10	138.4	30678.	90.2	.324	-55.2	2054.8
11	148.4	32974.	91.2	.328	-31.6	2023.0
12	158.4	35350.	92.1	.330	-17.5	2006.4
13	168.4	37809.	93.1	.332	-10.2	2001.2
14	178.4	40347.	94.0	.332	-7.6	2004.4
15	188.4	42961.	94.9	.332	-8.5	2013.9
16	198.4	45650.	95.7	.331	-12.0	2028.3
17	208.4	48414.	96.6	.330	-17.4	2046.7
18	218.4	51254.	97.4	.329	-24.2	2068.4
19	228.4	54169.	98.2	.328	-32.2	2092.6
20	238.4	57156.	99.1	.327	-40.9	2118.8
21	248.4	60212.	99.9	.325	-50.1	2146.4
22	258.4	63336.	100.7	.324	-59.7	2175.1
23	268.4	66528.	101.4	.322	-69.5	2204.8
24	278.4	69790.	102.2	.321	-79.5	2235.3
25	288.4	73119.	103.0	.320	-89.7	2266.5
26	298.8	76652.	103.8	.318	-100.3	2299.4
27	309.2	80252.	104.6	.317	-110.8	2332.4
28	309.5	79298.	104.9	.318	-99.9	2301.5
29	311.7	75522.	106.4	.317	-104.7	2245.9
30	317.4	66104.	110.2	.314	-113.2	2095.6
31	323.0	57351.	114.0	.311	-121.9	1947.2
32	328.7	49262.	117.9	.307	-131.0	1801.2
33	334.2	42101.	121.5	.303	-139.6	1662.4
34	339.6	35502.	125.1	.298	-147.2	1523.2
35	345.1	29465.	128.8	.292	-153.5	1383.7
36	348.4	26070.	131.0	.288	-156.1	1297.8
37	354.9	19972.	135.3	.278	-159.6	1128.1
38	361.4	14717.	139.6	.266	-162.2	961.6
39	366.9	10944.	143.2	.252	-161.9	822.7
40	372.3	7702.	146.8	.233	-157.0	680.3

1

--------------- VALUES AT RIGHT SIDE OF SLICE ---------------

Slice No.	X-Right	Side Force	Y-Coord. of Side Force Location	Fraction of Height	Sigma at Top	Sigma at Bottom
41	377.8	4991.	150.3	.209	-145.0	532.6
42	383.2	2781.	153.8	.177	-118.6	370.9
43	388.6	1043.	157.8	.155	-60.7	174.4
44	394.1	202.	162.0	.140	-16.0	43.5
45	399.5	0.	124.6	BELOW	.0	.0

```
CHECK SUMS - (ALL SHOULD BE SMALL)
SUM OF FORCES IN VERTICAL DIRECTION    =          .02  (=  .209E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF FORCES IN HORIZONTAL DIRECTION  =          .04  (=  .440E-01)
     SHOULD NOT EXCEED      .100E+03
SUM OF MOMENTS ABOUT COORDINATE ORIGIN =         -.82  (= -.821E+00)
     SHOULD NOT EXCEED      .100E+03
SHEAR STRENGTH/SHEAR FORCE CHECK-SUM   =          .00  (=  .477E-02)
     SHOULD NOT EXCEED      .100E+03
```

END-OF-FILE ENCOUNTERED WHILE READING COMMAND
WORDS - END OF PROBLEM(S) ASSUMED

C_NC.DAT

```
HEADING
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002
PROFILE LINES
1  1  HAWTHORNE - MAT. 1
-500 -80
1200 -80

2  2  SAND - MAT. 2
-500 80
1200 80

3  3  BERM - MAT. 3
0 80
48 96
80 96
128 80
1200 90.880

4  4  LINER - MAT. 4
80 96
80.904 96.226
128.079 80.501
1200 91.380

5  5  PROTECTIVE LAYER - MAT. 5
80.904 96.226
89.819 95.362
128.394 82.504
1200 93.380

6  6  FINAL COVER - MAT. 6
80.904 96.226
408.369 178
1200 178

7  7  MSW A - MAT. 7
89.819 95.362
108.369 100
1200 100

8  8  MSW B - MAT. 8
108.369 100
168.369 115
1200 115

9  9  MSW C - MAT. 9
168.369 115
228.369 130
1200 130

10  10  MSW D - MAT. 10
228.369 130
288.369 145
1200 145

11  11  MSW E - MAT. 11
288.369 145
348.369 160
1200 160

12  12  MSW F - MAT. 12
348.369 160
408.369 175
1200 175


MATERIAL PROPERTIES
1  HAWTHORNE - MAT. 1
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
2 SAND - MAT. 2
    115
    Conventional Shear Strength
    0 30
    Piezometric Line
    1
3 BERM - MAT. 3
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
4 LINER - MAT. 4
    110
    Nonlinear Mohr-Coulomb
    -1000 0
    0 0
    2005 429
    5013 787
    10025 1143
    15038 1594
    18000 1908

    Piezometric Line
    1
5  PROTECTIVE LAYER - MAT. 5
    110
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
6 FINAL COVER - MAT. 6
    120
    Conventional Shear Strength
    0 35
    Piezometric Line
    1
7 MSW A - MAT. 7
    67.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -1 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    825.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
8 MSW B - MAT. 8
    63.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
9 MSW C - MAT. 9
    58.5
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
10 MSW D - MAT. 10
    53.4
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
11 MSW E - MAT. 11
    48.1
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1
12 MSW F - MAT. 12
    22.6
    Nonlinear Mohr-Coulomb
    -1000 0
    -100 0
    0 501.24
    208.85 501.24
    417.7 501.24
    626.55 501.24
    835.4 636.86719
    5221.25 3485.03818

    Piezometric Line
    1

PIEZOMETRIC LINE DATA
1 62.4 PHREATIC
-500 80
1000 80


ANAlysis/computation data follow -
NonCircular
80.452 96.113
128.039 80.250
386.460 82.835
446.291 170

FACTOR OF SAFETY
3.0
ITE
100
SHORT

Plot
COMpute
```

C_NC.OUT

```
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    TABLE NO. 1
    *****************************************
    * COMPUTER PROGRAM DESIGNATION - UTEXAS3 *
    * Originally Coded By Stephen G. Wright  *
    * Version No. 1.206                      *
    * Last Revision Date  6/ 4/96            *
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    * All Rights Reserved                    *
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    ***************************************************************
    *                                                             *
    *      RESULTS OF COMPUTATIONS PERFORMED USING THIS COMPUTER *
    * PROGRAM SHOULD NOT BE USED FOR DESIGN PURPOSES UNLESS THEY *
    * HAVE BEEN VERIFIED BY INDEPENDENT ANALYSES, EXPERIMENTAL   *
    * DATA OR FIELD EXPERIENCE. THE USER SHOULD UNDERSTAND THE   *
    * ALGORITHMS AND ANALYTICAL PROCEDURES USED IN THE COMPUTER  *
    * PROGRAM AND MUST HAVE READ ALL DOCUMENTATION FOR THIS      *
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    *                                                             *
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    OAK HAMMOCK DISPOSAL FACILITY
    STABILITY ANALYSES - 98 FEET
    NON-CIRCULAR; RS 03/18/2002

    TABLE NO.  2
    ************************
    * NEW PROFILE LINE DATA *
    ************************

    PROFILE LINE  1 - MATERIAL TYPE =  1
    HAWTHORNE - MAT. I

         Point        X              Y

           1       -500.000        -80.000
           2       1200.000        -80.000

    PROFILE LINE  2 - MATERIAL TYPE =  2
    SAND - MAT. 2

         Point        X              Y

           1       -500.000         80.000
           2       1200.000         80.000

    PROFILE LINE  3 - MATERIAL TYPE =  3
    BERM - MAT. 3

         Point        X              Y

           1           .000         80.000
           2         48.000         96.000
           3         80.000         96.000
           4        128.000         80.000
           5       1200.000         90.880

    PROFILE LINE  4 - MATERIAL TYPE =  4
    LINER - MAT. 4

         Point        X              Y

           1         80.000         96.000
           2         80.904         96.226
           3        128.079         80.501
           4       1200.000         91.380

    PROFILE LINE  5 - MATERIAL TYPE =  5
    PROTECTIVE LAYER - MAT. 5

         Point        X              Y

           1         80.904         96.226
           2         89.819         95.362
           3        128.394         82.504
           4       1200.000         93.380

    PROFILE LINE  6 - MATERIAL TYPE =  6
    FINAL COVER - MAT. 6

         Point        X              Y

           1         80.904         96.226
           2        408.369        178.000
           3       1200.000        178.000

    PROFILE LINE  7 - MATERIAL TYPE =  7
    MSW A - MAT. 7

         Point        X              Y

           1         89.819         95.362
           2        108.369        100.000
           3       1200.000        100.000

    PROFILE LINE  8 - MATERIAL TYPE =  8
    MSW B - MAT. 8

         Point        X              Y

           1        108.369        100.000
           2        168.369        115.000
           3       1200.000        115.000

    PROFILE LINE  9 - MATERIAL TYPE =  9
    MSW C - MAT. 9

         Point        X              Y

           1        168.369        115.000
           2        228.369        130.000
           3       1200.000        130.000

    PROFILE LINE 10 - MATERIAL TYPE = 10
    MSW D - MAT. 10

         Point        X              Y

           1        228.369        130.000
           2        288.369        145.000
           3       1200.000        145.000

    PROFILE LINE 11 - MATERIAL TYPE = 11
    MSW E - MAT. 11

         Point        X              Y

           1        288.369        145.000
           2        348.369        160.000
           3       1200.000        160.000

    PROFILE LINE 12 - MATERIAL TYPE = 12
    MSW F - MAT. 12

         Point        X              Y

           1        348.369        160.000
           2        408.369        175.000
           3       1200.000        175.000

    All new profile lines defined - No old lines retained
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    TABLE NO.  3
    *******************************************************************
    * NEW MATERIAL PROPERTY DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
    *******************************************************************

    DATA FOR MATERIAL TYPE  1
    HAWTHORNE - MAT. 1

         Unit weight of material =  115.000

         CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
         Cohesion - - - - - - - -          .000
         Friction angle - - - - -  30.000 degrees

         Pore water pressures defined by piezometric line
         Number of the piezometric line used =  1
         Negative pore pressures set to zero

    DATA FOR MATERIAL TYPE  2
    SAND - MAT. 2

         Unit weight of material =  115.000

         CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
         Cohesion - - - - - - - -          .000
         Friction angle - - - - -  30.000 degrees

         Pore water pressures defined by piezometric line
         Number of the piezometric line used =  1
         Negative pore pressures set to zero

    DATA FOR MATERIAL TYPE  3
    BERM - MAT. 3

         Unit weight of material =  120.000

         CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
         Cohesion - - - - - - - -          .000
         Friction angle - - - - -  35.000 degrees

         Pore water pressures defined by piezometric line
         Number of the piezometric line used =  1
         Negative pore pressures set to zero

    DATA FOR MATERIAL TYPE  4
    LINER - MAT. 4

         Unit weight of material =  110.000

         ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
         Point      Normal Stress      Shear Stress

           1          -1000.000              .000
           2               .000              .000
           3           2005.000           429.000
           4           5013.000           787.000
           5          10025.000          1143.000
           6          15038.000          1594.000
           7          18000.000          1908.000

         Pore water pressures defined by piezometric line
         Number of the piezometric line used =  1
         Negative pore pressures set to zero

    DATA FOR MATERIAL TYPE  5
    PROTECTIVE LAYER - MAT. 5

         Unit weight of material =  110.000

         CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
         Cohesion - - - - - - - -          .000
         Friction angle - - - - -  35.000 degrees

         Pore water pressures defined by piezometric line
         Number of the piezometric line used =  1
         Negative pore pressures set to zero

    DATA FOR MATERIAL TYPE  6
    FINAL COVER - MAT. 6

         Unit weight of material =  120.000

         CONVENTIONAL (ISOTROPIC) SHEAR STRENGTHS
         Cohesion - - - - - - - -          .000
         Friction angle - - - - -  35.000 degrees

         Pore water pressures defined by piezometric line
         Number of the piezometric line used =  1
         Negative pore pressures set to zero

    DATA FOR MATERIAL TYPE  7
    MSW A - MAT. 7

         Unit weight of material =   67.500

         ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
         Point      Normal Stress      Shear Stress

           1          -1000.000              .000
           2             -1.000              .000
           3               .000           501.240
           4            208.850           501.240
           5            417.700           501.240
           6            626.550           501.240
           7            835.400           636.867
           8           5221.250          3485.038

         Pore water pressures defined by piezometric line
         Number of the piezometric line used =  1
         Negative pore pressures set to zero

    DATA FOR MATERIAL TYPE  8
    MSW B - MAT. 8

         Unit weight of material =   63.100

         ---- NONLINEAR SHEAR STRENGTH ENVELOPE ----
         Point      Normal Stress      Shear Stress

           1          -1000.000              .000
           2           -100.000              .000
           3               .000           501.240
           4            208.850           501.240
           5            417.700           501.240
           6            626.550           501.240
```

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7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 9
MSW C - MAT. 9

Unit weight of material = 58.500

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 10
MSW D - MAT. 10

Unit weight of material = 53.400

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 11
MSW E - MAT. 11

Unit weight of material = 48.100

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

DATA FOR MATERIAL TYPE 12
MSW F - MAT. 12

Unit weight of material = 22.600

---- NONLINEAR SHEAR STRENGTH ENVELOPE ----

Point	Normal Stress	Shear Stress
1	-1000.000	.000
2	-100.000	.000
3	.000	501.240
4	208.850	501.240
5	417.700	501.240
6	626.550	501.240
7	835.400	636.867
8	5221.250	3485.038

Pore water pressures defined by piezometric line
Number of the piezometric line used = 1
Negative pore pressures set to zero

All new material properties defined - No old data retained
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TABLE NO. 5
****
* NEW PIEZOMETRIC LINE DATA - CONVENTIONAL/FIRST-STAGE COMPUTATIONS *
****

Line No.	Point	X	Y	
1 - Unit weight of water =			62.40	PHREATIC
1	1	-500.000	80.000	PHREATIC
1	2	1000.000	80.000	PHREATIC

All new piezometric lines defined - No old lines retained
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TABLE NO. 15
****
* NEW ANALYSIS/COMPUTATION DATA *
****

Noncircular Shear Surface(s)

Computations Performed for Single Shear Surface

Shear Surface Coordinates -

Point	X	Y
1	80.452	96.113
2	128.039	80.250
3	386.460	82.835
4	446.291	170.000

Initial trial estimate for the factor of safety = 3.000

Maximum number of iterations allowed for calculating the factor of safety = 100

Short form of output will be used for search

THE FOLLOWING REPRESENT EITHER DEFAULT OR PREVIOUSLY DEFINED VALUES:

Initial trial estimate for side force inclination = 15.000 degrees
(Applicable to Spencer's procedure only)

Allowed force imbalance for convergence = 100.000

Allowed moment imbalance for convergence = 100.000

Number of increments for slice subdivision = 30

Depth of water in crack = .000

Unit weight of water in crack = 62.400

Seismic coefficient = .000

Conventional (single-stage) computations to be performed

Procedure used to compute the factor of safety: SPENCER
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TABLE NO. 16
****
* NEW SLOPE GEOMETRY DATA *
****

NOTE - NO DATA WERE INPUT, SLOPE GEOMETRY DATA WERE GENERATED BY THE PROGRAM

Slope Coordinates -

Point	X	Y
1	-500.000	80.000
2	.000	80.000
3	48.000	96.000
4	60.000	96.000
5	80.904	96.226
6	408.369	178.000
7	1200.000	178.000

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	80.5	96.1					
1	80.7	96.0	6.6	4	NONLINEAR	ENVELOPE	.0
	80.9	96.0					
2	85.4	94.5	2945.0	4	NONLINEAR	ENVELOPE	.0
	89.8	93.0					
3	94.5	91.4	7551.1	4	NONLINEAR	ENVELOPE	.0
	99.1	89.9					
4	103.7	88.4	10935.5	4	NONLINEAR	ENVELOPE	.0
	108.4	86.8					
5	113.3	85.2	15205.8	4	NONLINEAR	ENVELOPE	.0
	118.2	83.5					
6	123.1	81.9	18890.3	4	NONLINEAR	ENVELOPE	.0
	128.0	80.3					
7	128.0	80.3	82.4	4	NONLINEAR	ENVELOPE	.0
	128.0	80.3					
8	128.1	80.3	84.5	4	NONLINEAR	ENVELOPE	.0
	128.1	80.3					
9	128.2	80.3	665.9	4	NONLINEAR	ENVELOPE	.0
	128.4	80.3					
10	133.4	80.3	21878.4	4	NONLINEAR	ENVELOPE	.0
	138.4	80.4					
11	143.4	80.4	23383.7	4	NONLINEAR	ENVELOPS	.0
	148.4	80.5					
12	153.4	80.5	24889.0	4	NONLINEAR	ENVELOPE	.0
	158.4	80.6					
13	163.4	80.6	26394.4	4	NONLINEAR	ENVELOPE	.0
	168.4	80.7					
14	174.4	80.7	33599.2	4	NONLINEAR	ENVELOPE	.0
	180.4	80.8					
15	186.4	80.8	35604.0	4	NONLINEAR	ENVELOPE	.0
	192.4	80.9					
16	198.4	81.0	37608.8	4	NONLINEAR	ENVELOPE	.0
	204.4	81.0					
17	210.4	81.1	39613.6	4	NONLINEAR	ENVELOPE	.0
	216.4	81.1					
18	222.4	81.2	41618.4	4	NONLINEAR	ENVELOPE	.0
	228.4	81.3					
19	234.4	81.3	43531.4	4	NONLINEAR	ENVELOPE	.0
	240.4	81.4					
20	246.4	81.4	45352.6	4	NONLINEAR	ENVELOPE	.0
	252.4	81.5					

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TABLE NO. 26
****
* Coordinate, Weight, Strength and Pore Water Pressure *
* Information for Individual Slices for Conventional *
* Computations or First Stage of Multi-Stage Computations. *
* (Information is for the Critical Shear Surface in the *
* Case of an Automatic Search.) *
****

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	252.4	81.5					
21	258.4	81.6	47173.7	4	NONLINEAR	ENVELOPE	.0
	264.4	81.6					
22	270.4	81.7	48995.0	4	NONLINEAR	ENVELOPE	.0
	276.4	81.7					
23	282.4	81.8	50816.2	4	NONLINEAR	ENVELOPE	.0
	288.4	81.9					
24	294.4	81.9	52542.0	4	NONLINEAR	ENVELOPE	.0
	300.4	82.0					
25	306.4	82.0	54172.4	4	NONLINEAR	ENVELOPE	.0
	312.4	82.1					
26	318.4	82.2	55802.8	4	NONLINEAR	ENVELOPE	.0
	324.4	82.2					
27	330.4	82.3	57433.2	4	NONLINEAR	ENVELOPE	.0
	336.4	82.3					

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28	342.4	82.4	59063.5	4	NONLINEAR ENVELOPE		.0
	348.4	82.5					
29	353.1	82.5	47741.8	4	NONLINEAR ENVELOPE		.0
	357.9	82.5					
30	362.7	82.6	48190.6	4	NONLINEAR ENVELOPE		.0
	367.4	82.6					
31	372.2	82.7	48639.2	4	NONLINEAR ENVELOPE		.0
	376.9	82.7					
32	381.7	82.8	49087.7	4	NONLINEAR ENVELOPE		.0
	386.5	82.8					
33	386.6	83.0	1029.0	4	NONLINEAR ENVELOPE		.0
	386.7	83.1					
34	387.4	84.1	6968.3	5	.00	35.00	.0
	388.0	85.1					
35	390.6	88.9	23961.1	7	NONLINEAR ENVELOPE		.0
	393.1	92.6					
36	395.7	96.3	21549.2	7	NONLINEAR ENVELOPE		.0
	398.2	100.0					
37	400.8	103.7	19089.5	8	NONLINEAR ENVELOPE		.0
	403.3	107.4					
38	405.8	111.1	16876.7	8	NONLINEAR ENVELOPE		.0
	408.4	114.8					
39	408.5	114.9	526.3	8	NONLINEAR ENVELOPE		.0
	408.5	115.0					
40	411.1	118.8	14624.5	9	NONLINEAR ENVELOPE		.0
	411.7	122.5					

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NON-CIRCULAR; RS 03/18/2002

TABLE NO. 26

```
****************************************************************
*  Coordinate, Weight, Strength and Pore Water Pressure        *
*  Information for Individual Slices for Conventional          *
*  Computations or First Stage of Multi-Stage Computations.    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                               *
****************************************************************
```

Slice No.	X	Y	Slice Weight	Matl. Type	Cohesion	Friction Angle	Pore Pressure
	413.7	122.5					
41	416.3	126.3	12565.9	9	NONLINEAR ENVELOPE		.0
	418.8	130.0					
42	421.4	133.8	10405.5	10	NONLINEAR ENVELOPE		.0
	424.0	137.5					
43	426.6	141.3	8343.7	10	NONLINEAR ENVELOPE		.0
	429.1	145.0					
44	431.7	148.8	6384.3	11	NONLINEAR ENVELOPE		.0
	434.3	152.5					
45	436.9	156.3	4527.1	11	NONLINEAR ENVELOPE		.0
	439.4	160.0					
46	442.9	165.0	4022.4	12	NONLINEAR ENVELOPE		.0
	446.3	170.0					

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TABLE NO. 27

```
****************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for      *
*  Individual Slices for Conventional  Computations or the     *
*  First Stage of Multi-Stage Computations.                    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                               *
****************************************************************
```

				FORCES DUE TO SURFACE PRESSURES			
Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
1	80.7	0.	96.1	0.	0.	.0	.0
2	85.4	0.	95.9	0.	0.	.0	.0
3	94.5	0.	95.7	0.	0.	.0	.0
4	103.7	0.	95.4	0.	0.	.0	.0
5	113.3	0.	95.0	0.	0.	.0	.0
6	123.1	0.	94.6	0.	0.	.0	.0
7	128.0	0.	94.4	0.	0.	.0	.0
8	128.1	0.	94.4	0.	0.	.0	.0
9	128.2	0.	94.4	0.	0.	.0	.0
10	133.4	0.	95.1	0.	0.	.0	.0
11	143.4	0.	96.4	0.	0.	.0	.0
12	153.4	0.	97.6	0.	0.	.0	.0
13	163.4	0.	98.9	0.	0.	.0	.0
14	174.4	0.	100.3	0.	0.	.0	.0
15	186.4	0.	101.8	0.	0.	.0	.0
16	198.4	0.	103.2	0.	0.	.0	.0
17	210.4	0.	104.7	0.	0.	.0	.0
18	221.4	0.	106.2	0.	0.	.0	.0
19	234.4	0.	107.7	0.	0.	.0	.0
20	246.4	0.	109.1	0.	0.	.0	.0
21	258.4	0.	110.5	0.	0.	.0	.0
22	270.4	0.	112.0	0.	0.	.0	.0
23	282.4	0.	113.4	0.	0.	.0	.0
24	294.4	0.	114.8	0.	0.	.0	.0
25	306.4	0.	116.2	0.	0.	.0	.0
26	318.4	0.	117.6	0.	0.	.0	.0
27	330.4	0.	119.0	0.	0.	.0	.0
28	342.4	0.	120.4	0.	0.	.0	.0
29	351.1	0.	121.4	0.	0.	.0	.0
30	362.7	0.	122.0	0.	0.	.0	.0
31	372.2	0.	122.7	0.	0.	.0	.0
32	381.7	0.	123.4	0.	0.	.0	.0
33	386.6	0.	123.8	0.	0.	.0	.0
34	387.4	0.	124.9	0.	0.	.0	.0
35	390.6	0.	128.1	0.	0.	.0	.0
36	395.7	0.	132.7	0.	0.	.0	.0
37	400.8	0.	137.4	0.	0.	.0	.0
38	405.8	0.	142.0	0.	0.	.0	.0
39	408.5	0.	144.5	0.	0.	.0	.0

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TABLE NO. 27

```
****************************************************************
*  Seismic Forces and Forces Due to Surface Pressures for      *
*  Individual Slices for Conventional  Computations or the     *
*  First Stage of Multi-Stage Computations.                    *
*  (Information is for the Critical Shear Surface in the       *
*  Case of an Automatic Search.)                               *
****************************************************************
```

				FORCES DUE TO SURFACE PRESSURES			
Slice No.	X	Seismic Force	Y for Seismic Force	Normal Force	Shear Force	X	Y
40	411.1	0.	146.7	0.	0.	.0	.0
41	416.3	0.	151.0	0.	0.	.0	.0
42	421.4	0.	155.4	0.	0.	.0	.0
43	426.6	0.	159.8	0.	0.	.0	.0
44	431.7	0.	164.4	0.	0.	.0	.0
45	436.9	0.	169.3	0.	0.	.0	.0
46	442.9	0.	174.0	0.	0.	.0	.0

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TABLE NO. 29

```
******************************************************************
*  Information Generated During Iterative Solution for the Factor *
*  of Safety and Side Force Inclination by Spencer's Procedure    *
******************************************************************

       Trial    Trial
       Factor   Side Force   Force      Moment                  Delta
Iter-   of      Inclination  Imbalance  Imbalance   Delta-F     Theta
ation  Safety   (degrees)    (lbs.)     (ft.-lbs.)              (degrees)

   1  3.00000   15.0000   .3938E+05   .1574E+07
First-order corrections to F and THETA .........  -.127E+01 -.358E+01
Values factored by  .394E+00 - Deltas too large   -.500E+00 -.141E+01

   2  2.50000   13.5905   .2034E+05   .1145E+07
First-order corrections to F and THETA .........  -.511E+00 -.341E+01
Values factored by  .978E+00 - Deltas too large   -.500E+00 -.334E+01

   3  2.00000   10.2493  -.5803E+04   .6460E+06
First-order corrections to F and THETA .........   .448E-01 -.142E+01
Second-otder correction - Iteration  1 ........    .454E-01 -.142E+01
Second-order correction - Iteration  2 ........    .454E-01 -.142E+01

   4  2.04541    8.8145   .5560E+01  -.4898E+05
First-order corrections to F and THETA .........   .316E-02  .147E+00
Second-order correction - Iteration  1 ........    .316E-02  .147E+00

   5  2.04857    8.9716   .2197E-02  -.1054E+02
First-order corrections to F and THETA .........   .665E-06  .315E-04
```

For trial number 2 with a nonlinear strength envelope the maximum
percent change in shear strength was 35.924 - at slice 43
Material: 10 Normal stress: 1059.281
Strength from previous trial: 501.240
Estimated strength for new trial: 782.256

TABLE NO. 29

```
******************************************************************
*  Information Generated During Iterative Solution for the Factor *
*  of Safety and Side Force Inclination by Spencer's Procedure    *
******************************************************************

       Trial    Trial
       Factor   Side Force   Force      Moment                  Delta
Iter-   of      Inclination  Imbalance  Imbalance   Delta-F     Theta
ation  Safety   (degrees)    (lbs.)     (ft.-lbs.)              (degrees)

   1  2.04857    8.9716  -.1616E+04   .1240E+06
First-order corrections to F and THETA .........   .180E-01 -.162E+00
Second-order correction - Iteration  1 ........    .181E-01 -.162E+00
Second-order correction - Iteration  2 ........    .181E-01 -.162E+00

   2  2.06671    8.8099   .1315E+00  -.1521E+04
First-order corrections to F and THETA .........   .958E-04  .467E-02
Second-order correction - Iteration  1 ........    .958E-04  .468E-02

   3  2.06681    8.8146  -.7935E-02   .5815E+00
First-order corrections to F and THETA .........   .924E-07 -.664E-06
```

For trial number 3 with a nonlinear strength envelope the maximum
percent change in shear strength was .000 - at slice 15
Material: 4 Normal stress: 3000.773
Strength from previous trial: 547.513
Estimated strength for new trial: 547.513

TABLE NO. 29

```
******************************************************************
*  Information Generated During Iterative Solution for the Factor *
*  of Safety and Side Force Inclination by Spencer's Procedure    *
******************************************************************

       Trial    Trial
       Factor   Side Force   Force      Moment                  Delta
Iter-   of      Inclination  Imbalance  Imbalance   Delta-F     Theta
ation  Safety   (degrees)    (lbs.)     (ft.-lbs.)              (degrees)

   1  2.06681    8.8146  -.7935E-02   .5815E+00
First-order corrections to F and THETA .........   .924E-07 -.664E-06

Factor of Safety - - - - - - - - -      2.067
Side Force Inclination - - - - -         8.81
Number of Iterations - - - - - -        1
```

1 UTEXAS3 - VER. 1.206 - 6/ 4/96 - (C) 1985-1996 S. G. WRIGHT
One (1) copy licensed to Geosyntec Consultants, Atlanta, GA
Date: 3:27:2002 Time: 16:50:49 Input file: C_NC.DAT
OAK HAMMOCK DISPOSAL FACILITY
STABILITY ANALYSES - 98 FEET
NON-CIRCULAR; RS 03/18/2002

TABLE NO. 38

```
****************************************************************
*  Final Results for Stresses Along the Shear Surface          *
*  (Results for Critical Shear Surface in Case of a Search.)   *
****************************************************************
```

SPENCER'S PROCEDURE USED TO COMPUTE FACTOR OF SAFETY
Factor of Safety = 2.067 Side Force Inclination = 8.81 Degrees

-------- VALUES AT CENTER OF BASE OF SLICE---------

Slice No.	X-center	Y-center	Total Normal Stress	Effective Normal Stress	Shear Stress
1	80.7	96.0	16.2	16.2	1.7
2	85.4	94.5	368.0	368.0	38.1
3	94.5	91.4	906.9	906.9	93.9
4	103.7	88.4	1313.3	1313.3	136.0
5	113.3	85.2	1725.6	1725.6	178.6
6	123.1	81.9	2140.4	2140.4	215.4
7	128.0	80.3	2345.1	2345.1	227.2
8	128.1	80.3	2141.7	2141.7	215.4
9	128.2	80.3	2141.7	2141.7	215.4
10	133.4	80.3	2217.7	2217.7	219.8
11	143.4	80.4	2369.3	2369.3	228.5
12	153.4	80.5	2521.0	2521.0	237.3
13	163.4	80.6	2672.6	2672.6	246.0
14	174.4	80.7	2832.6	2832.6	255.2
15	186.4	80.8	3000.8	3000.8	264.9
16	198.4	81.0	3169.0	3169.0	274.6
17	210.4	81.1	3337.2	3337.2	284.3
18	222.4	81.2	3505.4	3505.4	294.0
19	234.4	81.3	3665.9	3665.9	303.2
20	246.4	81.4	3818.7	3818.7	312.0
21	258.4	81.6	3971.5	3971.5	320.8
22	270.4	81.7	4124.3	4124.3	329.6
23	282.4	81.8	4277.1	4277.1	338.4
24	294.4	81.9	4421.9	4421.9	346.7
25	306.4	82.0	4558.7	4558.7	354.6
26	318.4	82.2	4695.5	4695.5	362.5
27	330.4	82.3	4832.3	4832.3	370.4
28	342.4	82.4	4969.1	4969.1	378.3

SETTLEMENT ANALYSIS

LIST OF FIGURES

1. INTRODUCTION

1.1 Project Description

The Oak Hammock Disposal (OHD) landfill is a 264-acre facility with a planned height of 98 feet above current ground elevations. A double-composite liner system will be used for leachate containment. Collection and removal of leachate from the liner system depends on adequate slope to drain. Landfill settlement in future years will effect the landfill liner system slope and its ability to continually remove leachate.

1.2 Purpose of Analysis

The purpose of the analysis presented in this calculation package is to evaluate the total settlements expected in the foundation soils below the proposed OHD landfill. Total settlement is the sum of time-independent elastic settlements in cohesionless soils plus time-dependent consolidation settlements in cohesive soils. Total foundation soil settlements are used to evaluate post settlement subgrade elevations and slopes, and strains in the liner system due to these settlements.

1.3 Method of Analysis

The footprint of the proposed OHD landfill was divided into a 50 ft by 50 ft grid for the settlement analysis. A one-dimensional settlement analysis was performed for each grid location, taking into consideration the height of overlying waste and subgrade fill at that location. Post settlement subgrade elevations and slopes and strain in the liner system were then computed using the settlements calculated at each grid point.

The settlement analysis was performed for the final configuration of the proposed OHD landfill, and an overall factor of safety of 1.5 was applied to the settlements calculated. The final configuration (i.e., waste deposited to the proposed 95 ft height) represents the critical condition for subgrade settlement and strains in the liner system. Time rate of settlement in cohesive soils was not calculated, as the total settlement represents the critical condition. Further, most of the settlement will take place in coarse-grained soils which occurs instantaneously, for all practical purposes, as the subgrade soils, liner system, waste and final cover system are placed.

Settlement of the underlying soil layers, consisting almost entirely of sands to silty sands, was calculated using one-dimensional compression. A one-dimensional analysis is a relevant simplification for this site considering that the compressible soils are encountered to a maximum depth of approximately 300 ft, which is small when compared to the width of the landfill (approximately 1,500 to 3,500 ft, depending on location).

A two-dimensional stress distribution of a typical cross section of the landfill is shown in Figure 1 with depth and horizontal distances made dimensionless by being expressed as a percent of B ($^1/_2$ the landfill width). The figure represents an elastic solution for this load distribution from Polous and Davis (1974). Note the horizontal line drawn at an elevation of 30 percent B, which represents the typical depth of compressible soils at the proposed OHD facility. A two-dimensional settlement analysis was performed for a typical cross section of the landfill to estimate settlements outside the footprint of the landfill due to the loading imposed by the landfill.

The one-dimensional settlement analysis is exact, in terms of stress distribution, where the stress contours are vertically oriented in this region of compressible soils (as annotated in the figure). The one-dimensional settlement analysis is conservative with regards to settlement where the stress contours curve inward towards the center of this compressible zone, and unconservative where the stress contours curve outwards. This makes the post settlement subgrade slope conservative (i.e. slopes will be greater than predicted by one-dimensional analysis) at all locations affected by the landfill footprint. Also, the liner system strains predicted at the perimeter of the landfill footprint by the one-dimensional analysis will be conservative (i.e. predicted strains will be larger than experienced strains).

2. ANALYSIS PARAMETERS

2.1 Geometry

For settlement calculations, the elevation of the existing ground surface was assumed to be 80 ft (NGVD). The subgrade and final cover system elevations were interpolated at the 50 ft intervals (both in a North-South and East-West directions) from permit drawing Sheets 8 and 9 and Sheets 33 and 34 of 50. Break lines, points, and contours were taken into account during this interpolation to more accurately estimate elevations. This data was then electronically imported into a spreadsheet for calculation purposes. Figures 2 and 3 present the final cover and pre-settlement subgrade elevations, respectively. Attachments 1 and 2 present the data values from the spreadsheet solutions for the final cover and pre-settlement subgrade elevations, respectively.

2.2 Soil Properties

The compressible soil underlying the proposed OHD landfill was divided into three layers for settlement calculation purposes. These are the subgrade fill placed above existing ground surface, the Post Hawthorn Undifferentiated formation (to a depth of 155 ft), and the Hawthorn Group (from a depth of 155 ft to 300 ft). Note that the Post Hawthorn Undifferentiated formation will simply be referred to as the undifferentiated sand layer in this calculation package.

The undifferentiated sand layer consists of two distinct layers: a surficial silty sand to a depth of approximately 70 ft, and a shelly sand layer from a depth of approximately 70 ft to 155 ft. The Hawthorn Group consists of two distinct formations: the Peace River formation which approximately comprised the top 77 ft of the Hawthorn Group, and the Arcadia formation which approximately comprised the bottom 68 ft of the Hawthorn Group. The Ocala Group below these soil layers consists mostly of limestone and was considered incompressible. The geotechnical properties used for settlement calculations are summarized below and a more detailed discussion of the soil layers and the empirical correlations used to estimate their soil properties was presented in the calculation package entitled *Geotechnical Investigation Report.*

The parameter used for compression settlement calculations of the coarse-grained soils was the elastic modulus (E). The coarse-grained soils consisted of the subgrade fill, the undifferentiated sand layer, and the majority of the Hawthorn Group. A modified compression index ($C_{c\varepsilon}$) was used for the consolidation settlement of the cohesive soils of the Hawthorn Group. Figure 4 shows the elastic modulus (E) with depth that was used for settlement calculations of the coarse-grained portion of the compressible soils underlying the proposed OHD landfill. This figure is annotated to show the division between formations and the assumed cohesive sections of the Hawthorn Group.

The maximum shear modulus (G_{max}) for the subgrade fill was estimated by methods proposed by Seed and Idriss (1970), as shown in Equation 9 of the calculation package entitled *Geotechnical Investigation Report.* This was done at all grid locations using ½ the subgrade fill height at each location multiplied by a conservatively assumed unit weight for the soil (γ_{total}) of 120 pcf for computation of the vertical effective stress ($\sigma_v' = \sigma_1'$). The mean effective stress ($\sigma_m' = (\sigma_1' + \sigma_2' + \sigma_3')/3$ where $\sigma_2' = \sigma_3' = K_o \cdot \sigma_1'$), was calculated using an assumed value of 0.5 for the lateral earth pressure coefficient (K_o). The maximum shear modulus (G_{max}) was calculated using a (K_{2max}) value of 70, as detailed in the calculation package entitled *Geotechnical Investigation Report.* The elastic modulus

(E) was then calculated according to Equation 8 of the calculation package entitled *Geotechnical Investigation Report,* which stated that an average G was assumed to be 1/3 of G_{max} using a Poisson ratio (ν) of 0.3.

The elastic modulus for the surfical sand layers of the undifferentiated sand layer (to a depth of approximately 70 ft) was obtained from Standard Penetration Testing (SPT) performed during the field investigation. Empirical correlations applied to the SPT values taken at 5 ft intervals yielded the modulus profile with depth. The shelly silty sand layer below the surfical sands (to a depth of approximately 155 ft.) was conservatively estimated to have a modulus of 1,500 ksf (constant with depth). The spreadsheet solution divided the sand layers (surfical and shelly silty sand deposits) into 16 layers for calculation purposes, the first 15 layers were 10 ft thick and the last layer was 5 ft thick.

The Peace River Formation (comprising the top 77 ft of the Hawthorn Group) was estimated to consist of approximately 10 percent cohesive soils by volume, and the Arcadia formation (comprising 68 ft of the Hawthorn group) was estimated to consist of approximately 5 percent cohesive soils by volume. The cohesive soils within these formations are located throughout the formation in relatively thin seams. For settlement calculation purposes, the cohesive soils of the Peace River and Arcadia formations were assumed to occur at mid-depth of their respective formation. The settlement calculations for the Peace River formation thus used the following simplified lithology: compression settlement of a coarse-grained soil layer (from a depth of 155.0 to 189.7 ft), time dependant consolidation settlement of the assumed cohesive soil layer (from a depth of 189.7 to 197.4 ft), and compression settlement of a coarse-grained soil layer (from a depth of 197.4 to 232.0 ft). Similarly, the settlement calculations for the Arcadia formation used the following simplified lithology: compression settlement of a coarse-grained soil layer (from a depth of 232.0 to 264.3 ft), time dependant consolidation settlement of the assumed cohesive soil layer (from a depth of 264.3 to 267.7 ft), and compression settlement of a coarse-grained soil layer (from a depth of 267.7 to 300.0 ft).

Compression settlement calculations for the coarse-grained portions of the Hawthorn Group used an elastic modulus (E) that was estimated to vary linearly with depth. The modulus was 2,200 ksf at a depth of 155 ft increasing to 3,020 ksf at a depth of 300 ft. Consolidation settlement calculations for the cohesive portions of the Hawthorn Group were made using a modified compression index ($C_{c\varepsilon}$) of 0.10. The selection of these parameters is discussed in detail in the calculation package entitled *Geotechnical Investigation.*

The ground water table was considered to be at the existing ground surface, and all soils within the undifferentiated sand layer and Hawthorn Group were considered to be fully saturated. A unit weight of 120 pcf was conservatively used as a total unit weight for the subgrade fill (typical of compacted medium to fine silica sand that is representative of the borrow material). The subgrade material will be taken mostly from the borrow areas on site consisting of the surfical sand layers. Average total unit weights of 115 pcf were assumed for the undifferentiated sand layers and the Hawthorn Group, as detailed in the calculation package entitled *Geotechnical Investigation Report*.

2.3 Waste Properties

Variation of the unit weight of municipal solid waste with depth was studied by Kavazanjian, et al. (2000), and is presented in Figure 5. This study presented the in-situ unit weight "as-placed", to include typical initial cover material/soil incorporated into the waste. Two linear approximations are made to represent this curve: (i) from depth of 0 ft to 131 ft, and (ii) for depths greater than 131 ft. For settlement analysis, a constant waste density of 81.5 pcf was used below a depth of 131 ft. At depths above 131 ft the density was considered to vary linearly from, 42.7 to 81.5 pcf, according to the relationship shown below as Equation 1.

$$\gamma_{waste} = 42.7 + 0.30 \cdot (z) \qquad \text{(Equation 1)}$$

Where: γ_{waste} = unit weight of waste (pcf)
z = depth (ft)

3. VERTICAL STRESS INCREASE

The height of the subgrade fill and the depth of waste at each grid point in a 50 ft by 50 ft pattern were calculated using a spreadsheet. The height of the subgrade fill, at any grid location, is the original grade elevation assumed (80 ft NGVD 1929) subtracted from the subgrade elevation at that location. The depth of waste is obtained by subtracting the subgrade elevation from the final cover elevation.

The average unit weight of the waste was calculated at each grid point by integrating the unit weight with depth relationship (Equation 1) to the maximum depth of waste at that location. Figure 6 shows the average unit weight of waste (including initial cover) at all the grid points within the mesh.

The vertical stress due to the placement of the subgrade fill is the unit weight of the fill (120 pcf) multiplied by the depth of subgrade fill at a given location, and is shown in Figure 7. The vertical stress increase due to the placement of waste is the average unit weight of the waste (as shown previously) multiplied by the depth of the waste at a given location, and is shown in Figure 8. Attachments 3 and 4 present the data values from the spreadsheet solutions for the vertical load from the subgrade fill and the waste, respectively. Note that a manual calculation has been performed for each of the cited attachments at location Northing 1355000 ft and Easting 624400ft.

One-dimensional settlement analyses differ from two-dimensional analyses in the way that the stress increases at the surface of the foundation soil are attenuated through the compressible soil layers. The one-dimensional analysis models the stress increase to be constant with depth at any location of the landfill in plan view. The two-dimensional analysis utilizes an elastic solution for stress distribution to model the attenuation of stress increase throughout the compressible soil layers. Figure 9 presents the load distribution for a typical cross section (located at Northing 1354300 ft) due to the placement of general fill for the subgrade and the waste for both the one-dimensional and two-dimensional analysis. Note that the one-dimensional analysis can accommodate an actual load distribution that may vary widely, while due to the limited number of analytical solutions available, the two-dimensional analysis must approximate the actual load distribution with some regular distribution . Figure 10 shows this approximated waste load distribution for the two-dimensional analysis attenuated through the compressible foundation soil layers.

The compression settlement of the subgrade fill and the coarse-grained foundation soils (the undifferentiated sand layer and most of the Hawthorn Group) occur nearly instantaneously during placement of the subgrade fill, and thus the compression settlement due to the increase in vertical stress from the subgrade fill occurs before the liner system or waste is placed into the landfill. Consequently, only the vertical stress increase due to the placement of waste was used for calculation of the compression settlement of the subgrade fill and the coarse-grained foundation soils.

The consolidation settlement of the cohesive layers within the Hawthorn Group may experience a time lag between consolidation settlement and placement of the subgrade fill. Thus, the vertical stress increases imparted by the addition of the subgrade fill and the waste were used for the consolidation settlement of the cohesive foundation soils.

4. SETTLEMENT

The settlement of the subgrade due to the placement of waste for each grid point was calculated using Equation 2.

$$S_{sub-grade} = H_o \frac{\Delta \sigma_{vertical}}{E} SF \qquad \text{(Equation 2)}$$

Where: $S_{sub-grade}$ = total settlement in the subgrade fill (ft)

H_o = initial thickness (ft)

E = Elastic modulus at the midpoint (ft.)

$\Delta \sigma_{vertical}$ = increase in vertical stress due to waste (psf)

SF = safety factor = 1.5

The settlement of the undifferentiated sand layer due to the placement of waste for each grid point was calculated using Equation 3 as stated below. Note that the 155 ft deep undifferentiated sand layer was divided into 16 increments; 15 layers 10 ft thick, and 1 layer 5 ft thick.

$$S_{undiff.sand} = \sum_{i=1}^{16} H_{o,i} \frac{\Delta \sigma_{vertical}}{E_i} SF \qquad \text{(Equation 3)}$$

Where: $S_{undiff.sand}$ = total settlement in the undifferentiated sand layer (ft)

$H_{o,i}$ = initial thickness of the i^{th} layer (ft.)

E_i = Elastic modulus at the midpoint of the i^{th} layer (ft.)

$\Delta \sigma_{vertical}$ = increase in vertical stress due to waste (psf)

SF = safety factor = 1.5

The total settlement of the Hawthorn Group for each grid point was calculated by adding the compression settlements in the coarse-grained soils due to the placement of waste to the consolidation settlements of the cohesive soils due to the placement of subgrade fill and waste.

The compression settlements of the coarse-grained soils of the Hawthorn Group were calculated using Equation 3, shown previously. Note that the formation was broken up into 4 coarse-grained soil layers (2 in the Peace River formation and two in the Arcadia formation), as was detailed in Section 2.2 of this calculation package. The increase in vertical stress was due to the waste, and a safety factor of 1.5 was applied to these calculations as well.

The consolidation settlement of the two cohesive soil layers of the Hawthorn group (1 in the Peace River formation and 1 in the Arcadia formation) were both calculated using Equation 4 at each grid point. Note that the vertical stress increase is the result of the subgrade fill and the waste.

$$S_{Hawthorn,Cohesive} = H_o \cdot C_{c\varepsilon} \cdot \log\left[\frac{\sigma'_{vertical,initial} + \Delta\sigma_{vertical}}{\sigma'_{vertical,initial}}\right] \cdot SF \qquad \text{Equation 4}$$

Where: $S_{Hawthorn,Cohesive}$ = settlement in the cohesive Hawthorn layer (ft)

H_o = initial thickness of the i^th layer (ft.)

$C_{c\varepsilon}$ = modified compression index

$\sigma'_{vertical,initial}$ = initial effective vertical stress at the midpont of the cohesive Hawthorn layer (psf)

$\Delta\sigma_{vertical}$ = increase in vertical stress due to subgrade fill and waste (psf)

SF = safety factor = 1.5

The total settlement at each grid location is obtained by adding the settlements for the (1) subgrade, (2) the undifferentiated sand layers, and (3) the Hawthorn Group at that location. Figure 11 presents the total settlement for each grid point used in the analysis, based on the one-dimensional settlement analysis. Attachment 5 presents the data values from the spreadsheet solution for the total settlement. Note that a manual calculation has been performed for total settlement at location Northing 1355000 ft and Easting 624400 ft.

A two-dimensional settlement analysis was performed at a typical cross section of the landfill to assess this influence of the one-dimensional analysis on settlement calculations. This cross section was in an East-West direction and was located at Northing 1354300 ft, as was annotated in Figure 11. Equations 2 through 4, previously presented for one-dimensional settlement analysis, were all utilized as shown with the only exception that the change in stress ($\Delta\sigma_{vertical}$) was obtained from the two-dimensional elastic solution, Poulus and Davis (1974). The settlement profile and the post-settlement subgrade elevation obtained along this cross section, for both the one-dimensional and two-dimensional analysis, are presented in Figures 12 and 13, respectively. The one-dimensional analysis indicates larger settlements compared to the two-dimensional analysis for most of the landfill, with the exception that the one-dimensional analysis shows slightly less settlement near the perimeter of the landfill (see the area for settlements less than approximately 0.1 ft). Note that this makes the one-dimensional analysis conservative in regards to both subgrade slope change (i.e. "flattening out" of the cell floors) and liner system strain for all areas of the landfill.

5. POST-SETTLEMENT SUBGRADE ELEVATIONS AND SLOPES

The post-settlement subgrade elevation at any grid point was obtained by adding the settlement (expressed as a negative number) to the pre-settlement elevation at that point. Figure 14 shows the post-settlement subgrade elevations. Attachment 6 presents the data values from the spreadsheet solution for the post-settlement subgrade elevations. Note that a manual calculation has been performed for the post-settlement subgrade elevation at location Northing 1355000 ft and Easting 624400 ft.

The post settlement subgrade slopes were computed at the grid points in both the North-South and East-West directions using a central difference technique. Figure 15 is taken from Dunn, et al. (1980), and is used to illustrate this numerical approximation of slope given the elevations at discrete points where Δx is the 50 ft horizontal increment in either the North-South or East West directions and $y = f(x)$ is the elevation of the subgrade fill surface. Note that Northerly and Easterly are defined as the positive (+) for the orthogonal compass directions. Thus, positive (+) or negative (-) values of slope indicate that the elevation is increasing or decreasing, respectively, as you change positions in plan view in the defined positive (+) direction.

The maximum slope at any grid point is obtained as the vector sum of the grades calculated in the North-South and East-West directions, as these vectors lie within a plane tangent to the subgrade surface at that grid point. This is illustrated in Figure 16 showing that the North-South and East-West gradients are projections of the maximum grade onto these two respective orthogonal axis. As the North-South and East-West grades are orthogonal, the vector sum (maximum grade) can be obtained using the Pythagorean theorem, shown in Equation 5. The maximum slope of the post settlement subgrade is presented as Figure 17; note that only slopes within the range of 0 to 2.2 percent are presented as slopes greater than this are non-critical. Attachment 7 presents the data values from the spreadsheet solution for maximum post-settlement subgrade slope. Note that a manual calculation has been performed for the maximum slope at location Northing 1355000 ft and Easting 624400 ft.

$$M_{max} = \sqrt{M_{North-South}^{2} + M_{East-West}^{2}} \quad \text{(Equation 5)}$$

Where: M = slope (expressed as percent)

When the slope in the two orthogonal directions is squared in the above equation, sign convention is lost (+ or – slope), and only the magnitude of the maximum slope is obtained (i.e., the absolute value). If the direction (heading) of the maximum downward slope were to be calculated it would simply be as stated in Equation 6 (note that this would also establish the northerly axis as heading = 0°).

$$Heading = \tan^{-1}(M_{North-South} / M_{East-West}) \quad \text{(Equation 6)}$$

Where: $Heading$ = compass direction for the line of action of the maximum gradient
M = slope

The above equation is an odd function that will only return values of heading in the range of +90° (due east) to –90° (due west). Boolean Logic applied to the sign of both orthogonal vectors would determine which quadrant of the full 360° compass directions the maximum downward slope acts (i.e., the equation above identifies the line of action for the maximum gradient, and Boolean logic shows which of the two possibilities is down gradient from the localized coordinate system). The best way to illustrate maximum gradient directions is to refer back to the post-settlement subgrade, Figure 14, and recognize that the maximum grade is always perpendicular to the elevation contour at any given point.

6. LINER SYSTEM STRAIN DUE TO SETTLEMENT

The liner system is placed over the subgrade fill prior to the placement of waste. As settlement occurs in the subgrade fill and the foundation soil due to the placement of the waste, the liner system undergoes strain. The amount of liner system strain is calculated using results from the 1-dimensional settlement calculations.

The 1-dimesional settlement analysis for computing liner system strains is conservative in that the liner system is constrained to remain fixed at the landfill perimeter due to the 1-dimensional settlement model predicting zero settlement at the perimeter. This results in strains being over estimated at the perimeter of the landfill since the perimeter actually undergoes some settlement.

The liner system was assumed to remain fixed relative to the subgrade soil undergoing settlement. If the liner system were to slip relative to the subgrade soil during settlement, localized areas of high strain would be relieved causing lower strain.

In this strain analysis, it was assumed that the liner system (analyzed in 50 ft by 50 ft sections) will experience plain strain. This means that the normal strain and the shear strains on the top and bottom of the liner system are all zero. Thus the generalized 3-dimensional state of strain is simplified to a 2-dimensional model. This is appropriate for the liner system as the liner system thickness is small compared to the dimensions in plane with the liner system surface.

In order to fully define the state of strain of the liner system at any given point, three quantities were calculated numerically: the normal strain in the North-South direction, the normal strain in the East-West direction, and the shear strain along the edges of the plane strain element. Figure 18, taken from Higdon, et al. (1985), illustrates a plane strain element. Note that dimensions in the figure and in the derivations from Higdon, et al. (1985) are on a differential scale, while the numerical approximations used in this analysis are finite. Therefore, the dimensions in the figure and derivations from Higdon, et al. (1985) have orthogonal planar axis of "X" and "Y" corresponding to the "North" and "East" axis, respectively, for this analysis (defined herein as positive in the compass directions cited).

The normal strains (in a direction along either the North-South or East-West axis) were obtained using the discrete definition of normal strain (normal strain is simply the change in length, divided by the original length), and a central differencing technique to obtain the pre-settlement and post-settlement element lengths (the change in length is the difference of these two. Note that differences in elevation were accounted for (both pre-settlement and post-settlement) when calculating the element length.

Whereas the normal strains represent the change in a planar elements length in a given direction, the shear strain represents the distortion of the element. In order to compute the shear strain, the normal strain along the diagonal of the element must first be computed, line OB' as shown previously in Figure 18. Similar to the previous discussion of normal strains along the defined North and East axis, the normal strain along the diagonal of the planar element was approximated numerically with a central difference calculation.

Shear strain was calculated using the plain strain relationship shown as Equation 7. by applying the law of cosines to triangle OC'B', shown in Figure 18. This is expressed on a differential scale, as was derived in Higdon, et al. (1985), and was utilized on a finite scale by replacing the differential terms (dx, dy, and dn) with finite lengths (L_{north}, L_{east}, and $L_{diagonal}$) of the liner system sections analyzed, and relating "X" to the North axis and "Y" to the East axis.

(Equation 7)

$$[(1+\varepsilon_n)dn]^2 = [(1+\varepsilon_x)dx]^2 + [(1+\varepsilon_y)dy]^2 - 2[(1+\varepsilon_x)dx][(1+\varepsilon_y)dy][-\sin\gamma_{xy}]$$

Where:
ε_x = normal strain in the x (North) direction
ε_y = normal strain in the y (East) direction
ε_n = normal strain in the diagonal direction
γ_{xy} = shear strain along an edge of the element
dx = element length in the x (North) direction
dy = element length in the y (East) direction
dn = element length in diagonal direction

The principal strains were calculated using Equation 8, as are illustrated in the Mohr's strain space in Figure 18. The major and minor principle strains are the largest normal strains in the element in the tension (+) and compression (-) directions. The major principal strains calculated are shown in Figure 19. Attachment 8 presents the data values from the spreadsheet solution for major principal strain. Note that a manual calculation has been performed for the major principal strain at location Northing 1355000 ft and Easting 624400 ft.

$$\varepsilon_{p1}, \varepsilon_{p2} = \frac{\varepsilon_x + \varepsilon_y}{2} \pm \sqrt{\left(\frac{\varepsilon_x - \varepsilon_y}{2}\right)^2 + \left(\frac{\gamma_{xy}}{2}\right)^2}$$

Equation 8

Where: ε_{p1} = major principal strain

ε_{p2} = minor principal strain

ε_{x} = normal strain in the x (North) direction

ε_{y} = normal strain in the y (East) direction

γ_{xy} = shear strain along an edge of the element

A two-dimensional settlement analysis was performed at a typical cross section of the landfill to assess the influence of the one-dimensional analysis on settlement calculations. This cross section was in an East-West direction and was located at Northing 1354300 ft, as was annotated in Figure 11 presented previously. The two-dimensional analysis allows for computation of normal strain in the East-West direction only, shear strains and principal strains can not be assessed. Comparison of normal strains in the East-West direction, obtained along this cross section, for both the one-dimensional and two-dimensional analysis, is presented in Figure 20. The one-dimensional analysis is conservative compared to the two-dimensional analysis with respect to strain for most of the landfill, with the exception of areas near the location where the idealized two-dimensional load profile exceeds that in the one-dimensional analysis. As shown in the figure tension strains are overestimated and compression strains are underestimated by the one-dimensional analysis.

7. SUMMARY AND CONCLUSIONS

Settlements were calculated for the final configuration of the Proposed OHD facility (i.e., waste deposited to the proposed height of 95 ft), with a factor of safety of 1.5 applied to the settlements. These calculations were made at 50 ft grid intervals across the entire site with a one-dimensional model; comparisons were made to a two-dimensional model at a typical cross section of the landfill to illustrate the conservatism of the one-dimensional analysis on settlement calculations.

The maximum settlement obtained within the landfill was calculated to be approximately 2.1 ft of total settlement. The post settlement grade within the landfill cells was calculated to generally be 1.8 to 2.0 percent. Some of the cells had slopes reduce to as low as 1.5 percent at locations near the perimeter of the landfill. The major principal strain (largest tensile normal strain) in the liner system was calculated to be less than 2.0 percent in magnitude and was largest near the perimeter berm. The major principal strain calculated within the region of the landfill cells (i.e., the areas away from the perimeter berm) was less than 0.4 percent in magnitude.

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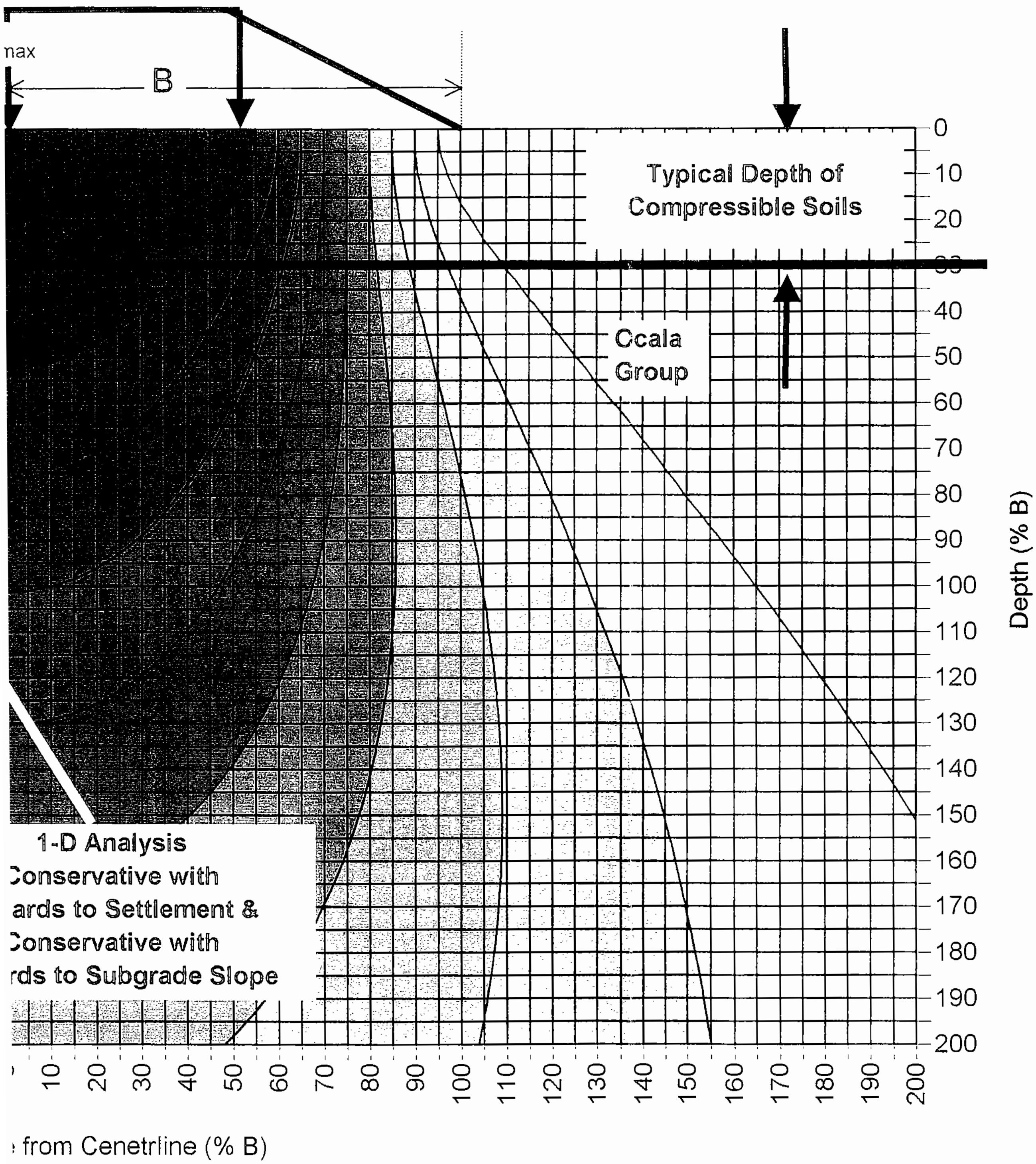

mensional Stress Distribution.

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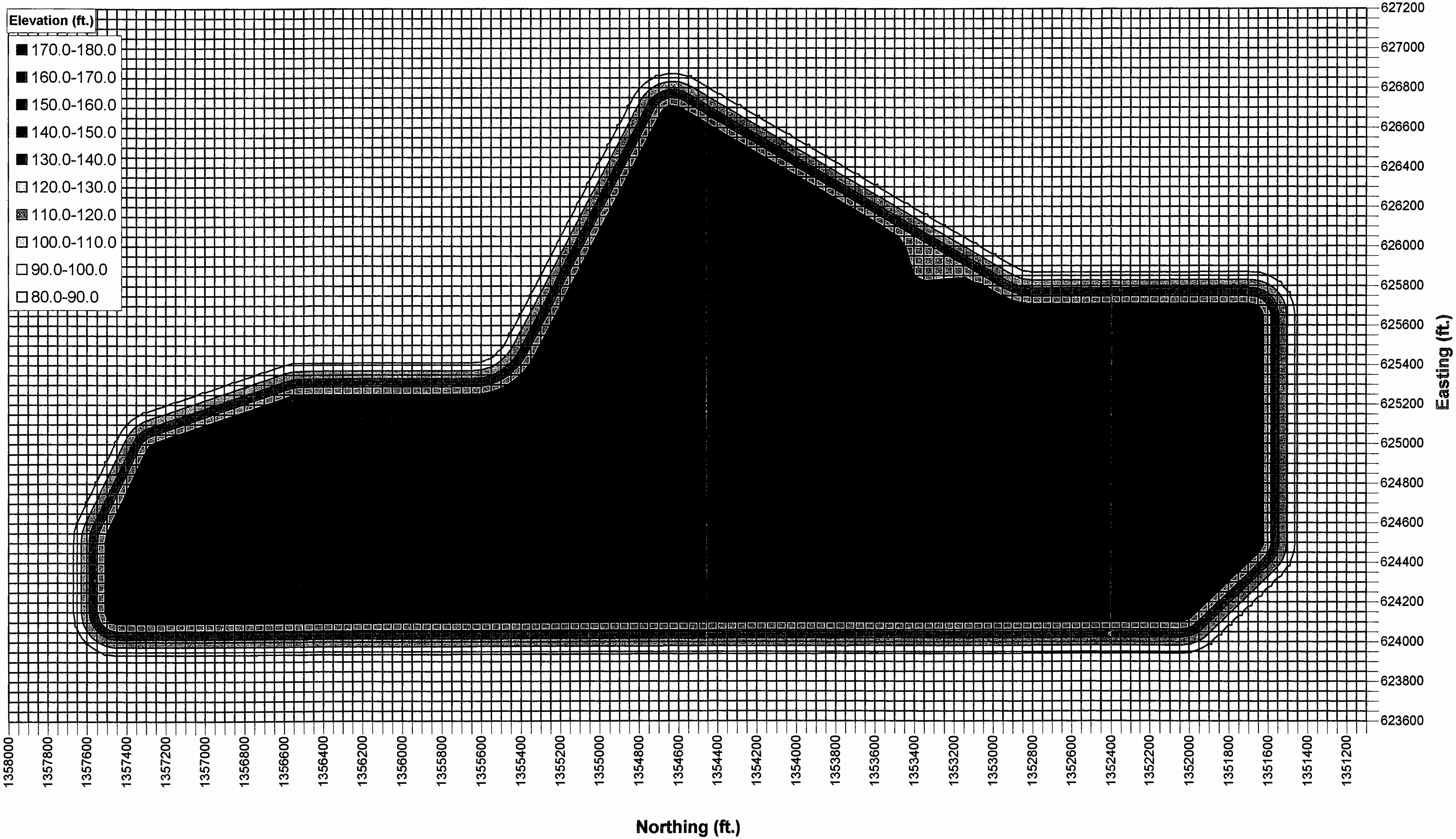

Figure 2. Cover Elevations.

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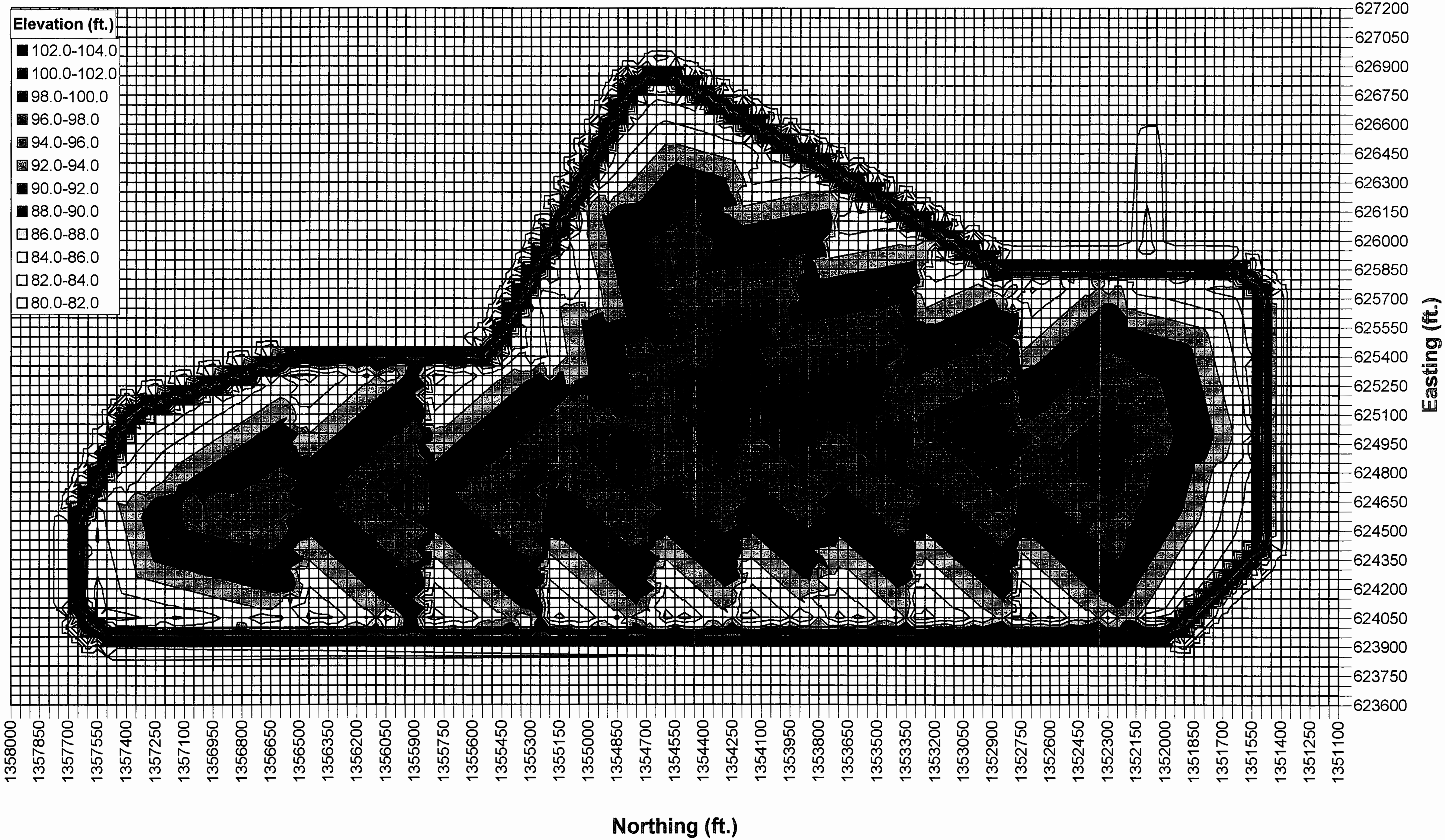

Figure 3. Sub-Grade Elevations: Pre-Settlement.

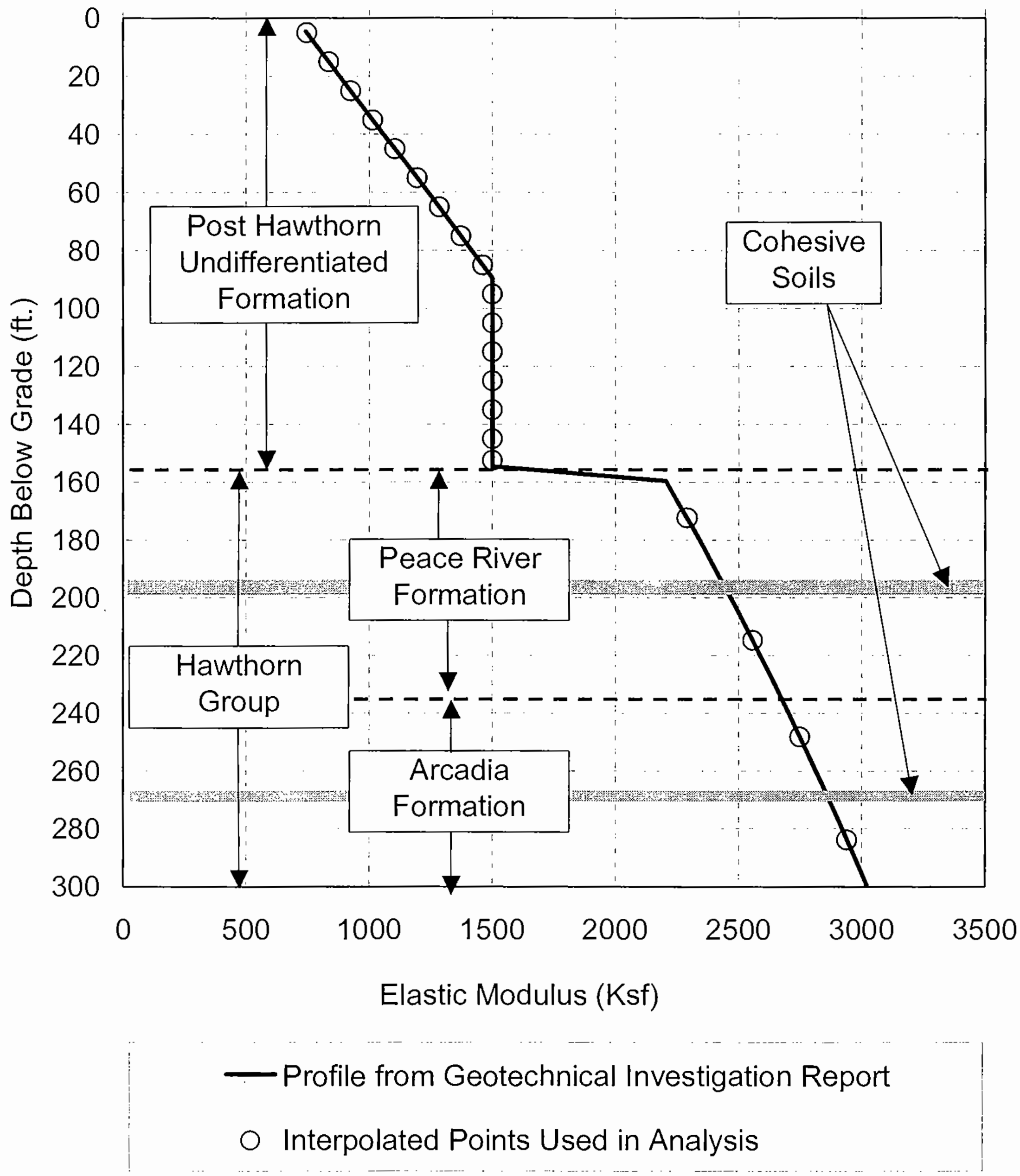

Figure 4. Elastic Modulus Utilized for Settlement in Coarse-Grained Foundation Soils.

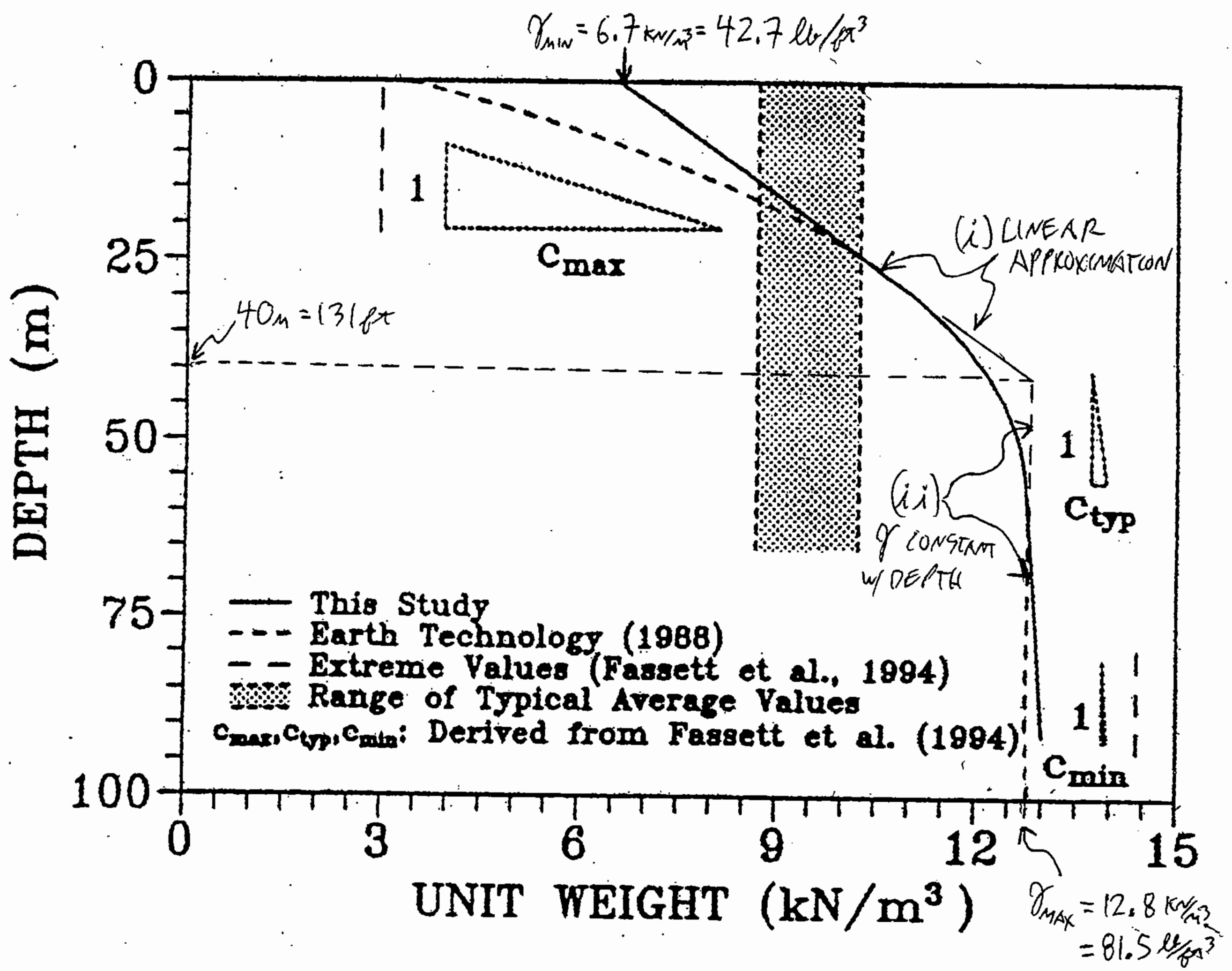

Figure 5. Variation of Unit Weight of Waste with Depth, from Kavazanjian (2000).

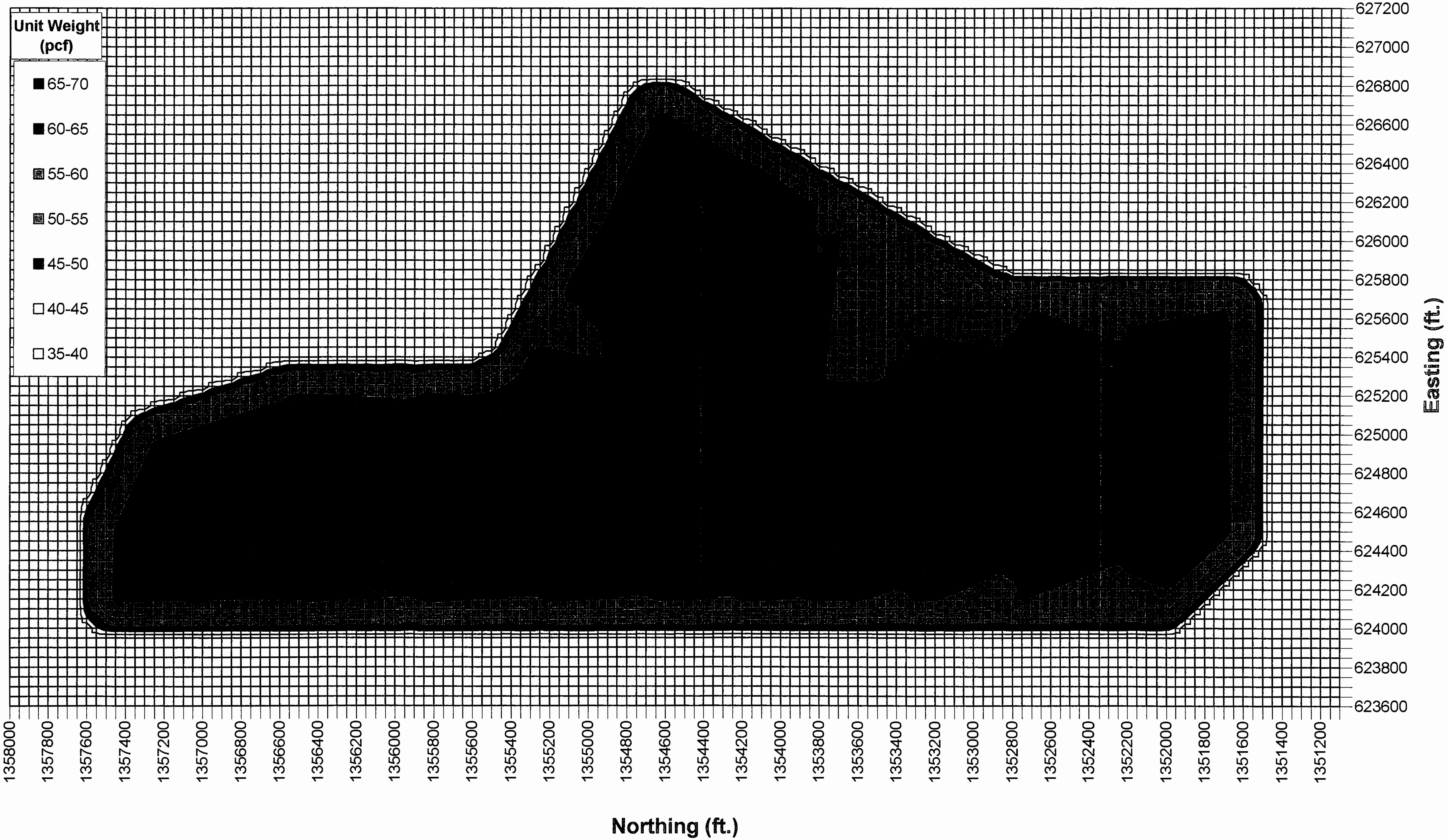

Figure 6. Average Unit Weight of Waste.

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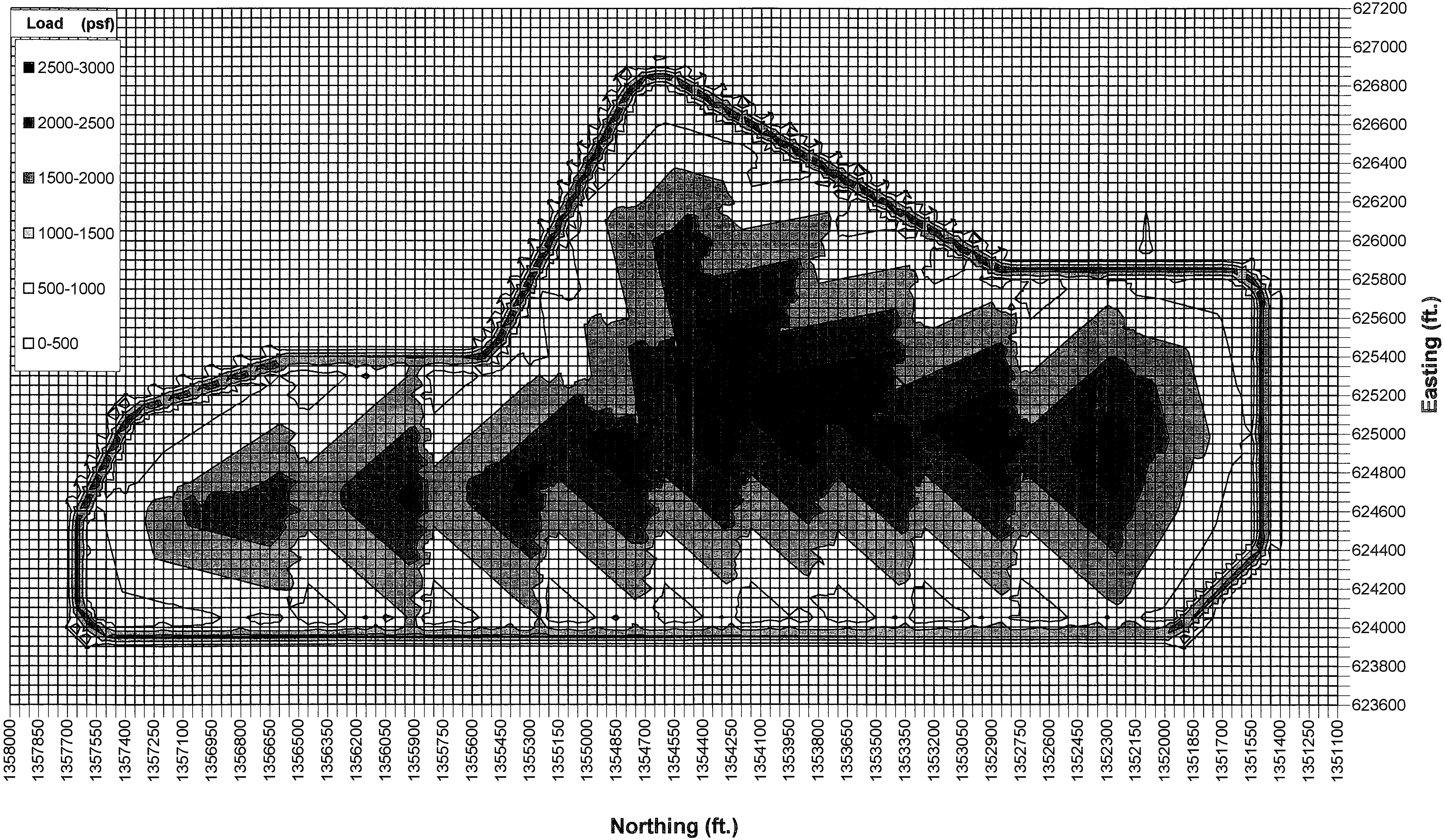

Figure 7. Vertical Load from Subgrade Fill.

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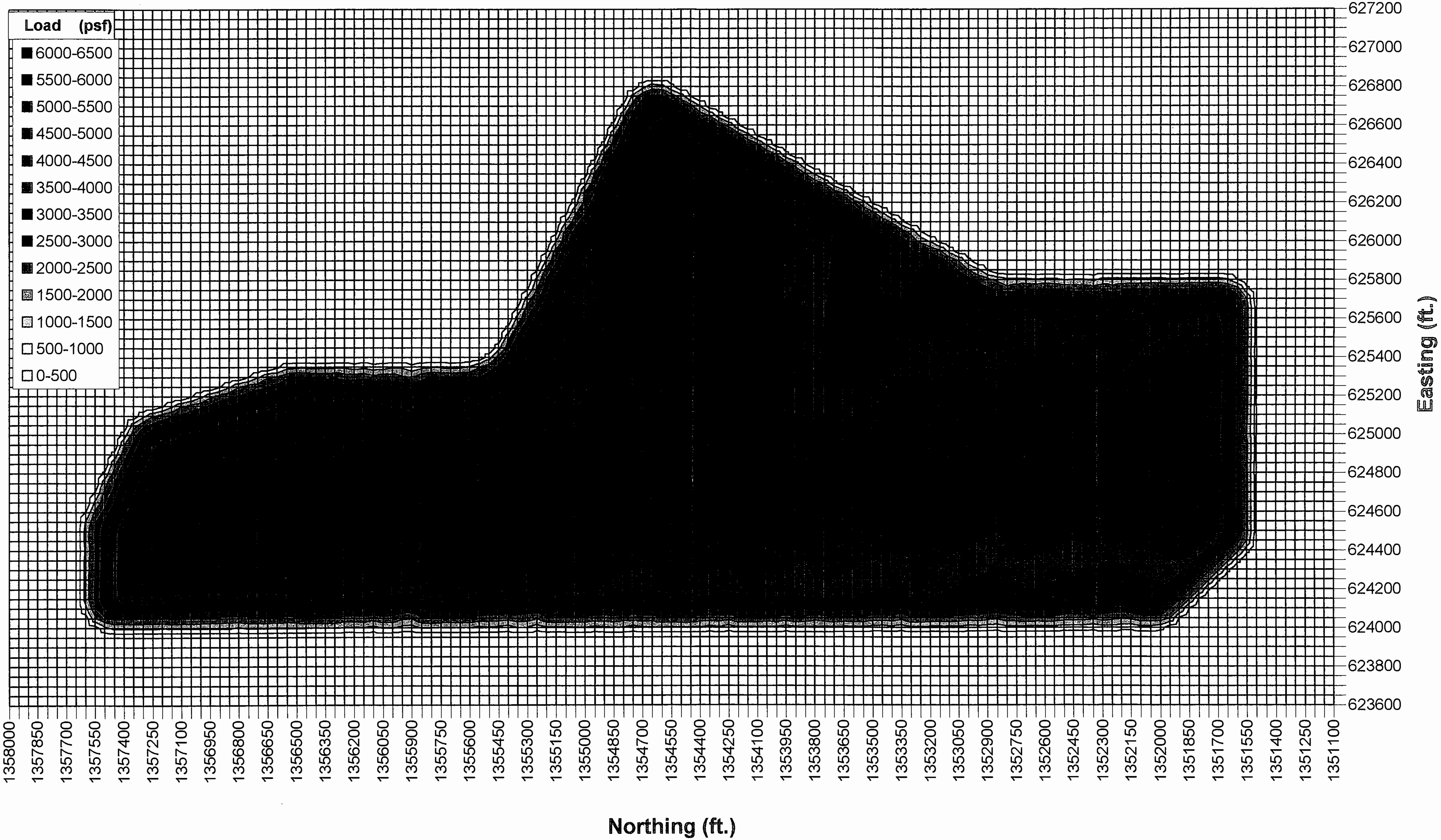

Figure 8. Vertical Load from Waste.

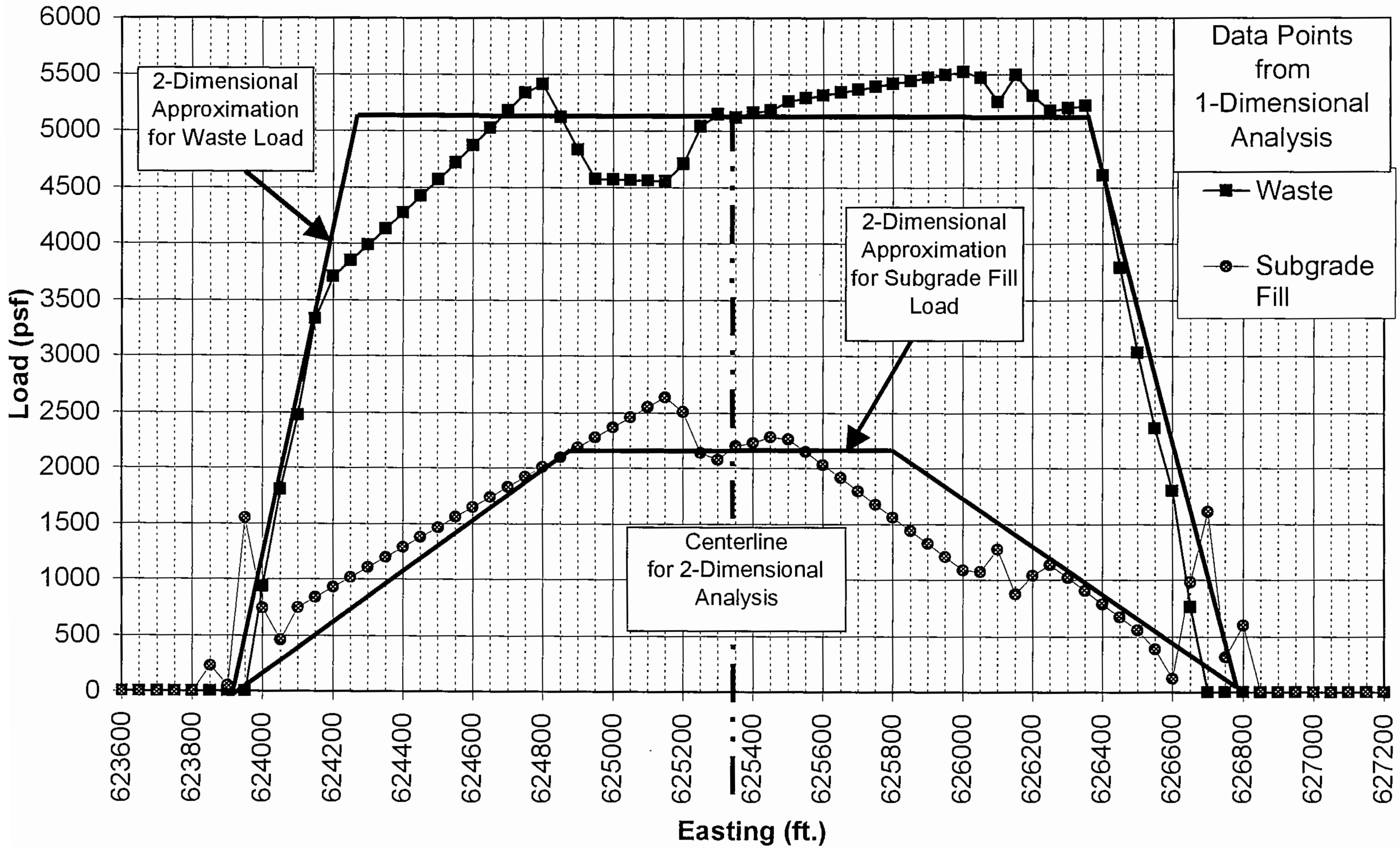

Figure 9. Comparison of Load for Cross-Section at Northing 1354300 (ft).

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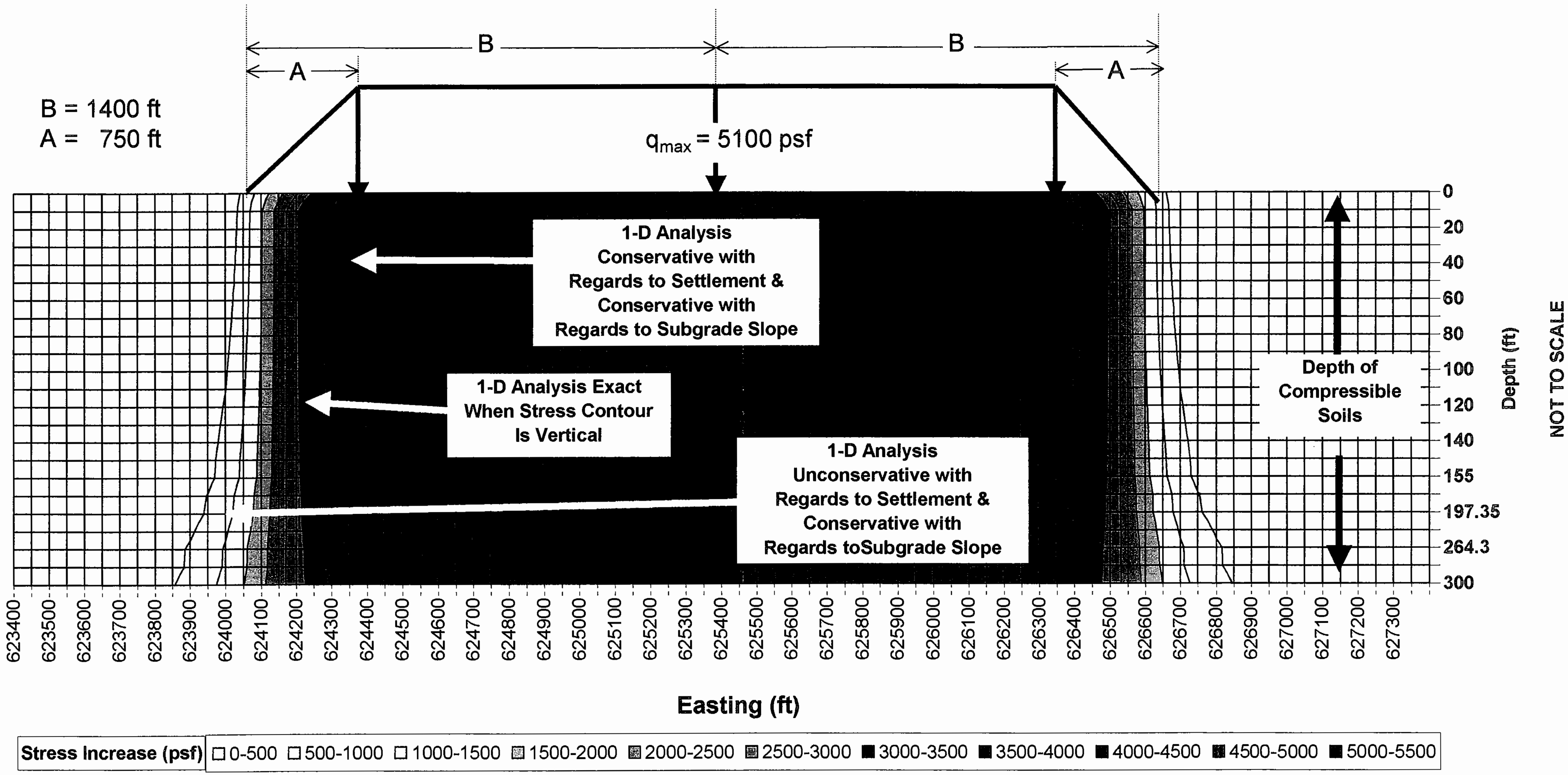

Figure 10. 2-Dimensional Stress Distribution from Waste for Cross-Section at Northing 1354300 ft

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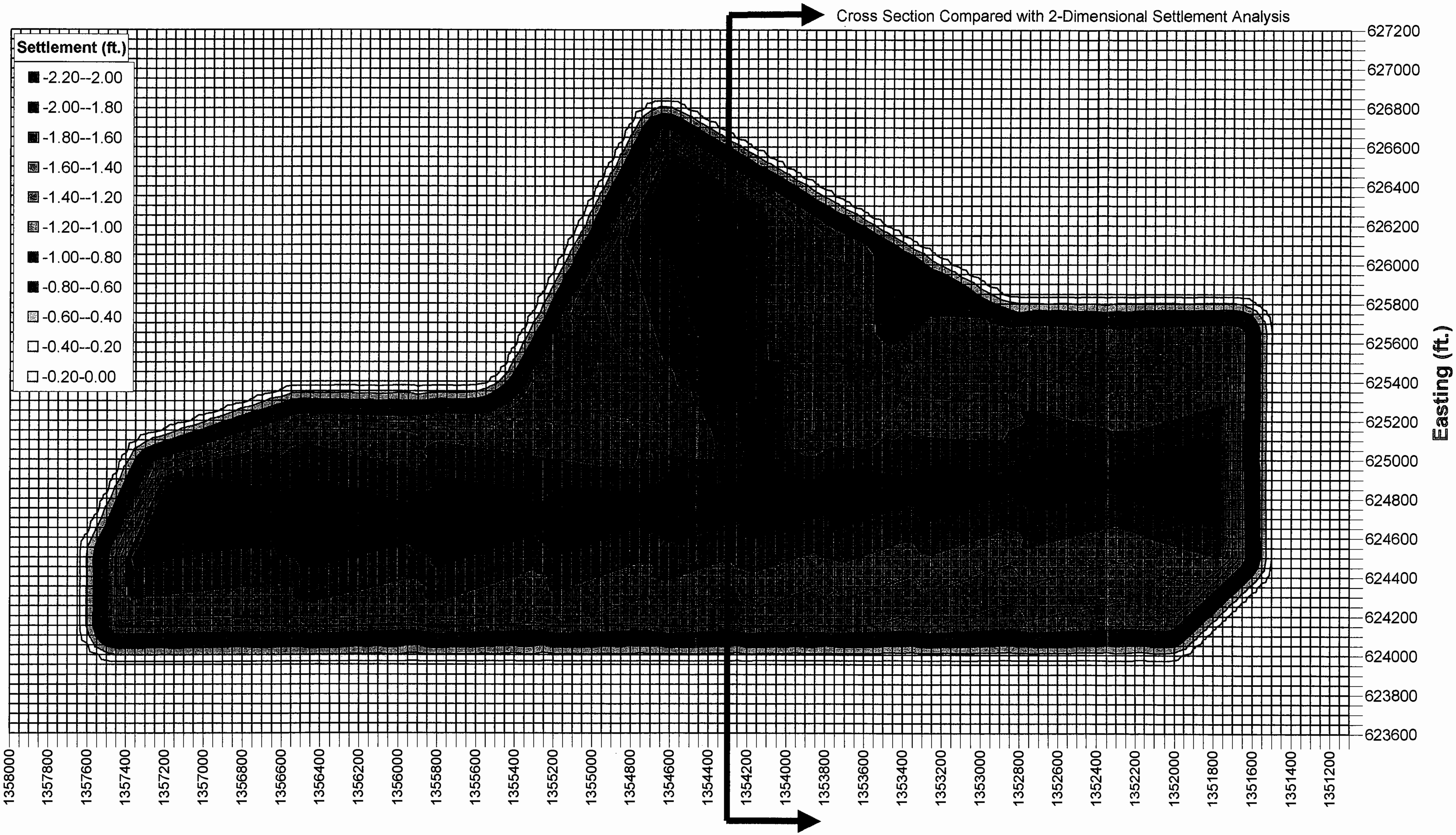

Figure 11. Total Settlement.

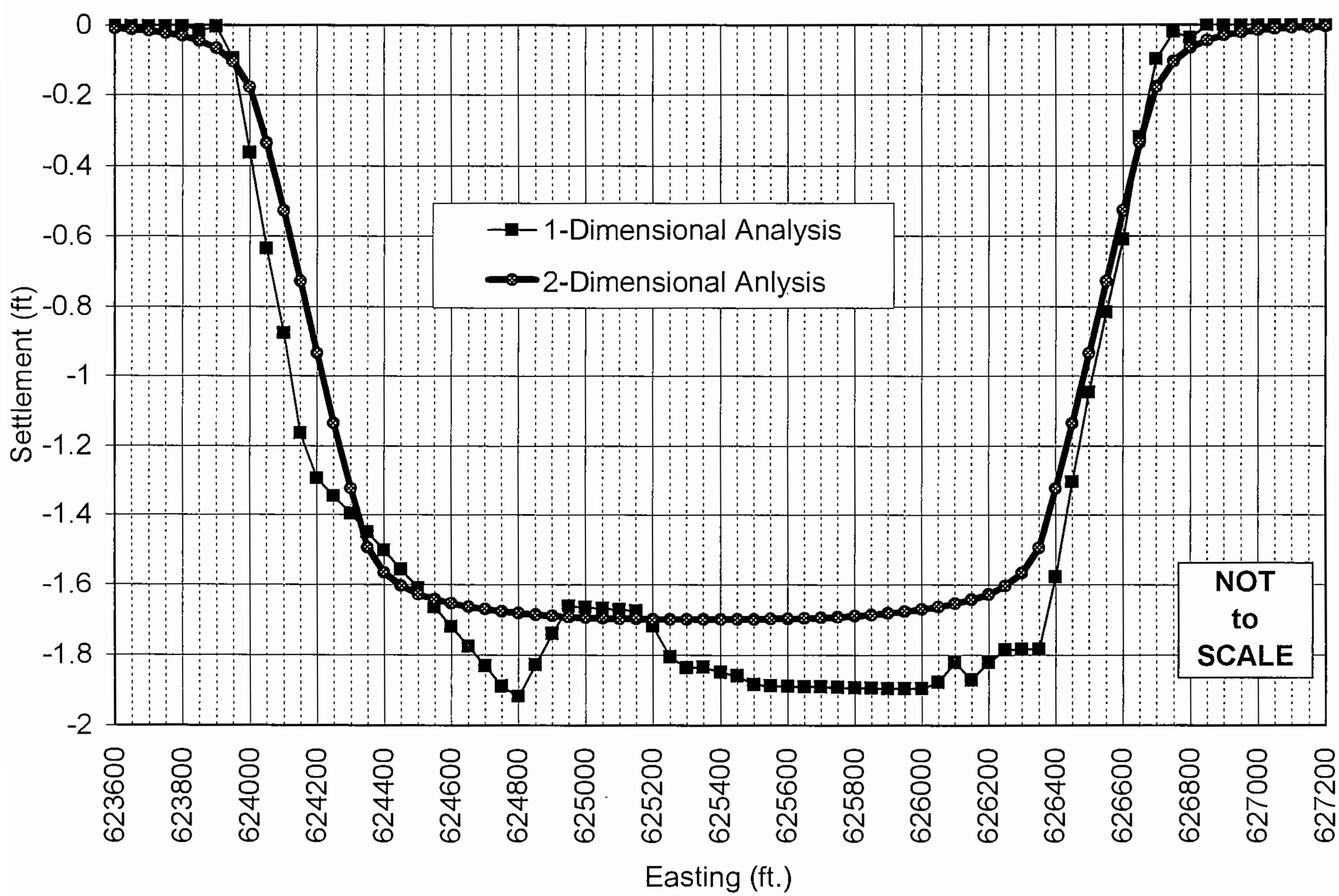

Figure 12. Comparison of Settlement of Cross-Section at Northing 1354300 (ft)

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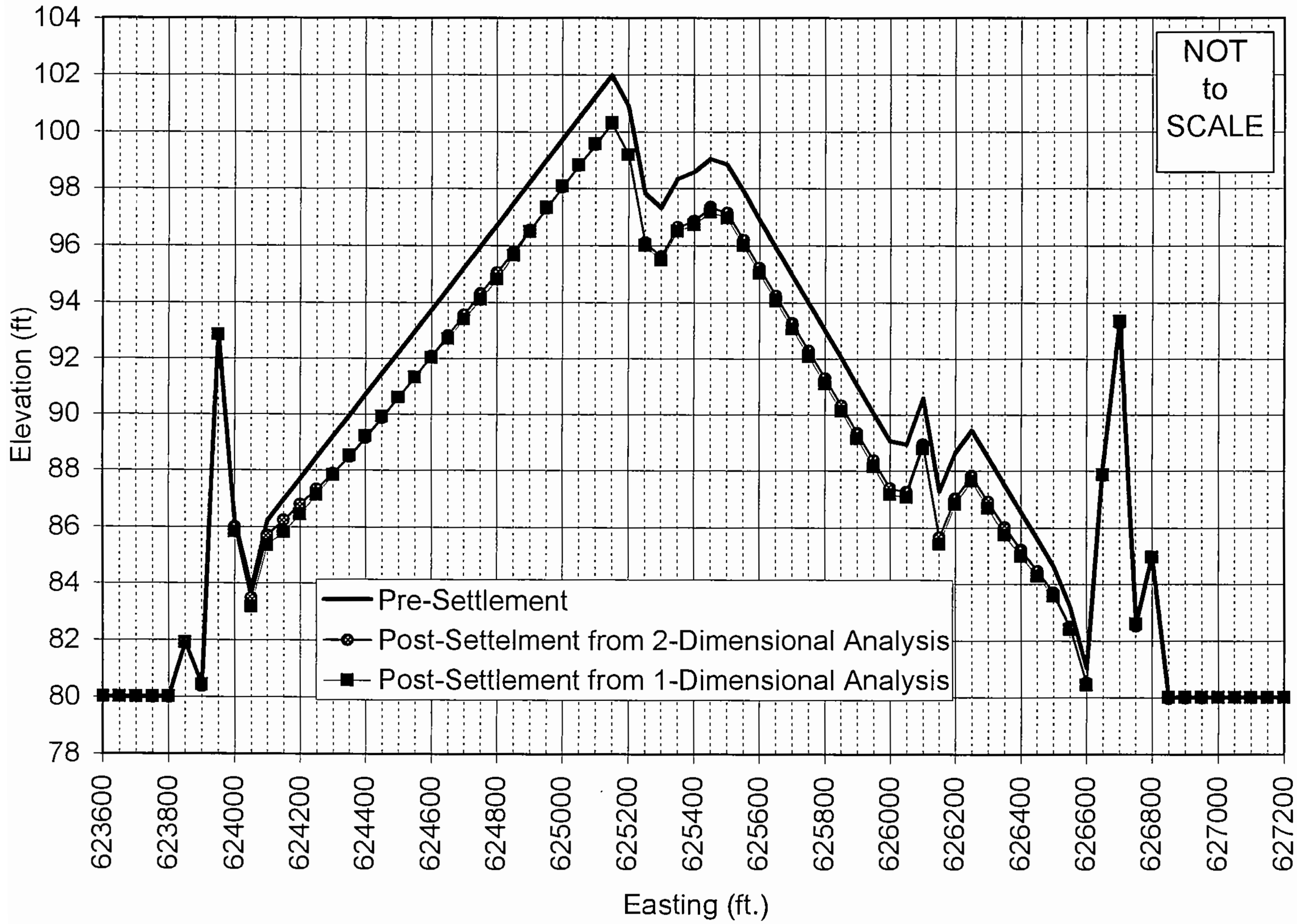

Figure 13. Comparison of Elevations of Cross-Section at: Northing 1354300 (ft)

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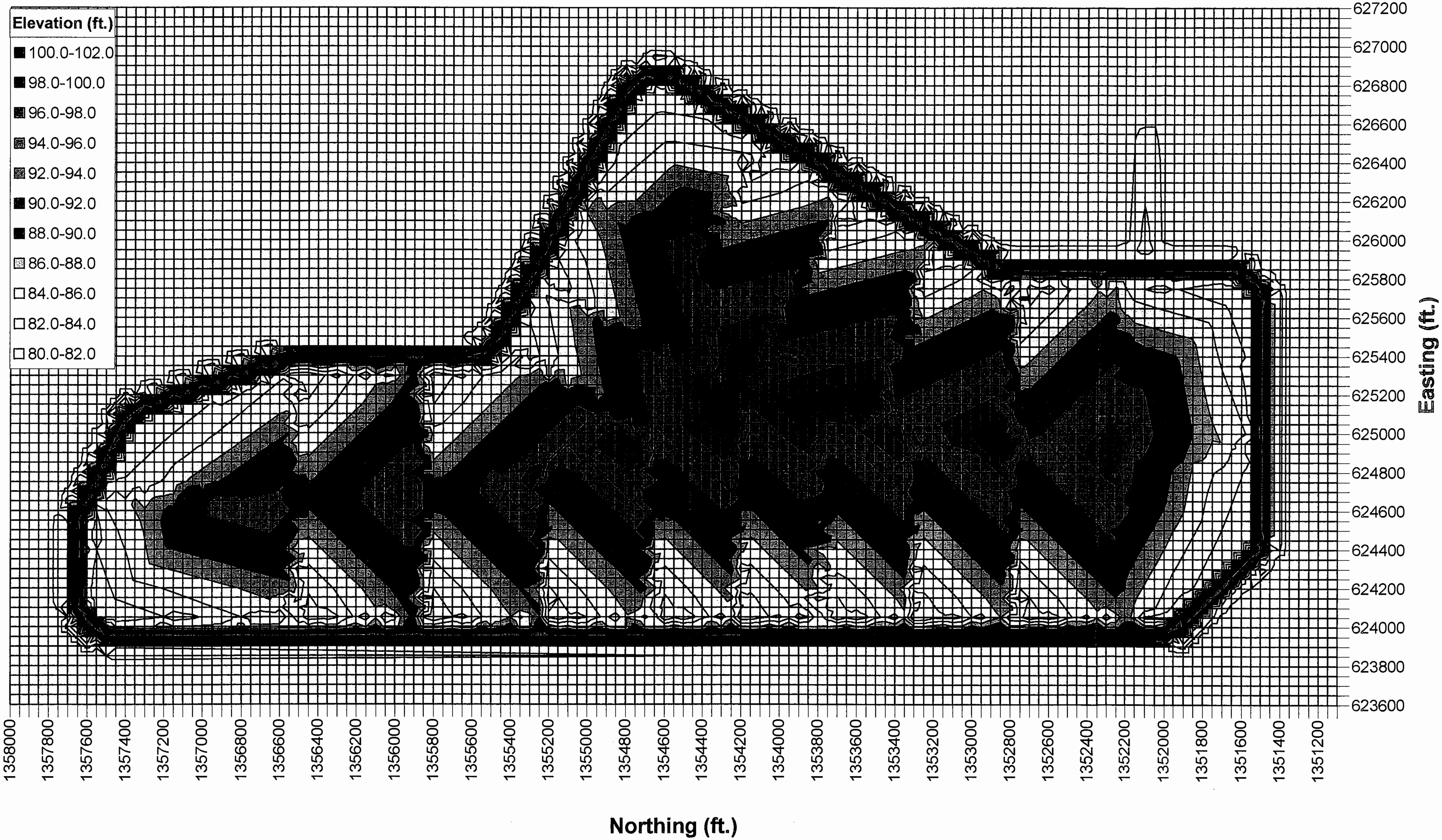

Figure 14. Subgrade Elevations: Post-Settlement.

$$y = f(x) \text{ at } x_i$$

$$y'_i = \frac{y_{i+1} - y_{i-1}}{2(\Delta x)} \qquad \text{central difference}$$

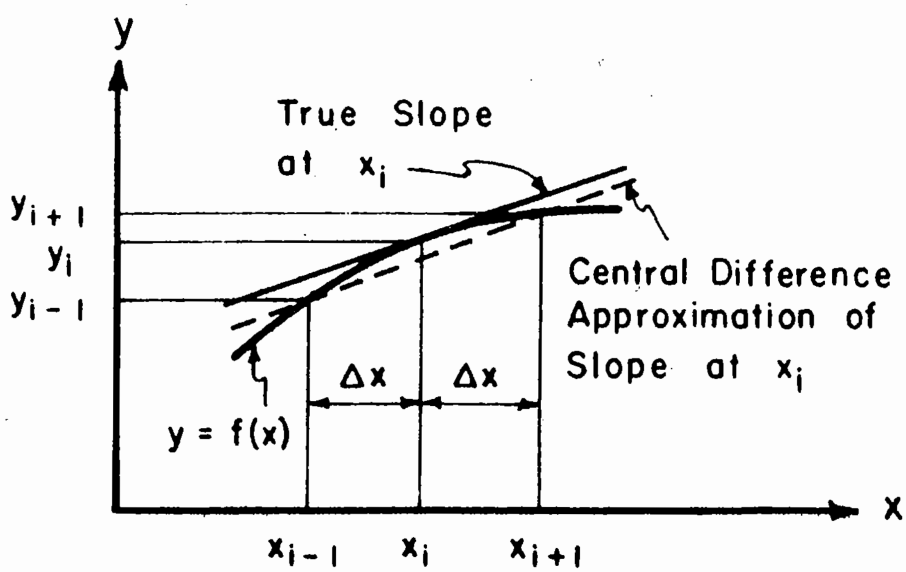

Figure 15. Central Difference Approximation of Slope, from Dunn (1980).

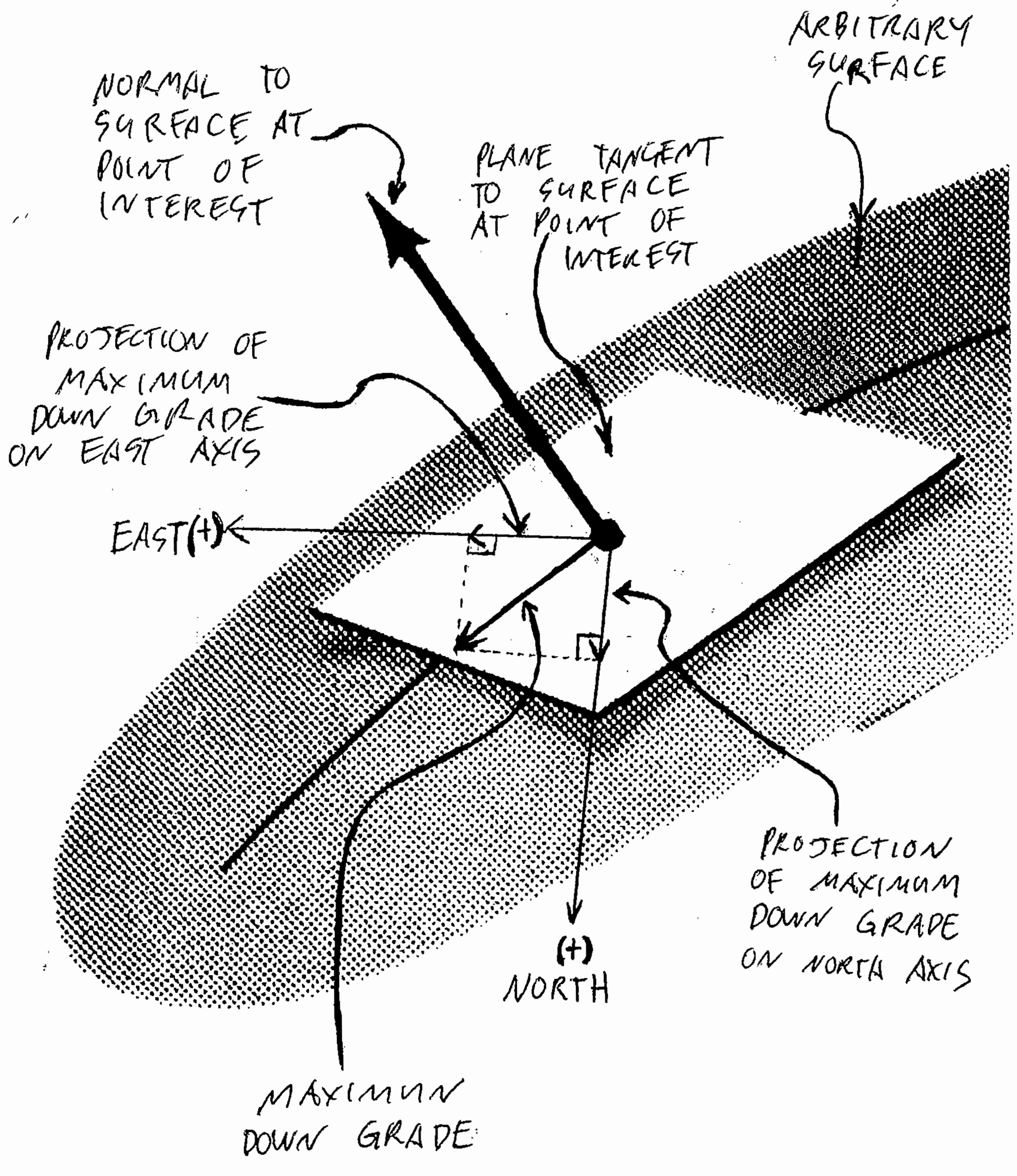

Figure 16. Gradients Within a Plane Tangent to an Arbitrary Surface.

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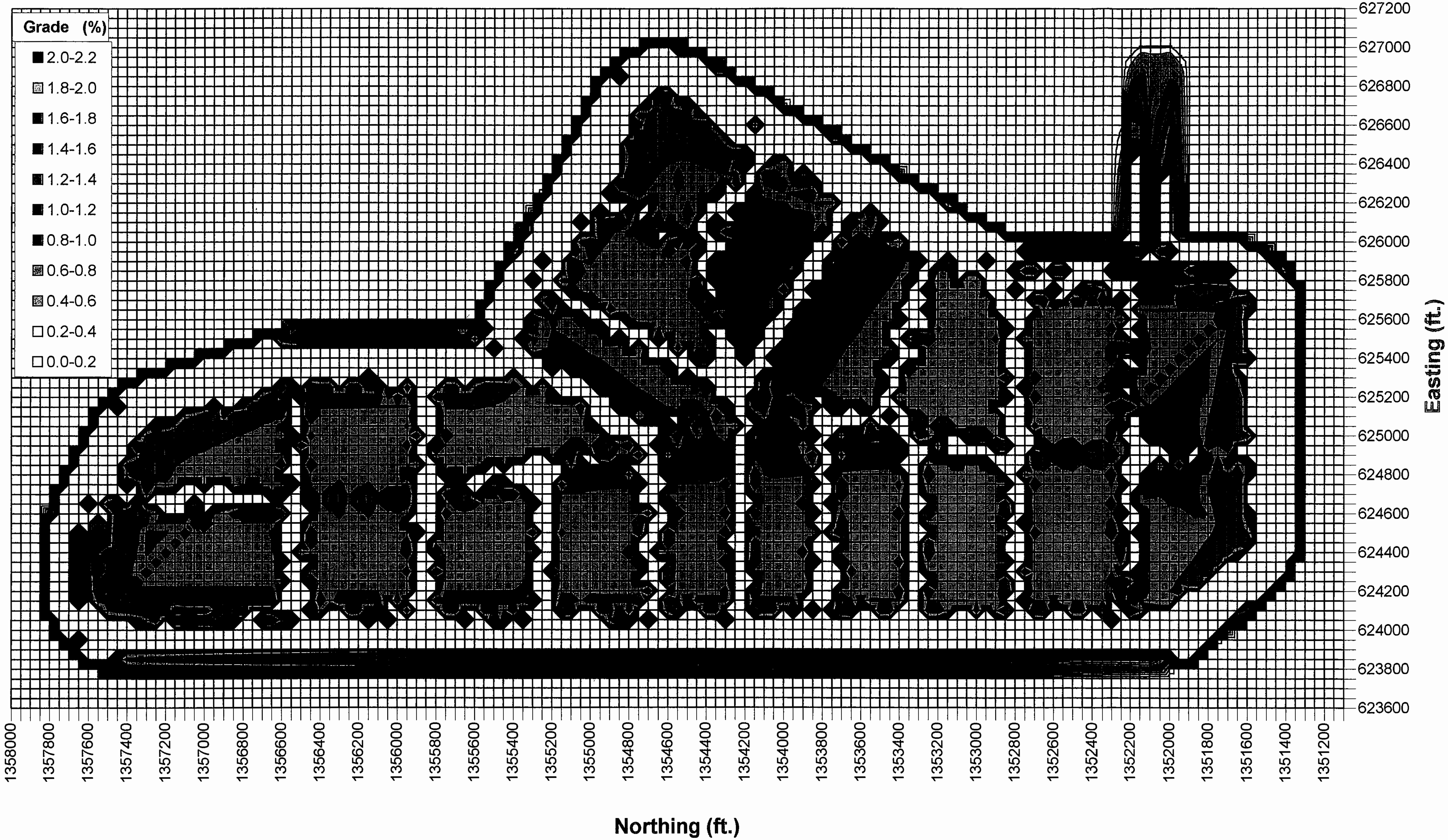

Figure 17. Maximum Grade (Only Cell Floor's are Shown): Post-Settlement.

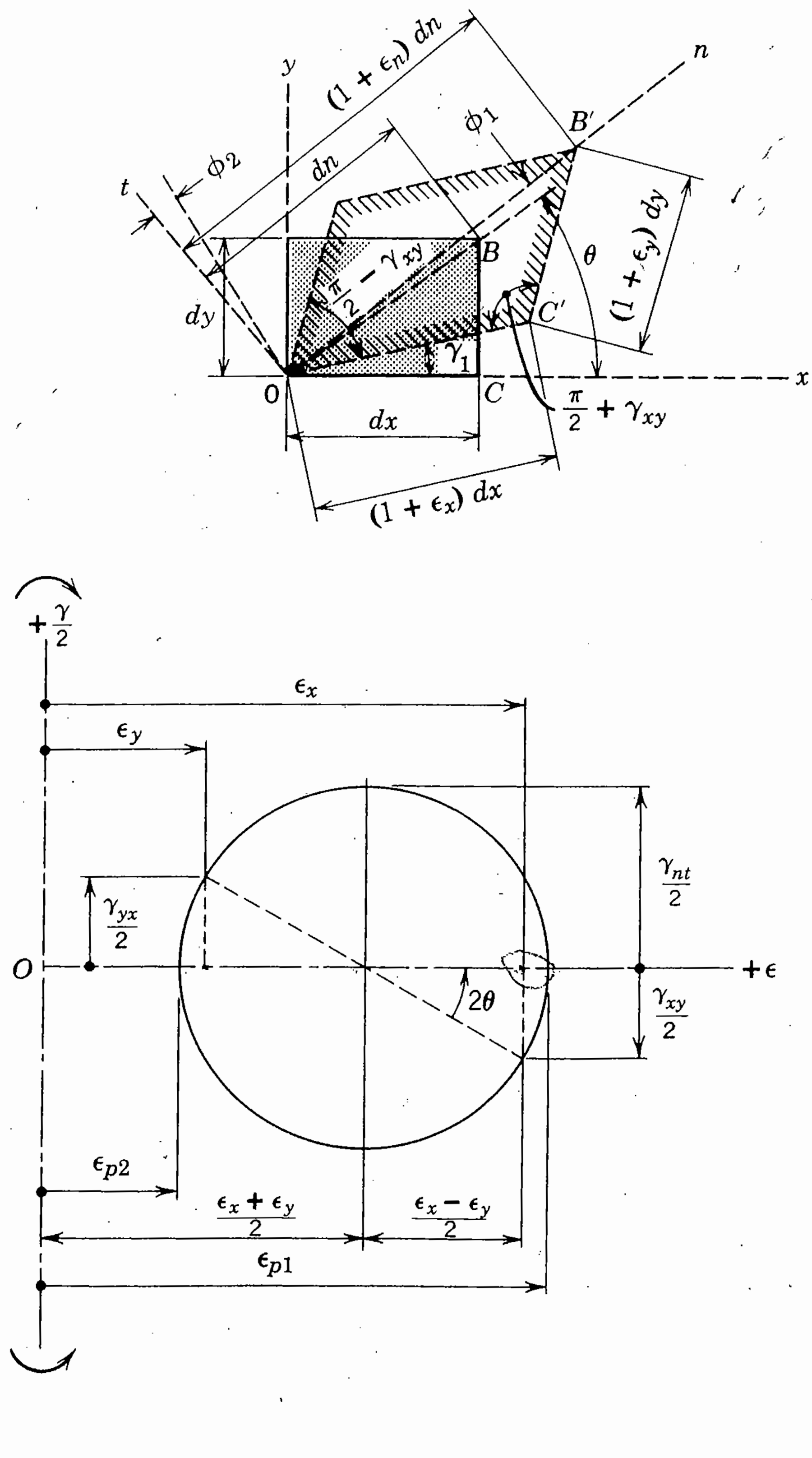

Figure 18. Plane Strain Condition, from Higdon (1985).

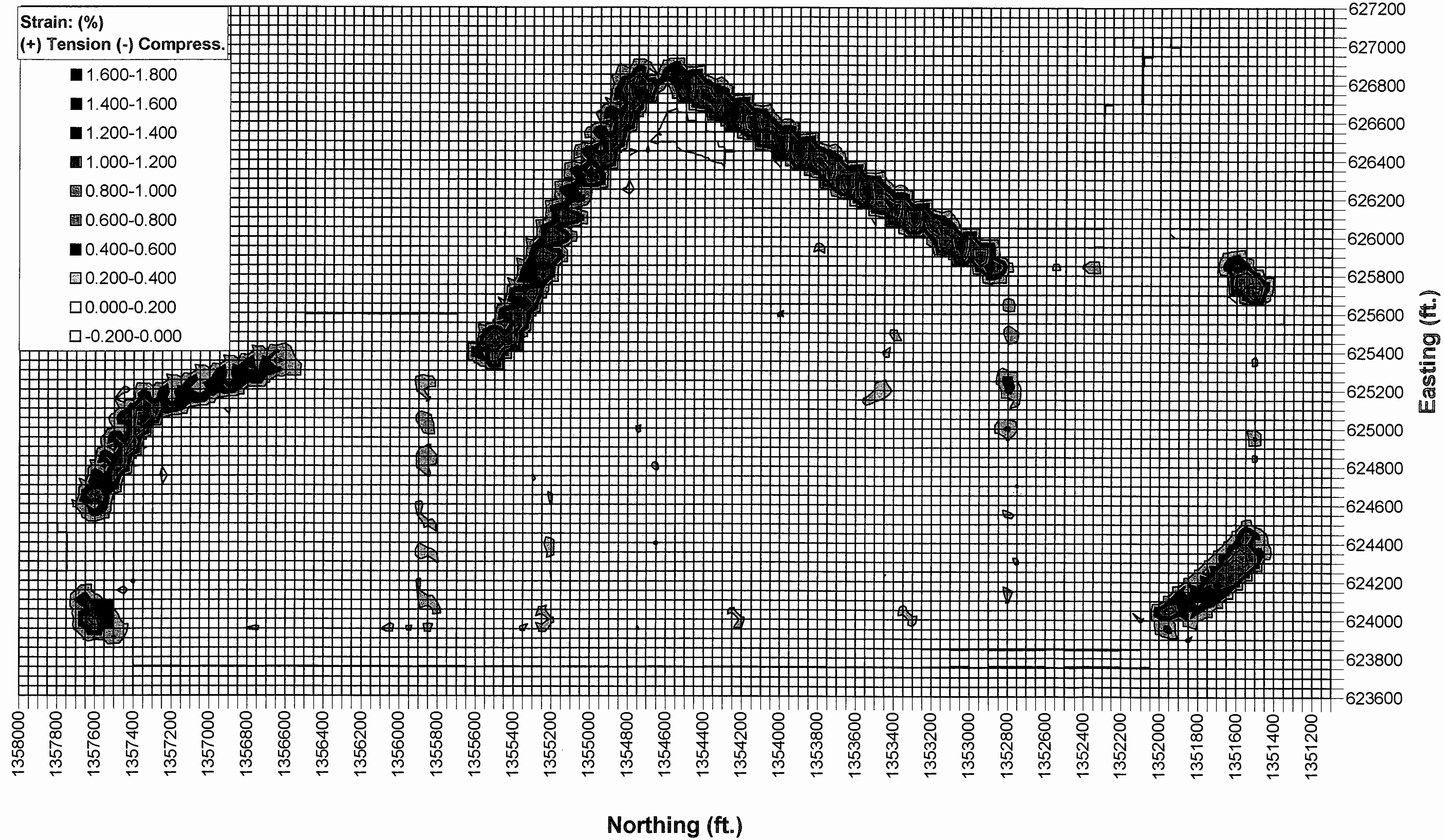

Figure 19. Major Principal Strain (Largest Normal Tensile Strain): Post-Settlement.

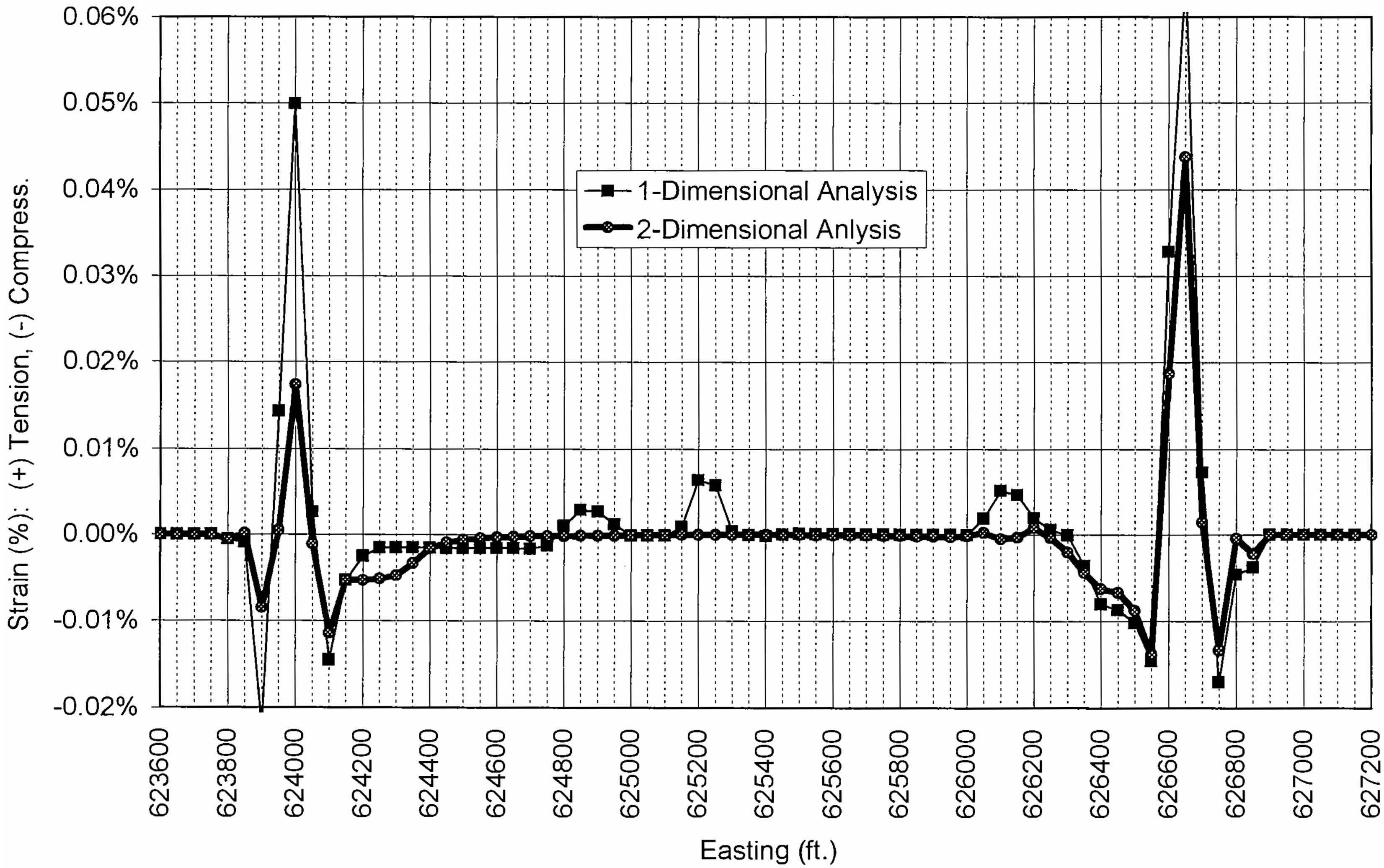

Figure 20. Comparison of Normal Strain of Cross-Section at: Northing 1354300 (ft)

ATTACHMENT 1

Cover Elevations

Cover Elevations (sheet 1 of 6)

NORTHING (ft)

EASTING (ft)	1358000	1357950	1357900	1357850	1357800	1357750	1357700	1357650	1357600	1357550	1357500	1357450	1357400	1357350	1357300	1357250	1357200	1357150	1357100	1357050	1357000	1356950	1356900	1356850
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.0	83.2	83.2	83.2	83.2	83.2	83.2	83.1	83.1	83.1	83.1	83.1	83.0	83.0
623900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	82.5	80.3	81.7	81.7	81.7	81.7	81.7	81.7	81.8	81.8	81.8	81.8	81.8	81.5	81.5
623950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.4	88.0	92.4	94.2	94.2	94.2	94.2	94.2	94.2	94.1	94.1	94.1	94.1	94.1	94.0	94.0
624000	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.5	90.9	98.8	104.5	106.7	106.7	106.7	106.7	106.7	106.7	108.6	106.6	108.6	108.8	106.8	108.5	106.5
624050	80.0	80.0	80.0	80.0	80.0	80.0	82.1	88.3	99.0	108.6	116.0	119.2	119.2	119.2	119.2	119.2	119.2	119.1	119.1	119.1	119.1	119.1	119.0	119.0
624100	80.0	80.0	80.0	80.0	80.0	82.5	80.8	93.0	104.8	118.2	128.2	131.7	131.7	131.7	131.7	131.7	131.7	131.6	131.8	131.8	131.8	131.6	131.5	131.5
624150	80.0	80.0	80.0	80.0	80.0	83.8	82.3	94.8	107.3	119.8	132.2	143.9	144.2	144.2	144.2	144.2	144.2	144.1	144.1	144.1	144.1	144.1	144.0	144.0
624200	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	107.4	119.9	132.4	144.9	155.1	154.8	154.5	154.5	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4
624250	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	107.4	119.9	132.4	144.9	157.0	157.0	157.0	157.0	156.9	158.9	158.9	156.9	156.9	156.9	156.9	156.9
624300	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	107.4	119.9	132.4	144.9	157.4	159.5	159.5	159.5	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4
624350	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	107.4	119.9	132.4	144.9	157.4	162.0	162.0	182.0	161.9	161.9	161.9	161.9	181.9	181.9	181.9	161.9
624400	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	107.4	119.9	132.4	144.9	157.4	184.5	184.5	164.5	184.4	184.4	164.4	164.4	164.4	164.4	184.4	184.4
624450	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	107.4	119.9	132.4	144.9	157.4	167.0	167.0	167.0	188.9	166.9	166.9	168.9	166.9	166.9	166.9	166.9
624500	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	107.4	119.9	132.4	144.9	157.4	189.4	169.5	189.5	169.4	169.4	169.4	169.4	189.4	169.4	189.4	189.4
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624600	80.0	80.0	80.0	80.0	80.0	81.1	80.0	90.8	102.3	113.5	124.8	138.0	147.3	158.8	169.8	174.5	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4
624650	80.0	80.0	80.0	80.0	80.0	80.0	85.0	85.6	96.8	108.1	119.4	130.6	141.9	153.1	164.4	175.6	176.9	178.9	176.9	176.9	176.9	176.9	178.9	178.9
624700	80.0	80.0	80.0	80.0	80.0	80.0	82.9	80.1	91.4	102.7	113.9	125.2	136.4	147.7	158.9	170.2	176.8	178.6	176.6	178.6	176.8	178.8	176.8	176.6
624750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	86.0	97.2	108.5	119.7	131.0	142.3	153.5	184.8	174.1	174.1	174.1	174.1	174.1	174.1	174.1	174.1
624800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.3	80.5	91.8	103.1	114.3	125.6	136.8	148.1	159.3	170.8	171.6	171.6	171.6	171.8	171.6	171.8	171.6
624850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.5	88.4	97.6	108.9	120.1	131.4	142.6	153.9	165.2	189.1	169.1	169.1	169.1	169.1	169.1	189.1
624900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.7	80.9	92.2	103.4	114.7	126.0	137.2	148.5	159.7	164.5	168.6	166.6	166.6	166.6	166.8	166.6
624950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.0	88.8	98.0	109.3	120.5	131.8	143.0	148.8	152.6	156.6	160.6	164.1	164.1	164.1	164.1
625000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.1	81.3	92.6	103.8	115.1	125.7	132.8	138.8	140.8	144.7	148.7	152.7	156.7	160.6	161.8
625050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.5	87.1	98.0	108.1	118.1	121.0	124.9	128.9	132.9	136.9	140.8	144.8	148.8	152.8
625100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.2	80.7	90.4	98.8	104.9	109.1	113.1	117.1	121.0	125.0	129.0	133.0	136.9	140.9
625150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.3	88.2	93.3	97.3	101.2	105.2	109.2	113.2	117.1	121.1	125.1	129.1
625200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.9	81.4	85.4	89.4	93.4	97.3	101.3	105.3	109.3	113.2	117.2
625250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.8	85.0	81.3	81.5	85.5	89.5	93.4	97.4	101.4	105.4
625300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.7	85.0	81.2	81.8	85.6	89.5	93.5
625350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.7	85.0	81.1	81.7
625400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.8
625450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
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625700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
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625900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Cover Elevations (sheet 2 of 6)

EASTING (ft)	NORTHING (ft) 1356800	1356750	1356700	1356650	1356600	1356550	1356500	1356450	1356400	1356350	1356300	1356250	1356200	1356150	1356100	1356050	1356000	1355950	1355900	1355850	1355800	1355750	1355700	1355650
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	83.0	83.0	82.9	82.9	82.9	82.9	82.9	82.8	82.8	82.8	82.8	82.8	82.7	82.7	82.7	82.7	82.7	82.6	82.6	82.6	82.6	82.5	82.5	82.5
623900	81.5	81.5	81.4	81.4	81.4	81.4	81.4	81.3	81.3	81.3	81.3	81.3	81.2	81.2	81.2	81.2	81.2	81.1	81.1	81.1	81.1	81.0	81.0	81.0
623950	94.0	94.0	93.9	93.9	93.9	93.9	93.9	93.8	93.8	93.8	93.8	93.8	93.7	93.7	93.7	93.7	93.7	93.6	93.6	93.6	93.6	93.5	93.5	93.5
624000	106.5	106.5	106.4	106.4	106.4	106.4	106.4	106.3	106.3	106.3	106.3	106.3	106.2	106.2	106.2	106.2	106.2	106.1	106.1	106.1	106.1	106.0	106.0	106.0
624050	119.0	119.0	118.9	118.9	118.9	118.9	118.9	118.8	118.8	118.8	118.8	118.8	118.7	118.7	118.7	118.7	118.7	118.6	118.6	118.6	118.6	118.5	118.5	118.5
624100	131.5	131.5	131.4	131.4	131.4	131.4	131.4	131.3	131.3	131.3	131.3	131.3	131.2	131.2	131.2	131.2	131.2	131.1	131.1	131.1	131.1	131.0	131.0	131.0
624150	144.0	144.0	143.9	143.9	143.9	143.9	143.9	143.8	143.8	143.8	143.8	143.8	143.7	143.7	143.7	143.7	143.7	143.6	143.6	143.6	143.6	143.5	143.5	143.5
624200	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.4	154.3	154.3	154.3	154.3	154.2	154.0	153.8	153.6
624250	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.9	156.8	156.8	156.8	156.8	156.7	156.5	156.3	158.1
624300	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.4	159.3	159.3	159.3	159.3	159.2	159.0	158.8	158.6
624350	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.9	161.8	161.8	161.8	161.8	161.7	161.5	161.3	161.1
624400	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.4	164.3	164.3	164.3	164.3	164.2	164.0	163.8	163.6
624450	166.9	166.9	166.9	166.9	166.9	166.9	166.9	166.9	166.9	166.9	166.9	168.9	166.9	166.9	166.9	166.9	166.8	166.8	166.8	166.8	166.6	166.5	166.3	166.1
624500	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.4	169.3	169.3	169.3	169.3	169.1	168.9	168.8	168.6
624550	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.8	171.8	171.6	171.8	171.6	171.4	171.3	171.1
624600	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.4	174.3	174.3	174.3	174.3	174.1	173.9	173.7	173.6
624650	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.8	176.8	176.8	176.8	176.6	176.4	176.2	176.1
624700	176.6	176.6	176.6	176.6	176.6	176.6	176.6	176.6	176.6	176.6	176.6	176.6	176.6	176.7	176.7	176.7	176.7	176.7	176.7	176.7	176.9	177.1	177.3	177.5
624750	174.1	174.1	174.1	174.1	174.1	174.1	174.1	174.1	174.1	174.1	174.1	174.1	174.1	174.2	174.2	174.2	174.2	174.2	174.2	174.2	174.4	174.6	174.8	175.0
624800	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.7	171.7	171.7	171.7	171.7	171.7	171.7	171.9	172.1	172.3	172.5
624850	169.1	169.1	169.1	169.1	169.1	169.1	169.1	169.1	169.1	169.1	169.1	169.1	169.1	169.2	169.2	169.2	169.2	169.2	169.2	169.2	169.4	169.6	169.8	170.0
624900	166.6	166.6	166.6	166.6	166.6	166.6	166.6	166.6	166.6	166.6	166.6	166.6	166.6	166.7	166.7	166.7	166.7	166.7	166.7	168.7	166.9	167.1	167.3	167.5
624950	164.1	164.1	164.1	164.1	164.1	164.1	164.1	164.1	164.1	164.1	164.1	164.1	164.1	164.2	164.2	164.2	164.2	164.2	164.2	164.2	164.4	164.6	164.8	165.0
625000	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.7	161.7	161.7	161.7	161.7	161.7	161.8	161.9	162.1	162.3	162.5
625050	156.8	159.1	159.1	159.1	159.1	159.1	159.1	159.1	159.1	159.1	159.1	159.1	159.1	159.2	159.2	159.2	159.2	159.2	159.2	159.3	159.5	159.6	159.8	160.0
625100	144.9	148.9	152.9	156.6	156.6	156.6	156.6	156.6	156.6	156.6	156.6	156.6	156.6	156.7	156.7	156.7	156.7	156.7	156.7	156.8	157.0	157.1	157.3	157.5
625150	133.1	137.0	141.0	145.0	149.0	152.9	154.1	154.1	154.1	154.1	154.1	154.1	154.1	154.2	154.2	154.2	154.2	154.2	154.2	154.3	154.3	154.3	154.4	154.4
625200	121.2	125.2	129.2	133.1	137.1	141.1	142.5	142.5	142.6	142.6	142.6	142.6	142.7	142.7	142.7	142.7	142.7	142.8	142.8	142.8	142.8	142.8	142.9	142.9
625250	109.4	113.3	117.3	121.3	125.3	129.2	130.0	130.0	130.1	130.1	130.1	130.1	130.2	130.2	130.2	130.2	130.2	130.3	130.3	130.3	130.3	130.3	130.4	130.4
625300	97.5	101.5	105.5	109.4	113.4	117.0	117.5	117.5	117.6	117.6	117.6	117.6	117.7	117.7	117.7	117.7	117.7	117.8	117.8	117.8	117.8	117.8	117.9	117.9
625350	85.6	89.6	93.6	97.6	101.6	104.6	105.0	105.0	105.1	105.1	105.1	105.1	105.2	105.2	105.2	105.2	105.2	105.3	105.3	105.3	105.3	105.3	105.4	105.4
625400	85.0	81.0	81.8	85.7	89.7	92.2	92.5	92.5	92.6	92.6	92.6	92.6	92.7	92.7	92.7	92.7	92.7	92.8	92.8	92.8	92.8	92.8	92.9	92.9
625450	80.0	80.0	83.9	85.0	81.1	80.0	80.0	80.0	80.1	80.1	80.1	80.1	80.2	80.2	80.2	80.2	80.2	80.3	80.3	80.3	80.3	80.3	80.4	80.4
625500	80.0	80.0	80.0	80.0	80.0	81.2	81.5	81.5	81.6	81.6	81.6	81.6	81.7	81.7	81.7	81.7	61.7	81.8	81.8	81.8	81.8	81.8	81.9	81.9
625550	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625600	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0
625650	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0
625700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0
625850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625900	80.0	80.0	80.0	60.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626000	80.0	60.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0
626050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0
626100	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0
626900	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	60.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Cover Elevations (sheet 3 of 6)

EASTING (ft) \ NORTHING (ft)	1355600	1355550	1355500	1355450	1355400	1355350	1355300	1355250	1355200	1355150	1355100	1355050	1355000	1354950	1354900	1354850	1354800	1354750	1354700	1354650	1354600	1354550	1354500	1354450
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	82.5	82.5	82.4	82.4	82.4	82.4	82.4	82.3	82.3	82.3	82.3	82.2	82.2	82.2	82.2	82.2	82.1	82.1	82.1	82.1	82.1	82.0	82.0	82.0
623900	81.0	81.0	80.9	80.9	80.9	80.9	80.9	80.8	80.8	80.8	80.8	80.7	80.7	80.7	80.7	80.7	80.6	80.8	80.6	80.6	80.6	80.5	80.5	80.5
623950	93.5	93.5	93.4	93.4	93.4	93.4	93.4	93.3	93.3	93.3	93.3	93.2	93.2	93.2	93.2	93.2	93.1	93.1	93.1	93.1	93.1	93.0	93.0	93.0
624000	106.0	106.0	105.9	105.9	105.9	105.9	105.9	105.8	105.8	105.8	105.8	105.7	105.7	105.7	105.7	105.7	105.6	105.6	105.6	105.6	105.6	105.5	105.5	105.5
624050	118.5	118.5	118.4	118.4	118.4	118.4	118.4	118.3	118.3	118.3	118.3	118.2	118.2	118.2	116.2	118.2	118.1	118.1	118.1	118.1	118.1	118.0	118.0	118.0
624100	131.0	131.0	130.9	130.9	130.9	130.9	130.9	130.8	130.8	130.8	130.8	130.7	130.7	130.7	130.7	130.7	130.6	130.6	130.6	130.6	130.6	130.5	130.5	130.5
624150	143.5	143.5	143.4	143.4	143.4	143.4	143.4	143.3	143.3	143.3	143.3	143.2	143.2	143.2	143.2	143.2	143.1	143.1	143.1	143.1	143.1	143.0	143.0	143.0
624200	153.4	153.2	153.1	152.9	152.7	152.5	152.3	152.1	151.9	151.7	151.6	151.4	151.2	151.0	150.8	150.6	150.4	150.2	150.0	149.9	149.7	149.5	149.3	149.1
624250	155.9	155.7	155.5	155.4	155.2	155.0	154.8	154.6	154.4	154.2	154.0	153.9	153.7	153.5	153.3	153.1	152.9	152.7	152.5	152.4	152.2	152.0	151.8	151.6
624300	158.4	158.2	158.0	157.9	157.7	157.5	157.3	157.1	156.9	156.7	156.5	156.3	156.2	156.0	155.8	155.6	155.4	155.2	155.0	154.8	154.7	154.5	154.3	154.1
624350	160.9	160.7	160.5	160.3	160.2	160.0	159.8	159.6	159.4	159.2	159.0	158.8	158.7	158.5	158.3	158.1	157.9	157.7	157.5	157.3	157.2	157.0	156.8	156.6
624400	163.4	163.2	163.0	162.8	162.6	162.5	162.3	162.1	161.9	161.7	161.5	161.3	161.1	161.0	160.8	160.6	160.4	160.2	160.0	159.8	159.6	159.5	159.3	159.1
624450	165.9	165.7	165.5	165.3	165.1	165.0	164.8	164.6	164.4	164.2	164.0	163.8	163.6	163.5	163.3	163.1	162.9	162.7	162.5	162.3	162.1	162.0	161.8	161.6
624500	168.4	168.2	168.0	167.8	167.6	167.4	167.3	167.1	166.9	166.7	166.5	166.3	166.1	165.9	165.8	165.6	165.4	165.2	165.0	164.8	164.6	164.4	164.3	164.1
624550	170.9	170.7	170.5	170.3	170.1	169.9	169.8	169.6	169.4	169.2	169.0	168.8	168.6	168.4	168.3	168.1	167.9	167.7	167.5	167.3	167.1	166.9	166.7	166.6
624600	173.4	173.2	173.0	172.8	172.6	172.4	172.2	172.1	171.9	171.7	171.5	171.3	171.1	170.9	170.7	170.6	170.4	170.2	170.0	169.8	169.6	169.4	169.2	169.1
624650	175.9	175.7	175.5	175.3	175.1	174.9	174.7	174.6	174.4	174.2	174.0	173.8	173.6	173.4	173.2	173.0	172.9	172.7	172.5	172.3	172.1	171.9	171.7	171.5
624700	177.7	177.8	178.0	177.8	177.6	177.4	177.2	177.0	176.9	176.7	176.5	176.3	176.1	175.9	175.7	175.5	175.4	175.2	175.0	174.8	174.6	174.4	174.2	174.0
624750	175.2	175.3	175.5	175.7	175.9	176.1	176.3	176.5	176.7	176.8	177.0	177.2	177.4	177.6	177.8	178.0	177.8	177.7	177.5	177.3	177.1	176.9	176.7	176.5
624800	172.7	172.9	173.0	173.2	173.4	173.6	173.8	174.0	174.2	174.4	174.5	174.7	174.9	175.1	175.3	175.5	175.7	175.9	176.0	176.2	176.4	176.6	176.8	177.0
624850	170.2	170.4	170.5	170.7	170.9	171.1	171.3	171.5	171.7	171.9	172.1	172.2	172.4	172.6	172.8	173.0	173.2	173.4	173.6	173.7	173.9	174.1	174.3	174.5
624900	167.7	167.9	168.1	168.2	168.4	168.6	168.8	169.0	169.2	169.4	169.6	169.7	169.9	170.1	170.3	170.5	170.7	170.9	171.1	171.2	171.4	171.6	171.8	172.0
624950	165.2	165.4	165.6	165.8	165.9	166.1	166.3	166.5	166.7	166.9	167.1	167.3	167.4	167.6	167.8	168.0	168.2	168.4	168.6	168.8	168.9	169.1	169.3	169.5
625000	162.7	162.9	163.1	163.3	163.4	163.6	163.8	164.0	164.2	164.4	164.6	164.8	164.9	165.1	165.3	165.5	165.7	165.9	166.1	166.3	166.4	166.6	166.8	167.0
625050	160.2	160.4	160.6	160.8	161.0	161.1	161.3	161.5	161.7	161.9	162.1	162.3	162.5	162.6	162.8	163.0	163.2	163.4	163.6	163.8	164.0	164.1	164.3	164.5
625100	157.7	157.9	158.1	158.3	158.5	158.6	158.8	159.0	159.2	159.4	159.6	159.8	160.0	160.1	160.3	160.5	160.7	160.9	161.1	161.3	161.5	161.7	162.8	165.2
625150	154.6	155.1	155.6	155.8	156.0	156.2	156.3	156.5	156.7	156.9	157.1	157.3	157.5	157.7	157.8	158.0	158.2	158.4	158.6	158.8	159.0	161.1	163.5	165.9
625200	143.4	145.4	149.0	153.3	153.5	153.7	153.8	154.0	154.2	154.4	154.6	154.8	155.0	155.2	155.4	155.5	155.7	155.9	156.1	157.0	159.4	161.8	164.2	166.6
625250	130.9	133.3	137.3	142.6	149.3	151.2	151.4	151.5	151.7	151.9	152.1	152.3	152.5	152.7	152.9	153.0	153.2	153.4	155.3	157.7	160.1	162.5	164.9	167.3
625300	118.6	121.2	125.8	132.0	139.4	147.8	148.9	149.1	149.2	149.4	149.6	149.8	150.0	150.2	150.4	150.6	151.2	153.6	156.0	158.4	160.8	163.2	165.6	168.0
625350	106.2	109.4	114.8	121.8	130.1	139.3	148.0	148.0	148.0	148.0	148.0	148.0	148.0	148.0	148.0	149.5	151.9	154.3	156.7	159.1	161.5	163.9	166.3	168.7
625400	93.9	97.9	104.3	112.5	121.9	132.0	142.7	144.1	144.5	144.9	145.3	145.6	146.0	146.6	148.0	150.2	152.6	155.0	157.4	159.8	162.2	164.6	167.0	169.4
625450	81.8	86.9	94.7	104.3	114.8	125.7	136.8	141.6	141.8	141.9	142.1	142.3	143.7	146.6	148.5	150.9	153.3	155.7	158.1	160.5	162.9	165.3	167.7	170.1
625500	83.9	81.9	86.9	97.8	108.9	119.9	131.0	139.1	139.3	139.5	139.6	141.9	144.4	146.8	149.2	151.6	154.0	156.4	158.8	161.2	163.6	166.0	168.4	170.8
625550	80.0	83.8	80.9	92.0	103.1	114.1	125.2	136.3	136.8	137.8	140.2	142.6	145.0	147.4	149.8	152.2	154.7	157.1	159.5	161.9	164.3	166.7	169.1	171.5
625600	80.0	80.0	84.5	86.2	97.3	108.4	119.4	130.5	136.1	138.5	140.9	143.3	145.7	148.1	150.5	152.9	155.3	157.7	160.1	162.6	165.0	167.4	169.8	172.2
625650	80.0	80.0	83.3	80.4	91.5	102.6	113.6	124.7	135.8	139.2	141.6	144.0	146.4	148.8	151.2	153.6	156.0	158.4	160.8	163.2	165.6	168.0	170.5	172.9
625700	80.0	80.0	80.0	85.0	85.7	96.8	107.9	118.9	130.0	139.9	142.3	144.7	147.1	149.5	151.9	154.3	156.7	159.1	161.5	163.9	166.3	168.7	171.1	173.5
625750	80.0	80.0	80.0	82.8	80.0	91.0	102.1	113.1	124.2	135.3	143.0	145.4	147.8	150.2	152.6	155.0	157.4	159.8	162.2	164.6	167.0	169.4	171.8	174.2
625800	80.0	80.0	80.0	80.0	85.0	85.2	96.3	107.3	118.4	129.5	140.6	146.1	148.5	150.9	153.3	155.7	158.1	160.5	162.9	165.3	167.7	170.1	172.5	174.9
625850	80.0	80.0	80.0	80.0	82.3	80.0	90.5	101.6	112.6	123.7	134.8	145.9	149.2	151.6	154.0	156.4	158.8	161.2	163.6	168.0	168.4	170.8	173.2	175.6
625900	80.0	80.0	80.0	80.0	80.0	85.0	84.7	95.8	106.8	117.9	129.0	140.1	149.9	152.3	154.7	157.1	159.5	161.9	164.3	186.7	169.1	171.5	173.9	176.3
625950	80.0	80.0	80.0	80.0	80.0	81.8	80.0	90.0	101.1	112.1	123.2	134.3	145.4	153.0	155.4	157.8	180.2	162.6	165.0	167.4	169.8	172.2	174.6	177.0
626000	80.0	80.0	80.0	80.0	80.0	80.0	85.0	84.2	95.3	106.3	117.4	128.5	139.6	150.7	156.1	158.5	160.9	163.3	165.7	168.1	170.5	172.9	175.3	177.7
626050	80.0	80.0	80.0	80.0	80.0	80.0	81.3	80.1	89.5	100.6	111.6	122.7	133.8	144.9	155.9	159.2	161.6	164.0	166.4	168.8	171.2	173.6	176.0	177.6
626100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	83.7	94.8	105.8	116.9	128.0	139.1	150.2	159.9	162.3	164.7	167.1	169.5	171.9	174.3	176.7	176.9
626150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.8	80.8	89.0	100.1	111.1	122.2	133.3	144.4	155.4	163.0	165.4	167.8	170.2	172.6	175.0	177.4	176.2
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	83.2	94.3	105.3	116.4	127.5	138.6	149.7	160.7	166.1	168.5	170.9	173.3	175.7	177.9	175.5
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.3	81.5	88.5	99.6	110.6	121.7	132.8	143.9	154.9	166.0	169.2	171.6	174.0	176.4	177.2	174.8
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	82.7	93.8	104.8	115.9	127.0	138.1	149.2	160.2	169.9	172.3	174.7	177.1	176.5	174.1
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.2	88.0	99.1	110.1	121.2	132.3	143.4	154.4	165.5	173.0	175.4	177.8	175.8	173.4
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	82.2	93.3	104.3	115.4	126.5	137.6	148.7	159.7	170.8	176.1	177.6	175.2	172.7
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.8	87.5	98.5	109.6	120.7	131.8	142.9	153.9	165.0	176.1	176.9	172.6	168.3
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.6	81.7	92.8	103.8	114.9	126.0	137.1	148.2	159.2	170.3	168.1	161.8	155.5
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.5	87.0	98.0	109.1	120.2	131.3	142.4	153.4	163.6	157.3	151.0	144.7
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	64.1	81.2	92.3	103.3	114.4	125.5	136.6	147.6	152.7	146.5	140.2	133.9
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	64.2	86.5	97.5	108.6	119.7	130.8	141.9	141.9	135.7	129.4	123.1
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.6	80.7	91.8	102.8	113.9	124.7	132.5	131.1	124.9	118.6	112.3
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.8	86.0	96.9	107.1	115.6	120.4	119.6	114.0	107.8	101.5
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.0	80.0	89.5	98.0	104.6	108.1	107.6	103.1	97.0	90.7
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	80.5	87.7	93.0	95.6	95.2	91.9	86.2	80.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.4	82.4	81.0	83.2	82.8	80.1	84.5	83.1
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.9	64.7	84.4	82.1	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Cover Elevations (sheet 4 of 6)

	NORTHING (ft)																							
EASTING (ft)	1354400	1354350	1354300	1354250	1354200	1354150	1354100	1354050	1354000	1353950	1353900	1353850	1353800	1353750	1353700	1353650	1353600	1353550	1353500	1353450	1353400	1353350	1353300	1353250
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	82.0	81.9	81.9	81.9	81.9	81.9	81.8	81.8	81.8	81.8	81.8	81.7	81.7	81.7	81.7	81.6	81.6	81.6	81.6	81.8	81.5	81.5	81.5	81.5
623900	80.5	80.4	80.4	80.4	80.4	80.4	80.3	80.3	80.3	80.3	80.3	80.2	80.2	80.2	80.2	80.1	80.1	80.1	80.1	80.1	80.0	80.0	80.0	80.0
623950	93.0	92.9	92.9	92.9	92.9	92.9	92.8	92.8	92.8	92.8	92.8	92.7	92.7	92.7	92.7	92.6	92.6	92.6	92.6	92.6	92.5	92.5	92.5	92.5
624000	105.5	105.4	105.4	105.4	105.4	105.4	105.3	105.3	105.3	105.3	105.3	105.2	105.2	105.2	105.2	105.1	105.1	105.1	105.1	105.1	105.0	105.0	105.0	105.0
624050	118.0	117.9	117.9	117.9	117.9	117.9	117.8	117.8	117.8	117.8	117.8	117.7	117.7	117.7	117.7	117.6	117.6	117.6	117.6	117.6	117.5	117.5	117.5	117.5
624100	130.5	130.4	130.4	130.4	130.4	130.4	130.3	130.3	130.3	130.3	130.3	130.2	130.2	130.2	130.2	130.1	130.1	130.1	130.1	130.1	130.0	130.0	130.0	130.0
624150	143.0	142.9	142.9	142.9	142.9	142.9	142.8	142.8	142.8	142.8	142.8	142.7	142.7	142.7	142.7	142.6	142.6	142.6	142.6	142.6	142.5	142.5	142.3	142.1
624200	148.9	148.7	148.5	148.4	148.2	148.0	147.8	147.6	147.4	147.2	147.0	146.9	146.7	146.5	146.3	146.1	145.9	145.7	145.5	145.4	145.2	145.0	144.8	144.6
624250	151.4	151.2	151.0	150.9	150.7	150.5	150.3	150.1	149.9	149.7	149.5	149.4	149.2	149.0	148.8	148.6	148.4	148.2	148.0	147.8	147.7	147.5	147.3	147.1
624300	153.9	153.7	153.5	153.3	153.2	153.0	152.8	152.6	152.4	152.2	152.0	151.8	151.7	151.5	151.3	151.1	150.9	150.7	150.5	150.3	150.2	150.0	149.8	149.6
624350	156.4	156.2	156.0	155.8	155.7	155.5	155.3	155.1	154.9	154.7	154.5	154.3	154.1	154.0	153.8	153.6	153.4	153.2	153.0	152.8	152.6	152.5	152.3	152.1
624400	158.9	158.7	158.5	158.3	158.1	158.0	157.8	157.6	157.4	157.2	157.0	156.8	156.6	156.5	156.3	156.1	155.9	155.7	155.5	155.3	155.1	155.0	154.8	154.6
624450	161.4	161.2	161.0	160.8	160.6	160.4	160.3	160.1	159.9	159.7	159.5	159.3	159.1	158.9	158.8	158.6	158.4	158.2	158.0	157.8	157.6	157.4	157.3	157.1
624500	163.9	163.7	163.5	163.3	163.1	162.9	162.8	162.6	162.4	162.2	162.0	161.8	161.6	161.4	161.3	161.1	160.9	160.7	160.5	160.3	160.1	159.9	159.7	159.6
624550	166.4	166.2	166.0	165.8	165.6	165.4	165.2	165.1	164.9	164.7	164.5	164.3	164.1	163.9	163.7	163.6	163.4	163.2	163.0	162.8	162.6	162.4	162.2	162.1
624600	168.9	168.7	168.5	168.3	168.1	167.9	167.7	167.6	167.4	167.2	167.0	166.8	166.6	166.4	166.2	166.1	165.9	165.7	165.5	165.3	165.1	164.9	164.7	164.5
624650	171.4	171.2	171.0	170.8	170.6	170.4	170.2	170.0	169.9	169.7	169.5	169.3	169.1	168.9	168.7	168.5	168.4	168.2	168.0	167.8	167.6	167.4	167.2	167.0
624700	173.9	173.7	173.5	173.3	173.1	172.9	172.7	172.5	172.4	172.2	172.0	171.8	171.6	171.4	171.2	171.0	170.8	170.7	170.5	170.3	170.1	169.9	169.7	169.5
624750	176.3	176.2	176.0	175.8	175.6	175.4	175.2	175.0	174.8	174.7	174.5	174.3	174.1	173.9	173.7	173.5	173.3	173.2	173.0	172.8	172.6	172.4	172.2	172.0
624800	177.2	177.4	177.5	177.7	177.9	177.9	177.7	177.5	177.3	177.1	177.0	176.8	176.6	176.4	176.2	176.0	175.8	175.6	175.5	175.3	175.1	174.9	174.7	174.5
624850	174.7	174.9	175.1	175.2	175.4	176.2	177.4	176.0	176.2	176.4	176.6	176.7	176.9	177.1	177.3	177.5	177.7	177.9	178.0	177.8	177.6	177.4	177.2	177.0
624900	172.2	172.4	172.6	172.7	174.5	176.9	176.8	174.4	173.7	173.9	174.1	174.3	174.4	174.6	174.8	175.0	175.2	175.4	175.6	175.8	175.9	176.1	176.3	176.5
624950	169.7	169.9	170.3	172.7	175.1	177.5	176.1	173.7	171.3	171.4	171.6	171.8	171.9	172.1	172.3	172.5	172.7	172.9	173.1	173.3	173.4	173.6	173.8	174.0
625000	167.2	168.6	171.0	173.4	175.8	177.8	175.4	173.0	170.6	168.9	169.1	169.3	169.5	169.6	169.8	170.0	170.2	170.4	170.6	170.8	171.0	171.1	171.3	171.5
625050	166.9	169.3	171.7	174.1	176.5	177.1	174.7	172.3	169.9	167.5	166.6	166.8	167.0	167.1	167.3	167.5	167.7	167.9	168.1	168.3	168.5	168.6	168.8	169.0
625100	167.6	170.0	172.4	174.8	177.2	176.4	174.0	171.6	169.2	166.8	164.4	164.3	164.5	164.7	164.8	165.0	165.2	165.4	165.6	165.8	166.0	166.2	166.3	166.5
625150	168.3	170.7	173.1	175.5	177.9	175.7	173.3	170.9	168.5	166.1	163.7	161.8	162.0	162.2	162.3	162.5	162.7	162.9	163.1	163.3	163.5	163.7	163.9	164.0
625200	169.0	171.4	173.8	176.2	177.4	175.0	172.6	170.2	167.8	165.4	163.0	160.6	159.5	159.7	159.9	160.0	160.2	160.4	160.6	160.8	161.0	161.2	161.4	161.5
625250	169.7	172.1	174.5	176.9	176.7	174.3	171.9	169.5	167.1	164.7	162.3	159.9	157.5	157.2	157.4	157.6	157.7	157.9	158.1	158.3	158.5	158.7	158.9	159.1
625300	170.4	172.8	175.2	177.6	176.0	173.6	171.2	168.8	166.4	164.0	161.6	159.2	156.8	154.7	154.9	155.1	155.2	155.4	155.6	155.8	156.0	156.2	156.4	156.6
625350	171.1	173.5	175.9	177.7	175.3	172.9	170.5	168.1	165.7	163.3	160.9	158.5	156.1	153.7	152.4	152.6	152.8	152.9	153.1	153.3	153.5	153.7	153.9	154.1
625400	171.8	174.2	176.6	177.0	174.6	172.2	169.8	167.4	165.0	162.6	160.2	157.8	155.4	153.0	150.6	150.1	150.3	150.4	150.6	150.8	151.0	151.2	151.4	151.6
625450	172.5	174.9	177.3	176.3	173.9	171.5	169.1	166.7	164.3	161.9	159.5	157.1	154.7	152.3	149.9	147.6	147.8	148.0	148.1	148.3	148.5	148.7	148.9	149.1
625500	173.2	175.6	178.0	175.6	173.2	170.8	168.4	166.0	163.6	161.2	158.8	156.4	154.0	151.6	149.2	146.8	145.3	145.5	145.7	145.8	146.0	146.2	146.4	146.6
625550	173.9	176.3	177.3	174.9	172.5	170.1	167.7	165.3	162.9	160.5	158.1	155.7	153.3	150.9	148.5	146.1	143.7	143.0	143.2	143.3	143.5	143.7	143.9	144.1
625600	174.6	177.0	176.6	174.2	171.8	169.4	167.0	164.6	162.2	159.8	157.4	155.0	152.6	150.2	147.8	145.4	143.0	140.6	140.7	140.9	141.0	141.2	141.4	141.6
625650	175.3	177.7	176.0	173.6	171.1	168.7	166.3	163.9	161.5	159.1	156.7	154.3	151.9	149.5	147.1	144.7	142.3	139.9	138.2	138.4	138.5	138.7	138.9	139.1
625700	175.9	177.7	175.3	172.9	170.5	168.1	165.7	163.3	160.8	158.4	156.0	153.6	151.2	148.8	146.4	144.0	141.6	139.2	136.8	135.9	136.1	136.2	136.4	136.6
625750	176.6	177.0	174.6	172.2	169.8	167.4	165.0	162.6	160.2	157.8	155.4	152.9	150.5	148.1	145.7	143.3	140.9	138.5	136.1	133.7	133.6	133.7	133.9	134.1
625800	177.3	176.3	173.9	171.5	169.1	166.7	164.3	161.9	159.5	157.1	154.7	152.3	149.9	147.5	145.0	142.6	140.2	137.8	135.4	133.0	131.1	131.3	131.4	131.6
625850	178.0	175.6	173.2	170.8	168.4	166.0	163.6	161.2	158.8	156.4	154.0	151.6	149.2	146.8	144.4	142.0	139.6	137.2	134.7	132.3	129.9	128.8	129.0	129.1
625900	177.3	174.9	172.5	170.1	167.7	165.3	162.9	160.5	158.1	155.7	153.3	150.9	148.5	146.1	143.7	141.3	138.9	136.5	134.1	131.7	129.3	126.8	126.5	126.6
625950	176.6	174.2	171.8	169.4	167.0	164.8	162.2	159.8	157.4	155.0	152.6	150.2	147.8	145.4	143.0	140.6	138.2	135.8	133.4	131.0	128.6	126.2	124.0	123.6
626000	175.9	173.5	171.1	168.7	166.3	163.9	161.5	159.1	156.7	154.3	151.9	149.5	147.1	144.7	142.3	139.9	137.5	135.1	132.7	130.3	127.9	125.4	119.1	112.8
626050	175.2	172.8	170.4	168.0	165.6	163.2	160.8	158.4	156.0	153.6	151.2	148.8	146.4	144.0	141.6	139.2	136.8	134.4	132.0	127.1	120.8	114.5	108.3	102.0
626100	174.5	172.1	169.7	167.3	164.9	162.5	160.1	157.7	155.3	152.9	150.5	148.1	145.7	143.3	140.9	138.5	135.2	128.9	122.6	116.3	110.0	103.7	97.5	91.2
626150	173.8	171.4	169.0	166.6	164.2	161.8	159.4	157.0	154.6	152.2	149.8	147.4	145.0	142.6	136.9	130.6	124.3	118.1	111.8	105.5	99.2	92.9	86.6	80.4
626200	173.1	170.7	168.3	165.9	163.5	161.1	158.7	156.3	153.9	151.5	149.1	145.0	138.7	132.4	126.1	119.8	113.5	107.3	101.0	94.7	88.4	82.1	83.6	83.6
626250	172.4	170.0	167.6	165.2	162.8	160.4	158.0	155.6	153.0	146.7	140.4	134.1	127.9	121.6	115.3	109.0	102.7	96.5	90.2	83.9	81.2	85.0	80.0	80.0
626300	171.7	169.3	166.9	164.5	162.1	159.7	154.8	148.5	142.2	135.9	129.6	123.3	117.1	110.8	104.5	98.2	91.9	85.6	80.0	85.0	80.8	80.0	80.0	80.0
626350	171.0	168.6	166.2	162.8	156.5	150.2	144.0	137.7	131.4	125.1	118.8	112.5	106.3	100.0	93.7	87.4	81.1	84.9	82.6	80.0	80.0	80.0	80.0	80.0
626400	170.3	164.6	158.3	152.0	145.7	139.4	133.1	126.9	120.6	114.3	108.0	101.7	95.4	89.2	82.9	82.5	84.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	160.0	153.8	147.5	141.2	134.9	128.6	122.3	116.1	109.8	103.5	97.2	90.9	84.6	80.2	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	149.2	142.9	136.7	130.4	124.1	117.8	111.5	105.2	99.0	92.7	86.4	80.1	65.0	81.6	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0
626550	138.4	132.1	125.9	119.6	113.3	107.0	100.7	94.4	88.2	81.9	83.9	83.3	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	127.6	121.3	115.1	108.8	102.5	96.2	89.9	83.6	81.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0
626650	116.8	110.5	104.2	98.0	91.7	85.4	80.0	85.0	80.5	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	106.0	99.7	93.4	87.2	80.9	85.0	82.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	95.2	88.9	82.6	82.9	64.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	84.4	80.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	85.0	81.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Cover Elevations (sheet 5 of 6)

NORTHING (ft)

EASTING (ft)	1353200	1353150	1353100	1353050	1353000	1352950	1352900	1352850	1352800	1352750	1352700	1352650	1352600	1352550	1352500	1352450	1352400	1352350	1352300	1352250	1352200	1352150	1352100	1352050
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	81.5	81.4	81.4	81.4	81.4	81.3	81.3	81.3	81.3	81.3	81.2	81.2	81.2	81.2	81.2	81.1	81.1	81.1	81.1	81.1	81.0	81.0	81.0	81.0
623900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623950	92.5	92.4	92.4	92.4	92.4	92.3	92.3	92.3	92.3	92.3	92.2	92.2	92.2	92.2	92.2	92.1	92.1	92.1	92.1	92.1	92.0	92.0	92.0	92.0
624000	105.0	104.9	104.9	104.9	104.9	104.8	104.8	104.8	104.8	104.8	104.7	104.7	104.7	104.7	104.7	104.6	104.6	104.6	104.6	104.6	104.5	104.5	104.5	104.5
624050	117.5	117.4	117.4	117.4	117.4	117.3	117.3	117.3	117.3	117.3	117.2	117.2	117.2	117.2	117.2	117.1	117.1	117.1	117.1	117.1	117.0	117.0	117.0	117.0
624100	130.0	129.9	129.9	129.9	129.9	129.8	129.8	129.8	129.8	129.8	129.7	129.7	129.7	129.7	129.7	129.6	129.6	129.6	129.6	129.6	129.5	129.5	129.5	129.5
624150	141.6	141.3	140.9	140.9	140.7	140.6	140.5	140.2	140.4	140.3	140.3	140.3	140.3	140.3	140.3	140.3	140.3	140.2	140.2	140.2	140.2	140.2	140.2	140.2
624200	144.4	144.2	144.0	143.9	143.7	143.5	143.3	143.1	142.9	142.8	142.8	142.8	142.8	142.8	142.8	142.8	142.8	142.7	142.7	142.7	142.7	142.7	142.7	142.7
624250	146.9	146.7	146.5	146.3	146.2	146.0	145.8	145.6	145.4	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.3	145.2	145.2	145.2	145.2	145.2	145.2	145.2
624300	149.4	149.2	149.0	148.8	148.7	148.5	148.3	148.1	147.9	147.8	147.8	147.8	147.8	147.8	147.8	147.8	147.8	147.7	147.7	147.7	147.7	147.7	147.7	147.7
624350	151.9	151.7	151.5	151.3	151.1	151.0	150.8	150.6	150.4	150.3	150.3	150.3	150.3	150.3	150.3	150.3	150.3	150.2	150.2	150.2	150.2	150.2	150.2	150.2
624400	154.4	154.2	154.0	153.8	153.6	153.4	153.3	153.1	152.9	152.8	152.8	152.8	152.8	152.8	152.8	152.8	152.8	152.7	152.7	152.7	152.7	152.7	152.7	152.7
624450	156.9	156.7	156.5	156.3	156.1	155.9	155.8	155.6	155.4	155.3	155.3	155.3	155.3	155.3	155.3	155.3	155.3	155.2	155.2	155.2	155.2	155.2	155.2	155.2
624500	159.4	159.2	159.0	158.8	158.6	158.4	158.2	158.1	157.9	157.8	157.8	157.8	157.8	157.8	157.8	157.8	157.8	157.7	157.7	157.7	157.7	157.7	157.7	157.7
624550	161.9	161.7	161.5	161.3	161.1	160.9	160.7	160.6	160.4	160.3	160.3	160.3	160.3	160.3	160.3	160.3	160.3	160.2	160.2	160.2	160.2	160.2	160.2	160.2
624600	164.4	164.2	164.0	163.8	163.6	163.4	163.2	163.0	162.9	162.8	162.8	162.8	162.8	162.8	162.8	162.8	162.8	162.7	162.7	162.7	162.7	162.7	162.7	162.7
624650	166.9	166.7	166.5	166.3	166.1	165.9	165.7	165.5	165.4	165.3	165.3	165.3	165.3	165.3	165.3	165.3	165.3	165.2	165.2	165.2	165.2	165.2	165.2	165.2
624700	169.3	169.2	169.0	168.8	168.8	168.4	168.2	168.0	167.8	167.8	187.8	167.8	167.8	167.8	167.8	167.8	167.8	167.7	167.7	167.7	167.7	167.7	167.7	167.7
624750	171.8	171.7	171.5	171.3	171.1	170.9	170.7	170.5	170.3	170.3	170.3	170.3	170.3	170.3	170.3	170.3	170.3	170.2	170.2	170.2	170.2	170.2	170.2	170.2
624800	174.3	174.1	174.0	173.8	173.6	173.4	173.2	173.0	172.8	172.8	172.8	172.8	172.8	172.8	172.8	172.8	172.8	172.7	172.7	172.7	172.7	172.7	172.7	172.7
624850	176.8	176.6	176.4	176.3	176.1	175.9	175.7	175.5	175.3	175.3	175.3	175.3	175.3	175.3	175.3	175.3	175.3	175.2	175.2	175.2	175.2	175.2	175.2	175.2
624900	176.7	176.9	177.1	177.3	177.4	177.6	177.8	178.0	177.8	177.8	177.8	177.8	177.8	177.8	177.8	177.8	177.8	177.7	177.7	177.7	177.7	177.7	177.7	177.7
624950	174.2	174.4	174.6	174.8	175.0	175.1	175.3	175.5	175.7	175.7	175.7	175.7	175.7	175.7	175.7	175.8	175.8	175.8	175.8	175.8	175.8	175.8	175.8	175.8
625000	171.7	171.9	172.1	172.3	172.5	172.6	172.8	173.0	173.2	173.2	173.2	173.2	173.2	173.2	173.2	173.3	173.3	173.3	173.3	173.3	173.3	173.3	173.3	173.3
625050	169.2	169.4	169.6	169.8	170.0	170.2	170.3	170.5	170.7	170.7	170.7	170.7	170.7	170.7	170.7	170.8	170.8	170.8	170.8	170.8	170.8	170.8	170.8	170.8
625100	166.7	166.9	167.1	167.3	167.5	167.7	167.8	168.0	168.2	168.2	168.2	168.2	168.2	168.2	168.2	168.3	168.3	168.3	168.3	168.3	168.3	168.3	168.3	166.3
625150	164.2	164.4	164.6	164.8	165.0	165.2	165.4	165.5	165.7	165.7	165.7	165.7	165.7	165.7	165.7	165.8	165.8	165.8	165.8	165.8	165.8	165.8	165.8	165.8
625200	161.7	161.9	162.1	162.3	162.5	162.7	162.9	163.0	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.3	163.3	163.3	163.3	163.3	163.3	163.3	163.3	163.3
625250	159.2	159.4	159.6	159.8	160.0	160.2	160.4	160.6	160.7	160.7	160.7	160.7	160.7	160.7	160.7	160.8	160.8	160.8	160.8	160.8	160.8	160.8	160.8	160.8
625300	156.7	156.9	157.1	157.3	157.5	157.7	157.9	158.1	158.2	158.2	158.2	158.2	158.2	158.2	158.2	158.3	158.3	158.3	158.3	158.3	158.3	158.3	158.3	158.3
625350	154.3	154.4	154.6	154.8	155.0	155.2	155.4	155.6	155.7	155.7	155.7	155.7	155.7	155.7	155.7	155.8	155.8	155.8	155.8	155.8	155.8	155.8	155.8	155.8
625400	151.8	152.0	152.1	152.3	152.5	152.7	152.9	153.1	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.3	153.3	153.3	153.3	153.3	153.3	153.3	153.3	153.3
625450	149.3	149.5	149.6	149.8	150.0	150.2	150.4	150.6	150.7	150.7	150.7	150.7	150.7	150.7	150.7	150.8	150.8	150.8	150.8	150.8	150.8	150.8	150.8	150.8
625500	146.8	147.0	147.2	147.3	147.5	147.7	147.9	148.1	148.2	148.2	148.2	148.2	148.2	148.2	148.2	148.3	148.3	148.3	146.3	148.3	148.3	148.3	148.3	148.3
625550	144.3	144.5	144.7	144.8	145.0	145.2	145.4	145.6	145.7	145.7	145.7	145.7	145.7	145.7	145.7	145.8	145.8	145.8	145.8	145.8	145.8	145.8	145.8	145.8
625600	141.8	142.0	142.2	142.4	142.5	142.7	142.9	143.1	143.2	143.2	143.2	143.2	143.2	143.2	143.2	143.3	143.3	143.3	143.3	143.3	143.3	143.3	143.3	143.3
625650	139.3	139.5	139.7	139.9	140.0	140.2	140.4	140.6	140.8	140.6	140.8	140.8	140.8	140.8	140.9	140.9	140.9	140.9	140.9	140.9	140.9	140.9	140.9	140.9
625700	136.8	137.0	137.2	137.4	137.6	137.7	136.0	133.2	132.1	132.0	132.0	132.0	132.1	132.1	132.1	132.1	132.1	132.2	132.2	132.2	132.2	132.3	132.3	132.3
625750	134.3	134.5	134.7	134.9	135.1	129.3	124.1	120.9	119.6	119.5	119.5	119.5	119.6	119.6	119.6	119.6	119.6	119.7	119.7	119.7	119.7	119.8	119.8	119.8
625800	131.8	132.0	132.2	130.9	124.6	118.3	112.6	108.6	107.1	107.0	107.0	107.0	107.1	107.1	107.1	107.1	107.1	107.2	107.2	107.2	107.2	107.3	107.3	107.3
625850	129.3	129.5	126.4	120.1	113.8	107.5	101.3	96.5	94.6	94.5	94.5	94.5	94.6	94.6	94.6	94.6	94.6	94.7	94.7	94.7	94.7	94.8	94.8	94.8
625900	126.8	121.8	115.5	109.3	103.0	96.7	90.4	64.6	82.1	82.0	82.0	82.0	82.1	82.1	82.1	82.1	82.1	82.2	82.2	82.2	82.2	82.3	82.3	82.3
625950	117.3	111.0	104.7	98.5	92.2	85.9	80.0	85.0	83.6	83.5	83.5	83.5	83.6	83.6	83.6	83.6	83.6	83.7	83.7	83.7	83.7	83.8	85.0	83.8
626000	106.5	100.2	93.9	87.7	81.4	84.6	82.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.3	83.0	84.7	83.3
626050	95.7	89.4	83.1	82.2	84.6	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.2	82.9	84.6	83.3
626100	84.9	80.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.1	82.8	84.4	83.3
626150	85.0	81.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.0	82.7	84.2	83.2
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.9	82.6	83.9	83.2
626250	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.8	82.5	83.7	83.1
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	60.0	80.0	80.0	80.0	80.0	80.7	82.4	83.4	83.1
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.7	82.4	83.2	83.0
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.6	82.3	82.9	82.9
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.5	82.2	82.7	82.7
626500	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.4	82.1	82.5	82.5
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.3	82.0	82.2	82.2
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.2	81.9	82.0	82.0
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	60.0	80.0	80.0	80.0	80.1	81.7	81.7	81.7
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	81.5	81.5	81.5
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.2	81.2	81.2
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.0	81.0	81.0
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.7	80.7	80.7
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.5	80.5	80.5
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.2	80.2	80.2
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Cover Elevations (sheet 6 of 6)

EASTING (ft)	NORTHING (ft) 1352000	1351950	1351900	1351850	1351800	1351750	1351700	1351650	1351600	1351550	1351500	1351450	1351400	1351350	1351300	1351250	1351200	1351150	1351100
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	80.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623900	80.0	83.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623950	91.1	87.7	81.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624000	103.3	99.0	92.1	83.6	84.7	80.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624050	115.4	109.6	101.3	92.6	84.0	84.2	80.7	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624100	126.9	118.9	110.3	101.7	93.0	84.4	83.6	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624150	136.6	128.0	119.4	110.7	102.1	93.5	84.8	83.1	81.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624200	142.7	137.0	128.4	119.8	111.1	102.5	93.9	85.2	82.6	82.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624250	145.2	145.2	137.4	128.8	120.2	111.5	102.9	94.3	85.6	82.0	82.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624300	147.7	147.7	146.5	137.8	129.2	120.6	111.9	103.3	94.7	86.0	81.5	82.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624350	150.2	150.2	150.2	146.9	138.2	129.6	121.0	112.3	103.7	95.1	86.0	83.6	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624400	152.7	152.7	152.7	152.7	147.3	138.6	130.0	121.4	112.7	103.5	92.9	81.6	84.1	80.0	80.0	80.0	80.0	80.0	80.0
624450	155.2	155.2	155.2	155.2	155.2	147.7	139.0	130.4	120.8	109.5	97.6	85.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624500	157.7	157.7	157.7	157.7	157.7	156.7	148.1	136.9	124.4	111.9	99.4	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624550	160.2	160.2	160.2	160.2	160.2	160.2	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624600	162.7	162.7	162.7	162.7	162.7	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624650	165.2	165.2	165.2	165.2	165.2	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624700	167.7	167.7	167.7	167.7	167.7	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624750	170.2	170.2	170.2	170.2	170.2	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624800	172.7	172.7	172.7	172.7	172.7	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624850	175.2	175.2	175.2	175.2	174.5	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624900	177.7	177.7	177.7	177.7	174.5	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624950	175.8	175.8	175.8	175.8	174.5	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625000	173.3	173.3	173.3	173.3	173.3	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625050	170.8	170.8	170.8	170.8	170.8	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625100	168.3	168.3	168.3	168.3	168.3	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625150	165.8	165.8	165.8	165.8	165.8	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625200	163.3	163.3	163.3	163.3	163.3	162.0	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625250	160.8	160.8	160.8	160.8	160.8	160.8	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625300	158.3	158.3	158.3	158.3	158.3	158.3	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625350	155.8	155.8	155.8	155.8	155.8	155.8	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625400	153.3	153.3	153.3	153.3	153.3	153.3	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625450	150.8	150.8	150.8	150.8	150.8	150.8	149.5	137.0	124.5	112.0	99.5	87.0	85.0	80.0	60.0	80.0	80.0	80.0	80.0
625500	148.3	148.3	148.3	148.3	148.3	148.3	148.3	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625550	145.8	145.8	145.8	145.8	145.8	145.8	145.8	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625600	143.3	143.3	143.3	143.3	143.3	143.3	143.3	137.0	124.5	112.0	99.5	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625650	140.9	140.9	140.9	140.9	140.9	140.9	140.9	136.8	124.3	111.9	99.4	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625700	132.3	132.3	132.4	132.4	132.4	132.4	132.4	129.7	120.5	109.3	97.5	85.4	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625750	119.8	119.8	119.9	119.9	119.9	119.9	119.9	118.3	112.1	103.0	92.6	81.4	83.8	80.0	80.0	80.0	80.0	80.0	80.0
625800	107.3	107.3	107.4	107.4	107.4	107.4	107.4	106.3	101.8	94.6	85.5	84.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625850	94.8	94.8	94.9	94.9	94.9	94.9	94.9	94.1	90.5	84.6	82.2	81.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625900	82.3	82.3	82.4	82.4	82.4	82.4	82.4	81.7	80.0	85.0	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625950	83.8	83.8	83.9	83.9	83.9	83.9	83.9	83.3	80.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626000	81.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626050	81.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626100	81.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626150	81.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626200	81.2	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626250	81.2	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626300	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626350	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626400	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	81.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	81.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626550	80.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	80.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	80.7	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	80.7	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626900	80.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.2	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

ATTACHMENT 2

Subgrade Elevations: Pre-Settlement

Subgrade Elevations: Pre-Settlement (sheet 1 of 6)

		NORTHING (ft)																						
	(ft)	1358000	1357950	1357900	1357850	1357800	1357750	1357700	1357650	1357600	1357550	1357500	1357450	1357400	1357350	1357300	1357250	1357200	1357150	1357100	1357050	1357000	1356950	1356900	1356850
	623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	623850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.0	83.2	83.2	83.2	83.2	83.2	83.2	83.1	83.1	83.1	83.1	83.1	83.0	83.0
	623900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	82.5	80.3	81.7	81.7	81.7	81.7	81.7	81.7	81.6	81.6	81.6	81.6	81.6	81.5	81.5
	623950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.4	88.0	92.4	94.2	94.2	94.2	94.2	94.2	94.2	94.1	94.1	94.1	94.1	94.1	94.0	94.0
	624000	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.5	90.9	94.9	87.5	84.4	84.3	84.4	84.4	84.4	85.9	84.5	84.5	84.5	84.6	84.6	84.6	85.0
	624050	80.0	80.0	80.0	80.0	80.0	80.0	82.1	88.3	94.7	81.9	80.8	81.1	81.4	81.8	82.2	82.4	82.7	81.6	82.0	82.2	82.9	83.5	84.2	84.4
	624100	80.0	80.0	80.0	80.0	80.0	82.5	80.8	93.0	86.9	80.8	82.1	82.4	82.6	82.9	83.1	83.4	83.6	83.7	84.1	84.4	84.6	84.9	85.1	85.4
	624150	80.0	80.0	80.0	80.0	80.0	83.8	82.3	94.8	83.6	81.2	82.4	83.4	83.6	83.9	84.1	84.4	84.6	84.8	85.1	85.3	85.8	85.8	86.1	86.3
	624200	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	83.4	81.3	82.7	83.6	84.6	84.8	85.1	85.3	85.6	85.8	86.1	86.3	86.6	86.8	87.1	87.3
	624250	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	83.4	81.9	82.9	83.9	84.9	85.8	86.0	86.3	86.5	86.8	87.0	87.3	87.5	87.8	88.0	88.3
	624300	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	83.4	62.2	83.2	84.1	85.1	86.1	87.0	87.3	87.5	87.8	88.0	88.3	88.5	88.7	89.0	89.2
	624350	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	83.8	82.5	83.4	84.4	85.4	86.3	87.3	88.2	88.5	88.7	89.0	89.2	89.5	89.7	90.0	90.2
	624400	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	85.0	82.7	83.7	84.6	85.6	86.6	87.6	88.5	89.4	89.7	89.9	90.2	90.4	90.7	90.9	91.2
	624450	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	83.4	81.7	83.9	84.9	85.9	86.8	87.8	88.8	89.7	90.7	90.9	91.2	91.4	91.7	91.9	92.2
	624500	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.9	83.4	81.9	84.2	85.1	86.1	87.1	88.1	89.0	90.0	91.0	91.9	92.1	92.4	92.6	92.9	93.1
	624550	80.0	80.0	80.0	80.0	80.0	83.5	81.8	94.3	84.7	82.2	84.4	85.4	86.4	87.3	88.3	89.3	90.2	91.2	92.2	93.1	93.3	93.6	93.8	94.1
	624600	80.0	80.0	80.0	80.0	80.0	81.1	80.0	90.8	90.8	82.7	84.7	85.6	86.6	87.6	88.1	89.1	90.0	90.9	92.4	93.4	93.2	94.6	94.8	95.1
	624650	80.0	80.0	80.0	80.0	80.0	80.0	85.0	85.6	96.0	85.7	84.9	85.9	85.5	87.8	86.7	88.8	89.2	88.9	92.7	93.6	91.4	94.9	95.8	95.8
	624700	80.0	80.0	80.0	80.0	80.0	80.0	82.9	80.1	91.4	90.6	82.8	84.8	83.8	86.0	85.4	86.8	87.1	87.6	89.9	92.0	89.9	92.3	91.9	91.5
	624750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	86.0	96.0	82.2	82.8	83.2	83.9	84.7	85.5	86.2	87.0	87.8	88.5	89.0	89.6	90.1	90.7
	624800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.3	80.5	91.8	89.3	81.4	82.5	83.3	84.1	84.8	85.8	86.4	87.1	87.8	88.2	88.7	89.3	89.8
	624850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.5	86.4	96.0	81.5	81.7	82.7	83.4	84.2	84.9	85.7	88.2	86.8	87.3	87.9	88.4	89.0
	624900	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	83.7	80.9	92.2	88.8	80.8	82.0	82.8	83.5	84.3	84.9	85.4	88.0	86.5	87.0	87.6	88.1
	624950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.0	86.8	96.0	81.0	81.2	62.1	82.9	83.5	84.0	84.6	85.1	85.7	86.2	86.8	87.3
	625000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.1	81.3	92.6	88.2	80.5	81.4	82.1	82.6	83.2	83.7	84.3	84.8	85.4	85.9	86.5
	625050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.5	87.1	96.0	82.5	80.8	81.1	81.7	82.3	82.9	83.4	84.0	84.5	85.1	85.8
	625100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.2	80.7	90.4	95.0	86.8	81.2	80.3	81.1	82.1	82.8	83.1	83.7	84.2	84.8
	625150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.3	88.2	93.3	96.0	91.7	86.4	81.1	81.4	82.3	82.9	82.7	83.9
	625200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.9	81.4	85.4	89.4	93.4	96.0	91.8	87.1	82.2	80.7	81.6
EASTING (ft)	625250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.6	85.0	81.3	81.5	85.5	89.5	93.4	96.0	91.5	88.2
	625300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	83.7	85.0	81.2	81.6	85.6	89.5	93.5
	625350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.7	85.0	81.1	81.7
	625400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.8
	625450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	625500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	625550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	625600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	625650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	625700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	625750	60.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	625800	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0
	625850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	625900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0
	625950	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626000	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0
	626100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0
	626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626350	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0
	626400	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
	627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Subgrade Elevations: Pre-Settlement (sheet 2 of 6)

NORTHING (ft)

EASTING (ft)	1356800	1356750	1356700	1356650	1356600	1356550	1356500	1356450	1356400	1356350	1356300	1356250	1356200	1356150	1356100	1356050	1356000	1355950	1355900	1355850	1355800	1355750	1355700	1355650
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	83.0	83.0	82.9	82.9	82.9	82.9	82.9	82.8	82.8	82.8	82.8	82.8	82.7	82.7	82.7	82.7	82.7	82.8	82.8	82.6	82.8	82.5	82.5	82.5
623900	81.5	81.5	81.4	81.4	81.4	81.4	81.4	81.3	81.3	81.3	81.3	81.3	81.2	81.2	81.2	81.2	81.2	81.1	81.1	81.1	81.1	81.0	81.0	81.0
623950	94.0	94.0	93.9	93.9	93.9	93.9	93.9	93.8	93.8	93.8	93.8	93.8	93.7	93.7	93.7	93.7	93.7	93.6	93.8	93.6	93.8	93.5	93.5	93.5
624000	87.5	84.7	84.7	84.8	84.8	84.8	84.9	85.2	88.3	84.9	85.0	88.5	87.3	86.2	89.2	85.1	85.1	88.6	89.6	85.2	85.3	86.0	86.7	85.3
624050	84.7	83.7	82.5	83.3	83.6	85.2	83.9	81.2	81.5	81.6	82.4	84.2	84.9	83.7	88.2	83.2	84.3	88.2	88.8	82.2	80.9	81.9	82.6	82.1
624100	85.6	85.9	86.1	86.4	85.3	84.2	83.0	82.3	83.0	83.2	84.3	85.0	85.8	86.3	86.9	88.3	88.3	88.9	89.6	87.8	82.0	82.7	83.4	84.0
624150	86.6	88.8	87.1	87.3	86.6	83.4	85.9	83.1	83.7	84.4	85.0	85.7	86.4	87.0	87.7	88.3	89.0	89.7	87.0	82.1	82.8	83.4	84.1	84.8
624200	87.6	87.8	88.1	88.3	88.5	88.8	88.8	83.8	84.5	85.1	85.8	86.5	87.1	87.8	88.4	89.1	89.8	90.4	91.1	87.5	83.5	84.2	84.9	85.5
624250	88.5	88.8	89.0	89.3	89.5	89.8	85.6	84.6	85.2	85.9	86.6	87.2	87.9	88.5	89.2	89.9	90.5	91.2	91.8	87.5	84.3	84.9	85.6	86.3
624300	89.5	89.7	90.0	90.2	90.5	87.5	84.7	85.3	86.0	86.6	87.3	88.0	88.6	89.3	89.9	90.6	91.3	91.9	90.4	85.1	85.0	85.7	86.4	87.0
624350	90.5	90.7	91.0	91.2	91.5	91.7	88.8	86.1	86.7	87.4	88.1	88.7	89.4	90.0	90.7	91.4	92.0	92.7	93.3	91.7	85.8	86.5	87.1	87.8
624400	91.4	91.7	91.9	92.2	91.3	88.2	86.2	86.8	87.5	88.1	88.8	89.5	90.1	90.8	91.4	92.1	92.8	93.4	93.3	87.1	86.5	87.2	87.9	88.5
624450	92.4	92.6	92.9	93.1	92.2	90.9	87.8	87.6	88.2	88.9	89.6	90.2	90.9	91.5	92.2	92.9	93.5	94.2	94.3	89.2	87.3	88.0	88.6	89.3
624500	93.4	93.6	93.9	94.1	93.0	91.8	89.6	88.3	89.0	89.6	90.3	91.0	91.6	92.3	92.9	93.6	94.3	94.9	95.6	93.6	88.0	88.7	89.4	90.0
624550	94.3	94.6	94.8	95.1	94.3	89.9	88.4	89.1	89.7	90.4	91.1	91.7	92.4	93.0	93.7	94.4	95.0	95.7	92.9	88.1	88.8	89.5	90.1	90.8
624600	95.3	95.6	95.8	95.9	95.3	94.5	92.9	89.8	90.5	91.1	91.8	92.5	93.1	93.8	94.4	95.1	95.8	96.4	97.1	94.0	90.1	90.2	90.9	91.5
624650	94.3	95.1	94.9	94.5	94.9	92.0	90.3	90.0	91.2	91.9	92.1	93.2	93.9	94.2	95.2	95.9	96.4	97.2	97.8	93.4	90.3	91.0	91.6	92.1
624700	92.1	92.9	93.1	93.7	94.2	92.1	90.5	90.1	91.2	91.8	92.1	93.2	93.8	94.2	95.1	95.8	96.4	97.1	97.8	93.8	90.5	91.7	92.0	92.0
624750	91.2	91.7	92.3	92.8	93.4	93.9	92.2	89.8	90.4	91.1	91.7	92.4	93.1	93.7	94.4	95.1	95.7	96.4	96.8	93.7	90.4	90.3	91.2	91.5
624800	90.4	90.9	91.4	92.0	92.5	90.4	88.3	89.0	69.7	90.3	91.0	91.7	92.3	93.0	93.6	94.3	95.0	95.6	93.3	88.1	86.8	89.4	90.1	90.7
624850	89.5	90.1	90.6	91.2	91.7	91.3	89.4	88.3	88.9	89.6	90.2	90.9	91.6	92.2	92.9	93.6	94.2	94.9	95.5	94.1	88.0	88.7	89.3	90.0
624900	88.7	89.2	89.8	90.3	90.9	91.2	86.8	87.5	88.2	88.8	89.5	90.2	90.8	91.5	92.1	92.8	93.5	94.1	94.8	89.1	87.3	87.9	88.6	89.2
624950	87.8	88.4	88.9	89.5	89.9	88.0	86.1	86.8	87.4	88.1	88.7	89.4	90.1	90.7	91.4	92.1	92.7	93.4	93.6	87.5	86.5	87.2	87.8	88.5
625000	67.0	87.5	88.1	88.6	89.2	89.7	87.6	86.0	86.7	87.3	88.0	88.7	89.3	90.0	90.6	91.3	92.0	92.6	93.3	91.6	87.0	86.4	87.1	87.7
625050	86.2	86.7	87.3	87.8	88.3	86.4	84.6	85.3	85.9	86.6	87.2	87.9	88.6	69.2	89.9	90.6	91.2	91.9	92.3	85.0	85.0	85.7	86.3	87.0
625100	85.3	85.9	86.4	87.0	87.5	87.8	84.8	84.5	85.2	85.8	86.5	87.2	87.8	88.5	89.2	89.8	90.5	91.1	91.8	87.8	84.3	84.9	85.6	86.3
625150	84.5	85.0	85.6	86.1	86.7	86.3	83.8	83.8	84.4	85.1	85.8	86.4	87.1	87.7	88.4	89.1	89.7	90.4	91.1	87.0	83.5	84.2	84.8	85.5
625200	83.0	84.2	84.7	85.3	85.8	83.7	82.4	83.0	83.7	84.3	85.0	85.7	86.3	87.0	87.7	88.3	89.0	89.6	87.2	82.1	82.8	83.4	84.1	84.8
625250	80.9	81.1	83.5	84.4	85.0	85.5	83.5	82.3	82.9	83.6	84.3	84.9	85.6	86.2	86.9	87.0	88.2	88.9	89.6	88.0	82.0	82.7	83.3	84.0
625300	96.0	91.4	86.1	81.5	84.2	81.8	80.9	81.1	82.2	82.8	82.0	84.2	84.8	83.2	86.2	84.1	84.6	88.1	88.8	84.5	81.1	81.8	82.6	82.1
625350	85.6	89.6	93.6	96.0	92.5	87.2	86.6	86.6	87.8	87.3	86.5	86.5	88.9	87.2	89.9	88.6	86.4	86.3	91.2	87.5	86.3	86.2	87.4	86.5
625400	85.0	81.0	81.8	85.7	89.7	92.2	92.5	92.5	92.6	92.6	92.6	92.6	92.7	92.7	92.7	92.7	92.7	92.8	92.8	92.8	92.8	92.8	92.9	92.9
625450	80.0	80.0	83.9	85.0	81.1	80.0	80.0	80.0	80.1	80.1	80.1	80.1	80.2	80.2	80.2	80.2	80.2	80.3	80.3	80.3	80.3	80.3	80.4	80.4
625500	80.0	80.0	80.0	80.0	80.0	81.2	81.5	81.5	81.6	81.6	81.6	81.6	81.7	81.7	81.7	81.7	81.7	81.8	81.8	81.6	81.8	81.8	81.9	81.9
625550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0
625600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625850	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625900	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626000	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0
626100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Subgrade Elevations: Pre-Settlement (sheet 3 of 6)

EASTING (ft)	NORTHING (ft) 1355600	1355550	1355500	1355450	1355400	1355350	1355300	1355250	1355200	1355150	1355100	1355050	1355000	1354950	1354900	1354850	1354800	1354750	1354700	1354650	1354600	1354550	1354500	1354450
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	82.5	82.5	82.4	82.4	82.4	82.4	82.4	82.3	82.3	82.3	82.3	82.2	82.2	82.2	82.2	82.2	82.1	82.1	82.1	82.1	82.1	82.0	82.0	82.0
623900	81.0	81.0	80.9	80.9	80.9	80.9	80.9	80.8	80.8	80.8	80.8	80.7	80.7	80.7	80.7	80.7	80.6	80.6	80.6	80.6	80.6	80.5	80.5	80.5
623950	93.5	93.5	93.4	93.4	93.4	93.4	93.4	93.3	93.3	93.3	93.3	93.2	93.2	93.2	93.2	93.2	93.1	93.1	93.1	93.1	93.1	93.0	93.0	93.0
624000	85.4	88.1	86.5	87.8	89.4	85.5	85.5	90.8	87.5	88.4	86.9	85.7	85.7	88.3	86.6	85.8	85.8	89.4	86.4	85.9	85.9	87.2	86.3	86.0
624050	83.0	84.6	85.2	85.4	86.5	84.3	85.5	88.5	82.3	81.5	82.4	82.0	82.6	84.4	85.0	83.3	86.3	85.2	84.3	85.5	80.9	82.2	81.2	82.2
624100	84.7	85.3	86.0	86.7	87.3	87.9	88.6	89.3	83.2	82.5	83.1	83.6	84.5	85.1	85.8	86.4	87.1	87.8	86.3	83.6	82.3	82.9	82.9	84.2
624150	85.4	86.1	86.7	87.4	88.1	88.7	89.4	87.5	82.6	83.2	83.9	84.5	85.2	85.9	86.5	87.2	87.8	88.5	86.9	84.8	83.0	83.7	84.3	85.0
624200	86.2	86.8	87.5	88.2	88.8	89.5	86.6	86.4	83.3	84.0	84.6	85.3	86.0	86.6	87.3	87.9	88.6	89.3	89.9	87.7	83.8	84.4	85.1	85.7
624250	66.9	87.6	88.2	68.9	89.6	90.2	90.9	90.4	84.1	84.7	85.4	86.1	86.7	87.4	88.0	88.7	89.4	90.0	87.3	84.6	84.5	85.2	85.8	86.5
624300	87.7	88.3	89.0	89.7	90.3	91.0	91.6	85.8	84.8	85.5	86.1	86.8	87.5	88.1	86.8	89.4	90.1	90.8	91.4	85.7	85.3	85.9	86.6	87.2
624350	88.4	69.1	89.8	90.4	91.1	91.7	92.4	89.3	85.6	86.2	86.9	87.8	88.2	88.9	89.5	90.2	90.9	91.5	91.3	88.8	88.0	86.7	87.3	88.0
624400	89.2	89.8	90.5	91.2	91.8	92.5	93.1	93.8	86.3	87.0	87.6	88.3	**89.0**	89.6	90.3	90.9	91.6	90.9	88.3	66.1	86.8	87.4	88.1	88.7
624450	89.9	90.6	91.3	91.9	92.6	93.2	93.9	89.2	87.1	87.7	88.4	89.1	89.7	90.4	91.0	91.7	92.4	93.0	93.7	67.7	87.5	88.2	88.8	89.5
624500	90.7	91.3	92.0	92.7	93.3	94.0	94.6	93.2	90.1	88.5	89.1	89.8	90.5	91.1	91.8	92.4	93.1	93.8	92.3	89.6	88.3	88.9	89.8	90.2
624550	91.4	92.1	92.8	93.4	94.1	94.7	95.4	93.0	88.6	89.2	89.9	90.6	91.2	91.9	92.5	93.2	93.9	94.5	93.5	88.4	89.0	89.7	90.3	91.0
624600	92.2	92.8	93.5	94.2	94.8	95.5	96.1	92.5	89.3	90.0	90.6	91.3	92.0	92.6	93.3	93.9	94.6	95.3	95.9	93.6	91.0	90.4	91.1	91.6
624650	92.9	93.6	94.3	94.9	95.6	96.2	96.9	96.5	90.1	90.7	91.4	92.1	92.7	93.4	94.0	94.7	95.4	96.0	93.3	90.6	90.5	91.2	91.8	92.5
624700	93.0	94.3	95.0	95.7	96.3	97.0	97.7	91.8	90.8	91.5	92.2	92.8	93.5	94.1	94.8	95.5	96.1	96.8	93.1	90.8	91.3	91.9	92.6	93.3
624750	93.4	93.6	95.8	95.3	96.2	97.7	98.4	95.8	93.4	92.2	92.9	93.6	94.2	94.9	95.5	96.2	96.9	97.5	97.3	94.6	92.0	92.7	93.3	94.0
624800	91.4	92.2	94.2	93.4	94.5	96.3	98.6	99.8	94.2	93.0	93.7	94.3	95.0	95.6	96.3	97.0	97.6	97.0	94.2	92.1	92.8	93.4	94.1	94.8
624850	90.7	91.3	92.0	92.6	93.3	94.0	96.4	97.0	96.0	94.4	94.4	95.1	95.7	96.4	97.0	97.7	98.4	99.0	99.7	92.9	93.5	94.2	94.8	95.5
624900	89.9	90.6	91.2	91.9	92.6	93.2	93.9	94.5	95.2	95.9	95.1	95.8	97.9	97.5	97.8	98.5	99.3	99.8	98.3	95.6	94.3	94.9	95.6	96.3
624950	89.2	89.8	90.5	91.1	91.8	92.5	93.1	93.8	94.5	95.1	95.8	96.5	97.1	97.8	98.0	98.8	99.8	100.0	98.6	94.0	95.0	95.7	96.3	97.0
625000	88.4	89.1	89.7	90.4	91.1	91.7	92.4	93.1	93.7	94.4	95.0	95.7	96.4	97.0	97.7	98.4	98.2	95.0	97.9	94.2	95.8	96.0	97.1	97.8
625050	87.7	88.3	89.0	89.7	90.3	91.0	91.6	92.3	93.0	93.6	94.3	95.0	95.6	96.3	94.9	95.1	96.5	92.1	93.1	94.2	95.6	96.2	97.9	98.0
625100	86.9	87.6	88.2	88.9	89.6	90.2	90.9	91.6	92.2	92.9	93.5	94.2	94.7	93.7	94.8	90.3	91.6	92.3	93.3	94.3	95.2	96.5	97.8	98.4
625150	86.2	66.8	87.5	88.2	88.8	89.5	90.1	90.8	91.5	92.1	92.8	93.5	92.0	89.7	91.3	90.4	91.4	92.4	93.4	94.4	95.4	96.4	97.4	98.7
625200	85.4	86.1	86.7	87.4	88.1	88.7	89.4	90.1	90.7	91.4	92.0	92.7	92.0	88.6	89.6	90.6	91.6	92.6	93.6	94.6	95.5	96.5	97.5	98.5
625250	84.7	85.3	86.0	86.7	87.3	88.0	88.6	89.3	89.7	90.0	86.6	89.5	88.6	88.8	89.6	90.7	91.7	92.7	93.7	94.7	95.7	96.7	97.7	98.7
625300	83.6	84.6	85.2	85.7	86.6	87.2	87.5	68.6	84.4	89.1	86.2	86.9	87.9	88.9	89.9	90.9	91.9	92.9	93.9	94.8	95.8	96.8	97.8	97.6
625350	85.0	80.8	81.2	83.2	85.4	84.3	84.2	86.9	84.4	86.2	86.1	87.1	66.1	89.1	90.0	91.0	92.0	93.0	94.0	95.0	96.0	95.6	98.0	95.2
625400	93.9	96.0	87.7	80.7	82.9	85.2	82.3	83.3	84.3	85.2	86.2	87.2	86.2	89.2	90.2	91.2	92.2	93.2	94.2	95.1	95.6	92.3	94.6	94.4
625450	81.8	86.9	94.7	87.6	81.1	81.3	82.4	63.4	84.4	85.4	86.4	87.4	88.4	89.4	90.3	91.3	92.3	93.3	92.9	91.8	94.7	92.2	93.1	94.1
625500	83.9	81.9	86.9	96.0	81.5	81.5	82.6	83.6	84.6	85.5	86.5	87.5	68.5	89.5	90.5	91.5	89.9	91.5	92.1	90.5	91.4	92.4	93.4	94.4
625550	80.0	83.8	80.9	92.0	89.3	81.1	82.7	83.7	84.7	85.7	86.7	87.7	88.7	89.6	89.0	90.9	89.0	88.8	89.9	90.7	91.7	92.7	93.6	94.6
625600	80.0	80.0	84.5	86.2	96.0	83.9	82.7	83.6	84.8	85.8	86.8	87.8	87.7	89.6	86.1	87.1	88.0	89.0	90.0	90.9	91.9	92.9	93.9	94.8
625650	80.0	80.0	83.3	80.4	91.5	89.9	81.3	84.0	85.0	86.0	87.0	88.0	84.4	85.6	86.3	87.3	88.3	89.2	90.2	91.2	92.2	93.1	94.1	95.1
625700	60.0	80.0	60.0	85.0	85.7	96.0	82.9	84.2	85.1	84.8	83.5	84.8	84.6	85.6	86.6	87.5	88.5	89.5	90.5	91.4	92.4	93.4	94.3	95.3
625750	80.0	80.0	80.0	82.8	60.0	91.0	91.9	83.8	83.4	82.5	82.9	83.9	84.9	85.8	86.8	87.8	88.8	89.7	90.7	91.7	92.6	93.6	94.6	95.5
625800	80.0	80.0	80.0	80.0	85.0	85.2	96.0	84.0	81.0	82.2	83.2	84.1	85.1	86.1	87.0	88.0	89.0	90.0	90.9	91.9	92.9	93.8	94.8	95.8
625850	80.0	80.0	80.0	80.0	82.3	80.0	90.5	91.3	80.6	82.4	83.4	84.4	85.3	86.3	87.3	88.3	89.2	90.2	91.2	92.1	93.1	94.1	95.1	95.9
625900	80.0	80.0	80.0	80.0	80.0	85.0	84.7	95.8	85.3	82.7	83.5	84.6	85.6	86.6	87.5	88.5	89.5	90.4	91.4	92.4	93.4	94.3	95.3	96.0
625950	80.0	80.0	80.0	80.0	80.0	81.8	80.0	90.0	92.4	80.7	83.5	84.9	85.8	86.8	87.8	88.7	89.7	90.7	91.6	92.6	93.6	94.2	95.5	96.0
626000	80.0	80.0	80.0	80.0	80.0	80.0	85.0	84.2	95.3	86.4	84.1	85.1	86.1	87.0	88.0	89.0	89.9	90.9	91.9	92.9	93.8	94.0	94.4	95.1
626050	80.0	80.0	80.0	80.0	80.0	80.0	81.3	80.1	89.5	93.5	80.4	83.7	86.3	87.3	88.2	89.2	90.2	91.2	90.8	91.3	92.2	92.8	93.5	94.1
626100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	83.7	94.8	85.6	83.0	86.5	87.5	88.5	89.5	89.0	90.5	91.5	90.6	91.4	92.1	92.9	93.1
626150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.8	80.8	89.0	93.3	83.8	86.8	87.7	87.4	89.2	88.7	89.0	89.6	90.0	90.7	91.5	92.2	92.2
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	83.2	94.3	89.5	84.9	88.0	85.6	87.0	87.7	87.8	88.6	89.3	90.0	90.8	91.5	91.2
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.3	81.5	88.5	93.9	80.4	85.0	84.9	85.7	86.4	87.1	87.9	88.6	89.4	90.1	90.5	90.3
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	82.7	93.8	86.9	81.9	84.2	85.0	85.7	86.5	87.2	88.0	88.7	89.4	89.8	89.3
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.2	88.0	94.6	80.0	82.7	84.3	85.1	85.8	86.5	87.3	88.0	88.8	88.6	88.3
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	82.2	93.3	87.6	81.2	83.2	84.4	85.1	85.9	86.6	87.4	87.9	87.8	87.4
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.8	87.5	95.3	80.5	82.5	83.7	84.5	85.2	85.9	86.7	86.9	86.7	86.4
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.6	81.7	92.8	89.2	82.3	83.0	83.8	84.5	85.3	86.0	86.0	85.7	85.4
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.5	87.0	96.0	81.2	82.4	83.1	83.9	84.6	85.3	85.0	84.8	84.5
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.1	81.2	92.3	88.9	81.0	82.5	83.2	83.9	84.3	84.1	83.8	83.5
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.2	86.5	96.0	81.8	81.5	82.5	83.3	83.4	83.1	82.8	82.6
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.6	80.7	91.8	89.6	80.6	81.8	82.6	82.4	82.1	81.7	80.9
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.8	86.0	96.0	83.9	80.7	81.5	81.2	80.7	83.0	91.4
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.0	80.0	89.5	96.0	87.2	82.6	83.3	89.1	96.0	90.7
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	80.5	87.7	93.0	95.6	95.2	91.9	86.2	80.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.4	82.4	81.0	83.2	82.8	80.1	84.5	83.1
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.9	84.7	84.4	82.1	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Subgrade Elevations: Pre-Settlement (sheet 4 of 6)

EASTING (ft)	NORTHING (ft)																							
(ft)	1354400	1354350	1354300	1354250	1354200	1354150	1354100	1354050	1354000	1353950	1353900	1353850	1353800	1353750	1353700	1353650	1353600	1353550	1353500	1353450	1353400	1353350	1353300	1353250
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	82.0	81.9	81.9	81.9	81.9	81.9	81.8	81.8	81.8	81.8	81.8	81.7	81.7	81.7	81.7	81.6	81.6	81.6	81.6	81.6	81.5	81.5	81.5	81.5
623900	80.5	80.4	80.4	80.4	80.4	80.4	80.3	80.3	80.3	80.3	80.3	80.2	80.2	80.2	80.2	80.1	80.1	80.1	80.1	80.1	80.0	80.0	80.0	80.0
623950	93.0	92.9	92.9	92.9	92.9	92.9	92.8	92.8	92.8	92.8	92.8	92.7	92.7	92.7	92.7	92.6	92.6	92.6	92.6	92.6	92.5	92.5	92.5	92.5
624000	86.1	88.6	86.2	89.8	86.2	86.2	86.3	87.5	86.5	88.7	86.3	86.4	86.4	86.4	86.7	87.7	86.5	86.5	88.4	88.6	87.7	90.2	86.7	86.7
624050	84.1	84.8	83.8	85.8	81.1	81.3	82.0	82.7	82.2	84.0	81.7	82.5	86.0	83.4	81.2	82.3	81.4	82.1	84.3	84.9	83.6	86.2	80.7	80.9
624100	84.9	85.6	86.2	85.1	83.0	82.1	82.8	83.5	84.1	84.8	84.2	85.8	84.2	82.7	82.4	83.0	83.3	84.4	85.0	85.7	86.3	87.0	83.6	82.1
624150	85.7	86.3	87.0	87.6	82.2	82.9	83.5	84.2	84.9	85.5	86.2	84.5	82.5	83.3	83.1	83.8	84.4	85.1	85.8	86.4	87.1	87.7	82.2	82.8
624200	86.4	87.1	87.7	86.0	84.1	83.6	84.3	85.0	85.6	86.3	86.9	87.6	87.4	85.9	83.9	84.5	85.2	85.9	86.5	87.2	87.8	86.5	83.6	83.6
624250	87.2	87.8	88.5	89.1	87.2	84.4	85.0	85.7	86.4	87.0	87.7	88.1	85.6	84.1	84.6	85.3	85.9	86.6	67.3	87.9	88.6	89.2	87.0	84.3
624300	87.9	88.6	69.2	89.9	84.5	85.1	85.8	86.5	87.1	87.8	88.4	89.1	85.2	88.0	85.9	86.0	86.7	87.4	88.0	88.7	89.3	90.0	84.4	85.1
624350	88.7	89.3	90.0	89.1	86.3	85.9	86.6	87.2	87.9	88.5	89.2	89.9	88.8	87.3	86.1	86.8	87.5	88.1	88.8	89.4	90.1	90.2	87.6	85.8
624400	89.4	90.1	90.7	91.4	88.1	86.6	87.3	88.0	88.6	89.3	89.9	88.6	87.0	86.2	86.9	87.5	88.2	88.9	89.5	90.2	90.8	91.5	87.9	86.6
624450	90.2	90.8	91.5	88.9	87.2	87.4	88.1	88.7	89.4	90.0	90.7	91.4	92.0	90.4	87.6	88.3	89.0	89.6	90.3	90.9	91.6	89.6	87.2	87.3
624500	90.9	91.6	92.2	92.0	90.3	88.1	88.8	89.5	90.1	90.8	91.4	91.9	90.2	88.7	88.4	89.0	89.7	90.4	91.0	91.7	92.3	93.0	90.6	88.1
624550	91.7	92.3	93.0	93.6	88.2	88.9	89.6	90.2	90.9	91.5	92.2	92.9	88.9	90.3	89.1	89.8	90.5	91.1	91.8	92.4	93.1	93.8	88.2	88.8
624600	92.4	93.1	93.7	92.4	89.8	69.6	90.3	91.0	91.6	92.3	92.9	93.6	93.4	91.6	89.9	90.5	91.2	91.9	92.5	93.2	93.8	93.7	90.2	89.6
624650	93.2	93.8	94.5	95.1	92.9	90.4	91.1	91.7	92.4	93.0	93.7	93.2	91.6	90.1	90.6	91.3	92.0	92.6	93.3	93.9	94.6	95.3	93.6	90.3
624700	93.9	94.6	95.2	95.9	90.5	91.1	91.8	92.5	93.1	93.8	94.4	95.1	95.4	92.4	91.4	92.0	92.7	93.4	94.0	94.7	95.3	95.9	90.4	91.1
624750	94.7	95.3	96.0	94.9	93.3	91.9	92.6	93.2	93.9	94.5	95.2	95.9	94.8	93.2	92.1	92.8	93.5	94.1	94.8	95.4	96.1	96.4	93.6	91.9
624800	95.4	96.1	96.7	97.4	93.3	92.7	93.3	94.0	94.6	95.3	96.0	96.6	93.0	92.2	92.9	93.6	94.2	94.9	95.5	96.2	96.9	97.5	93.7	92.6
624850	96.2	96.8	97.5	95.6	93.0	93.4	94.1	94.7	95.4	96.0	96.7	97.4	98.0	93.0	93.6	94.3	95.0	95.6	96.3	96.9	97.6	95.3	93.3	93.4
624900	96.9	97.6	98.2	96.7	96.2	94.2	94.8	95.5	96.1	96.8	97.5	97.7	96.2	94.6	94.4	95.1	95.7	96.4	97.0	97.7	98.4	98.7	96.6	94.2
624950	97.7	98.3	99.0	99.7	94.2	94.9	95.6	96.2	96.9	97.5	98.2	96.1	94.6	94.5	95.1	95.8	96.5	97.1	97.8	98.4	99.1	99.8	94.4	95.8
625000	98.4	99.1	99.7	100.4	97.4	95.7	96.3	97.0	97.6	98.3	99.0	99.6	99.4	95.8	95.9	96.6	97.2	97.9	98.5	99.2	99.9	97.5	95.3	97.2
625050	99.2	99.8	100.5	101.2	99.7	96.4	97.1	97.7	98.4	99.0	99.7	99.2	97.6	96.0	96.6	97.3	98.0	96.9	97.0	99.9	96.3	96.8	95.9	97.0
625100	99.8	100.5	101.2	101.9	96.5	97.2	97.8	98.5	99.1	99.8	100.5	101.1	97.7	100.3	100.8	98.3	100.9	98.9	94.2	96.0	94.9	95.3	95.7	96.1
625150	100.0	100.6	102.0	100.7	99.5	97.9	98.0	99.2	99.9	100.0	100.5	101.2	101.5	101.0	101.1	101.3	101.4	101.6	101.8	97.8	93.9	94.4	94.8	95.2
625200	99.5	100.3	100.9	100.3	98.0	98.0	98.0	99.2	99.2	99.1	99.3	99.5	99.7	99.9	100.1	100.3	100.5	100.7	100.9	93.8	93.0	93.4	93.9	94.3
625250	99.6	98.3	97.8	103.2	102.9	97.3	97.5	97.7	97.9	98.1	98.3	98.5	98.7	98.9	99.1	99.3	99.5	99.7	99.9	98.8	92.1	92.5	92.9	93.4
625300	99.8	97.9	97.3	102.7	100.3	96.4	96.6	96.7	96.9	97.1	97.3	97.5	97.7	97.9	98.1	98.3	98.5	98.7	98.9	97.9	92.5	91.6	92.0	92.4
625350	94.6	96.6	98.3	101.9	100.8	99.7	97.5	95.8	96.0	96.2	96.4	96.5	96.7	96.9	97.1	97.3	97.5	97.7	97.9	95.5	90.3	90.7	91.1	91.5
625400	94.8	95.8	98.6	101.0	101.2	101.4	95.0	94.8	95.0	95.2	95.4	95.6	95.8	96.0	96.2	96.3	96.5	96.7	96.9	97.1	96.9	92.1	90.2	90.6
625450	95.1	96.1	99.0	100.1	100.3	100.4	96.3	95.2	94.0	94.2	94.4	94.6	94.8	95.0	95.2	95.4	95.6	95.8	96.0	96.1	96.3	92.5	89.3	89.7
625500	95.3	96.5	98.8	99.1	99.3	99.5	99.7	96.5	93.0	93.2	93.4	93.6	93.8	94.0	94.2	94.4	94.6	94.8	95.0	95.2	90.2	88.1	88.4	88.8
625550	95.6	96.9	97.9	98.1	98.3	98.5	98.7	94.5	92.0	92.2	92.4	92.6	92.8	93.0	93.2	93.4	93.6	93.8	94.0	94.2	92.7	91.9	90.2	88.5
625600	95.8	96.7	96.9	97.1	97.3	97.5	97.7	97.9	97.5	91.3	91.4	91.6	91.8	92.0	92.2	92.4	92.6	92.8	93.0	93.2	93.4	91.2	86.6	87.0
625650	96.0	95.9	95.9	96.1	96.3	96.5	96.7	96.9	96.7	90.3	90.5	90.7	90.9	91.1	91.2	91.4	91.6	91.8	92.0	92.2	92.4	89.3	87.8	86.1
625700	95.8	94.8	95.0	95.2	95.3	95.5	95.7	95.9	95.6	94.2	92.2	89.7	89.9	90.1	90.3	90.5	90.7	90.9	91.0	91.2	91.4	91.6	87.7	85.2
625750	95.1	93.8	94.0	94.2	94.4	94.6	94.8	95.0	95.1	95.3	89.2	88.7	88.9	89.1	89.3	89.5	89.7	89.9	90.1	90.3	90.5	89.9	85.1	84.2
625800	93.5	92.8	93.0	93.2	93.4	93.6	93.8	94.0	94.2	94.3	90.8	89.7	87.9	88.1	88.3	88.5	88.7	88.9	89.1	89.3	89.5	89.7	89.9	84.7
625850	91.6	91.8	92.0	92.2	92.4	92.6	92.8	93.0	93.2	93.4	93.6	90.1	86.9	87.1	87.3	87.5	87.7	87.9	88.1	88.3	88.5	88.7	87.9	82.4
625900	90.6	90.8	91.0	91.2	91.4	91.6	91.8	92.0	92.2	92.4	92.6	88.2	86.3	86.1	86.3	86.5	86.7	86.9	87.1	87.3	87.5	87.7	87.9	87.2
625950	94.8	91.4	90.1	90.2	90.4	90.6	90.8	91.0	91.2	91.4	91.6	91.8	91.8	85.2	85.4	85.6	85.8	85.9	86.1	86.3	86.5	86.7	86.9	87.1
626000	94.8	92.2	89.1	69.3	89.5	89.7	89.9	90.0	90.2	90.4	90.6	90.8	88.9	84.2	84.4	84.6	84.8	85.0	85.2	85.4	85.5	85.1	85.0	86.1
626050	90.4	88.3	88.9	88.3	88.5	88.7	88.9	89.1	89.3	89.5	89.6	89.8	89.8	88.7	83.9	83.6	83.8	84.0	84.2	84.4	84.6	81.6	82.3	91.0
626100	91.1	90.7	90.6	88.3	87.5	87.7	87.9	88.1	88.3	88.5	88.7	88.9	89.1	89.3	82.4	82.6	82.8	83.0	82.8	81.6	82.4	90.3	96.0	91.2
626150	91.8	89.3	87.3	86.3	86.5	86.7	86.9	87.1	87.3	87.5	87.7	87.9	88.1	88.2	85.3	84.2	81.8	82.0	82.0	86.6	94.8	92.9	86.6	80.4
626200	90.9	89.6	88.7	88.9	85.5	85.7	85.9	86.1	86.3	86.5	86.7	86.9	87.1	87.3	85.9	84.9	80.5	83.7	92.5	94.7	88.4	82.1	83.6	83.6
626250	90.0	89.7	89.4	87.0	84.6	84.8	84.9	85.1	85.3	85.5	85.7	85.9	86.1	86.3	81.8	81.3	89.7	96.0	90.2	83.9	81.2	85.0	80.0	80.0
626300	89.0	88.8	88.5	86.6	86.8	83.8	84.0	84.2	84.4	84.6	84.7	84.9	83.4	82.8	90.6	95.7	91.9	85.6	80.0	85.0	80.8	80.0	80.0	80.0
626350	88.1	87.8	87.5	87.2	85.6	82.8	83.0	83.2	83.3	83.1	82.6	83.7	87.0	94.4	93.7	87.4	81.1	84.9	82.6	80.0	80.0	80.0	80.0	80.0
626400	87.1	86.8	86.6	86.3	84.4	85.5	82.0	82.2	82.0	81.0	82.7	91.4	95.4	89.2	82.9	82.5	84.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	86.1	85.9	85.6	85.3	85.1	84.8	83.3	80.7	81.4	89.6	96.0	90.9	84.6	80.2	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	85.2	84.9	84.6	84.4	84.1	83.0	80.9	86.3	94.9	92.7	86.4	80.1	85.0	81.6	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0
626550	84.2	83.9	83.2	82.1	81.0	84.0	92.4	94.4	88.2	81.9	83.9	83.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	83.2	82.8	81.0	81.7	90.0	96.0	89.9	83.6	81.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	82.3	82.0	88.2	96.0	91.7	85.4	80.0	85.0	80.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	85.3	94.0	93.4	87.2	80.9	85.0	82.3	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	95.2	88.9	82.6	82.9	84.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	84.4	60.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	85.0	81.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Subgrade Elevations: Pre-Settlement (sheet 5 of 6)

NORTHING (ft)

EASTING (ft)	1353200	1353150	1353100	1353050	1353000	1352950	1352900	1352850	1352800	1352750	1352700	1352650	1352600	1352550	1352500	1352450	1352400	1352350	1352300	1352250	1352200	1352150	1352100	1352050
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	81.5	81.4	81.4	81.4	81.4	81.3	81.3	81.3	81.3	81.3	81.2	81.2	81.2	81.2	81.2	81.1	81.1	81.1	81.1	81.1	81.0	81.0	81.0	81.0
623900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623950	92.5	92.4	92.4	92.4	92.4	92.3	92.3	92.3	92.3	92.3	92.2	92.2	92.2	92.2	92.2	92.1	92.1	92.1	92.1	92.1	92.0	92.0	92.0	92.0
624000	87.4	87.9	86.8	86.8	89.1	88.1	89.2	90.3	87.0	87.0	87.8	88.2	87.1	87.1	89.4	88.5	89.1	90.5	87.2	87.3	89.9	90.6	87.4	87.4
624050	82.0	82.3	82.0	82.6	84.6	83.8	85.6	86.6	83.4	83.2	81.4	82.3	81.7	82.3	84.3	84.9	84.0	86.3	83.5	85.7	87.2	88.2	82.2	81.9
624100	82.7	83.4	84.1	84.7	85.4	86.0	86.7	87.4	87.9	83.7	82.4	83.0	83.4	84.4	85.0	85.7	88.4	87.0	88.6	88.0	87.6	86.7	85.9	85.0
624150	83.5	84.2	84.8	85.5	86.1	86.8	87.5	88.1	83.2	82.5	83.1	83.8	84.5	85.1	85.8	86.4	87.1	87.8	88.4	89.0	88.2	87.3	88.4	85.6
624200	84.2	84.9	85.6	86.2	88.9	87.5	88.2	88.9	88.4	83.2	83.9	84.6	85.2	85.9	86.5	87.2	87.9	88.5	89.2	89.8	89.2	87.8	87.0	86.1
624250	85.0	85.7	86.3	87.0	87.6	88.3	89.0	89.6	88.3	84.1	84.6	85.3	86.0	86.6	87.3	87.9	88.6	89.3	89.9	90.0	89.3	88.3	87.5	86.6
624300	85.8	86.4	87.1	87.7	88.4	89.1	89.7	90.4	86.4	84.7	85.4	86.1	86.7	87.4	88.0	88.7	69.4	90.0	90.7	91.1	89.7	88.9	88.0	87.2
624350	86.5	87.2	87.8	88.5	89.1	89.8	90.5	91.1	91.8	85.5	86.1	86.8	87.5	88.1	88.8	89.4	90.1	90.8	91.4	92.1	90.7	89.4	88.5	87.7
624400	87.3	87.9	88.6	89.2	89.9	90.6	91.2	91.9	88.7	86.2	86.9	87.6	88.2	88.9	89.5	90.2	90.9	91.5	92.2	92.8	91.6	89.9	89.1	88.2
624450	88.0	88.7	89.3	90.0	90.6	91.3	92.0	92.6	90.2	87.0	87.6	88.3	89.0	89.6	90.3	90.9	91.6	92.3	92.9	93.6	91.9	90.4	89.6	88.7
624500	88.8	89.4	90.1	90.7	91.4	92.1	92.7	93.4	93.8	89.7	88.4	89.1	89.7	90.4	91.0	91.7	92.4	93.0	93.7	93.0	91.8	91.0	90.1	89.3
624550	89.5	90.2	90.8	91.5	92.1	92.8	93.5	94.1	89.1	88.5	89.1	89.8	90.5	91.1	91.8	92.5	93.1	93.8	94.4	94.6	93.0	91.5	90.6	89.8
624600	90.3	90.9	91.6	92.2	92.9	93.6	94.2	94.9	94.6	89.2	89.9	90.6	91.2	91.9	92.5	93.2	93.9	94.5	95.2	95.8	94.6	92.0	91.2	90.3
624650	91.0	91.7	92.3	93.0	93.6	94.3	95.0	95.6	94.2	90.1	90.7	91.3	92.0	92.6	93.3	94.0	94.6	95.3	95.9	94.7	93.4	92.5	91.7	90.8
624700	91.8	92.4	93.1	93.7	94.4	95.1	95.7	96.4	92.7	90.7	91.4	92.1	92.7	93.4	94.0	94.7	95.4	96.0	96.7	97.3	93.9	93.1	92.1	91.1
624750	92.5	93.2	93.8	94.5	95.2	95.8	96.5	97.1	97.8	92.4	92.2	92.8	93.5	94.1	94.8	95.5	96.1	96.8	97.4	97.8	95.5	93.3	92.4	91.4
624800	93.3	93.9	94.6	95.2	95.9	96.6	97.2	97.9	94.6	92.2	92.9	93.6	94.2	94.9	95.5	96.2	96.9	97.5	98.2	97.1	95.0	93.6	92.6	91.6
624850	94.0	94.7	95.3	96.0	96.7	97.3	98.0	98.6	95.8	93.0	93.7	94.3	95.0	95.6	96.3	97.0	97.6	98.3	98.9	99.6	97.2	93.9	92.9	91.9
624900	94.8	95.4	96.2	96.7	97.4	98.2	100.7	100.1	99.8	95.4	94.0	94.5	95.7	96.0	96.4	97.6	98.0	98.6	99.6	100.0	97.8	94.3	94.3	92.3
624950	95.5	96.2	98.2	98.7	98.6	100.6	101.7	101.6	101.0	97.6	94.9	94.5	95.1	95.8	96.4	97.1	97.8	98.4	99.1	99.8	98.2	96.0	95.0	93.3
625000	96.4	97.3	99.1	99.6	100.0	100.4	100.8	101.2	93.2	97.1	93.0	93.7	94.4	95.0	95.7	96.4	97.0	97.7	98.3	98.3	97.0	95.7	94.8	93.6
625050	97.4	97.8	98.2	98.6	99.1	99.5	99.9	100.3	97.0	93.9	92.3	93.0	93.6	94.3	94.9	95.6	96.3	96.9	97.6	97.8	97.0	95.5	94.5	93.5
625100	96.5	96.9	97.3	97.7	98.2	98.6	99.0	98.1	96.1	90.9	91.5	92.2	92.9	93.5	94.2	94.9	95.5	96.2	96.9	97.5	96.4	95.2	94.3	93.3
625150	95.6	96.0	96.4	96.8	97.2	97.7	98.1	95.4	93.2	90.1	90.8	91.5	92.1	92.8	93.5	94.1	94.8	95.4	96.1	96.0	95.8	95.0	94.0	93.0
625200	94.7	95.1	95.5	95.9	96.3	96.7	97.2	97.6	97.7	90.3	90.1	90.7	91.4	92.0	92.7	93.4	94.0	94.7	95.4	96.0	95.2	94.5	93.8	92.8
625250	93.8	94.2	94.6	95.0	95.4	95.8	96.2	96.4	89.3	88.6	89.3	90.0	90.6	91.3	92.0	92.6	93.3	93.9	94.0	94.0	93.7	93.5	93.2	92.5
625300	92.9	93.3	93.7	94.1	94.5	94.9	95.3	95.7	94.8	89.1	88.6	89.2	89.9	90.5	91.2	91.9	92.5	93.2	93.9	93.3	92.8	92.5	92.3	92.0
625350	91.9	92.4	92.8	93.2	93.6	94.0	94.4	94.8	91.6	87.1	87.8	88.5	89.1	69.8	90.5	91.1	91.8	92.4	93.1	93.8	92.9	91.5	91.3	91.1
625400	91.0	91.4	91.9	92.3	92.7	93.1	93.5	93.9	89.7	86.4	87.1	87.7	88.4	89.0	89.7	90.4	91.0	91.7	92.4	92.2	91.7	90.7	90.3	90.1
625450	90.1	90.5	90.9	91.4	91.8	92.2	92.6	93.0	91.8	85.6	86.3	87.0	87.6	88.3	89.0	89.6	90.3	90.9	91.6	90.9	90.5	89.9	89.4	89.1
625500	89.2	89.6	90.0	90.4	90.9	91.3	91.7	91.3	86.7	84.9	85.6	66.2	86.9	87.5	88.2	88.9	89.5	90.2	90.9	91.5	90.6	88.9	88.4	88.1
625550	88.3	88.7	89.1	89.5	90.0	90.4	90.8	91.2	91.8	84.1	84.8	85.5	86.1	86.8	87.5	88.1	88.8	89.4	90.1	88.8	87.9	87.7	87.4	87.2
625600	87.4	87.8	88.2	88.6	89.0	89.5	89.9	90.3	90.7	86.0	84.1	84.7	85.4	66.0	86.7	87.4	88.0	68.7	89.4	90.0	87.8	86.7	86.5	86.2
625650	86.5	86.9	87.3	87.7	88.1	88.5	89.0	86.9	82.9	86.1	83.3	84.0	84.6	85.3	86.0	86.6	87.3	87.9	88.6	88.1	86.0	85.7	85.5	85.2
625700	85.6	86.0	86.4	86.8	87.2	87.6	88.0	86.5	85.0	82.4	82.6	83.2	83.7	84.5	85.2	85.9	86.5	87.2	87.4	87.2	85.5	84.8	84.5	84.3
625750	84.7	85.1	85.5	85.9	86.3	86.7	85.4	84.3	87.6	84.6	81.5	82.5	81.8	83.1	84.5	85.1	84.8	86.5	84.3	87.0	84.8	83.2	82.7	82.1
625800	83.7	84.2	84.6	85.0	85.4	83.6	81.1	81.8	83.9	84.0	84.0	85.5	83.9	83.9	88.5	85.4	85.6	88.4	83.8	83.7	83.7	83.7	83.6	83.6
625850	82.8	83.2	83.2	84.1	84.5	84.8	91.6	96.0	94.6	94.5	94.5	94.5	94.6	94.6	94.6	94.6	94.6	94.7	94.7	94.7	94.7	94.8	94.8	94.8
625900	81.9	82.0	80.9	81.0	89.4	96.0	90.4	84.6	82.1	82.0	82.0	82.0	82.1	82.1	82.1	82.1	82.1	82.2	82.2	82.2	82.2	82.3	82.3	82.3
625950	82.2	81.1	88.1	95.4	92.2	85.9	80.0	85.0	83.6	83.5	83.5	83.5	83.8	83.6	83.6	83.6	83.6	83.7	83.7	83.7	83.7	83.8	85.0	83.8
626000	87.2	93.4	93.9	87.7	81.4	84.6	82.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	81.3	83.0	84.7	83.3
626050	95.7	89.4	83.1	82.2	84.6	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.2	82.9	84.6	83.3
626100	84.9	80.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	81.1	82.8	84.4	83.3
626150	85.0	81.8	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	60.0	80.0	81.0	82.7	84.2	83.2
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.9	82.6	83.9	83.2
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.8	82.5	83.7	83.1
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.7	82.4	83.4	83.1
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.7	82.4	83.2	83.0
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.6	82.3	62.9	82.9
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.5	82.2	82.7	82.7
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.4	82.1	82.5	82.5
626550	60.0	80.0	60.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.3	82.0	82.2	82.2
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.2	81.9	82.0	82.0
626650	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.1	81.7	81.7	81.7
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.5	81.5	81.5
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	81.2	81.2	81.2
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.0	81.0	81.0
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.7	80.7	80.7
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.5	80.5	80.5
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.2	80.2	80.2
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0
627100	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Subgrade Elevations: Pre-Settlement (sheet 6 of 6)

EASTING (ft) \ NORTHING (ft)	1352000	1351950	1351900	1351850	1351800	1351750	1351700	1351650	1351600	1351550	1351500	1351450	1351400	1351350	1351300	1351250	1351200	1351150	1351100
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	80.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623900	80.0	83.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623950	91.1	87.7	81.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624000	88.9	94.7	92.1	83.8	84.7	80.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624050	81.2	80.5	91.6	92.8	84.0	84.2	80.7	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624100	84.0	82.2	80.1	91.1	93.0	84.4	83.8	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624150	84.7	83.7	81.8	81.2	91.2	93.5	84.8	83.1	81.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624200	85.3	84.4	83.8	82.7	80.7	90.0	93.9	85.2	82.6	82.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624250	85.8	84.9	84.1	83.2	82.4	80.5	89.5	94.3	85.6	82.0	82.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624300	86.3	85.5	84.6	83.8	82.9	82.1	80.3	88.9	94.7	88.0	81.5	82.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624350	86.8	86.0	85.1	84.3	83.4	82.6	81.6	80.3	88.4	95.1	88.0	83.6	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624400	87.4	88.5	85.7	84.8	84.0	83.1	82.3	81.3	80.3	88.7	92.9	81.6	84.1	80.0	80.0	80.0	80.0	80.0	80.0
624450	87.9	87.0	86.2	85.3	84.5	83.6	82.8	81.9	81.0	80.7	96.0	85.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624500	88.4	87.8	86.7	85.9	85.0	84.2	83.3	82.4	81.3	80.2	94.1	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624550	88.9	88.1	87.2	88.4	85.5	84.8	83.8	82.8	81.6	80.2	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624600	89.5	88.6	87.7	86.8	85.8	84.8	83.9	82.9	81.9	80.3	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624650	89.9	89.0	88.0	87.0	86.0	85.1	84.1	83.1	82.2	80.4	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624700	90.2	89.2	88.2	87.3	86.3	85.3	84.4	83.4	82.4	80.5	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624750	90.4	89.5	88.5	87.5	86.5	85.8	84.6	83.6	82.7	80.8	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624800	90.7	89.7	88.7	87.8	68.8	85.8	84.9	83.9	82.9	81.6	94.3	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624850	91.2	90.4	89.7	88.0	87.7	86.2	85.8	84.3	83.7	82.2	94.3	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624900	92.4	90.4	90.6	88.6	88.7	86.7	86.8	84.8	84.3	80.6	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624950	93.1	91.3	91.1	89.4	89.2	87.5	87.3	85.4	83.9	80.6	94.1	87.0	85.0	80.0	80.0	80.0	60.0	80.0	80.0
625000	92.8	91.9	90.9	89.9	88.9	88.0	87.0	88.0	85.1	84.1	94.8	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625050	92.6	91.8	90.6	89.7	88.7	87.7	86.8	85.8	84.8	82.6	94.6	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625100	92.3	91.4	90.4	89.4	88.4	87.5	86.5	85.5	84.6	81.3	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625150	92.1	91.1	90.1	89.2	88.2	87.2	86.3	85.3	84.3	81.1	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625200	91.8	90.9	89.9	88.9	87.9	87.0	88.0	85.0	84.1	80.8	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625250	91.6	90.6	89.6	88.7	87.7	86.7	85.8	84.8	83.5	80.6	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625300	91.3	90.4	89.4	88.4	87.4	86.5	85.5	84.5	83.1	80.4	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625350	90.8	90.1	89.1	88.2	87.2	86.2	85.3	84.3	82.5	80.4	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625400	89.8	89.8	88.9	87.9	86.9	86.0	85.0	84.0	83.1	82.1	94.3	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625450	88.9	88.8	88.4	87.7	88.7	85.7	84.8	83.8	82.8	81.1	94.2	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625500	87.9	87.8	87.4	87.2	88.4	85.5	84.5	83.5	82.8	80.7	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625550	86.9	86.7	88.4	88.2	85.9	85.2	84.3	83.3	82.3	80.4	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625600	88.0	85.7	85.5	85.2	85.0	84.7	84.0	83.0	82.1	80.3	94.1	87.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625650	85.0	84.7	84.5	84.2	84.0	83.7	83.5	82.8	81.7	80.2	94.2	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625700	84.0	83.8	83.5	83.3	83.0	82.8	82.5	82.3	81.4	81.0	96.0	85.4	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625750	82.0	82.8	82.6	82.3	82.1	81.5	81.3	81.0	80.3	89.3	92.6	81.4	83.8	80.0	80.0	80.0	80.0	80.0	80.0
625800	83.8	84.8	84.4	83.5	83.5	83.5	83.4	84.9	91.0	94.8	85.5	84.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625850	94.8	94.8	94.9	94.9	94.9	94.9	94.9	94.1	90.5	84.6	82.2	81.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625900	62.3	82.3	82.4	82.4	82.4	82.4	82.4	81.7	80.0	85.0	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625950	83.8	83.8	83.9	83.9	83.9	83.9	83.9	83.3	80.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626000	81.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626050	81.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626100	81.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	60.0
626150	81.3	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626200	81.2	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626250	81.2	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626300	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626350	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626400	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	81.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	81.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626550	80.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	80.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	80.7	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	80.7	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626900	80.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.2	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

ATTACHMENT 3

Vertical Load from Subgrade Fill

Vertical Load from Subgrade Fill (sheet 1 of 6)

EASTING (ft) \ NORTHING (ft) (psf)	1358000	1357950	1357900	1357850	1357800	1357750	1357700	1357650	1357600	1357550	1357500	1357450	1357400	1357350	1357300	1357250	1357200	1357150	1357100	1357050	1357000	1356950	1356900	1356850
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	0	0	0	0	0	0	0	0	0	0	239	388	389	386	384	382	379	377	373	371	368	366	364	361
623900	0	0	0	0	0	0	0	0	600	300	37	205	209	206	204	202	199	197	193	191	188	186	184	181
623950	0	0	0	0	0	0	0	600	162	962	1493	1709	1709	1706	1704	1702	1699	1697	1693	1691	1688	1686	1684	1661
624000	0	0	0	0	0	0	600	180	1307	1788	898	524	521	524	528	532	708	539	541	545	548	552	556	599
624050	0	0	0	0	0	0	248	996	1760	226	91	132	170	214	259	289	319	190	235	262	350	421	498	528
624100	0	0	0	0	0	301	94	1556	827	97	257	287	316	346	376	406	436	446	494	524	554	584	614	644
624150	0	0	0	0	0	461	280	1778	431	144	290	402	432	462	492	522	552	581	611	641	671	701	731	760
624200	0	0	0	0	0	472	292	1792	410	155	320	437	546	578	608	638	667	697	727	757	787	817	846	876
624250	0	0	0	0	0	472	292	1792	410	227	350	467	583	695	725	754	784	814	844	874	904	932	962	992
624300	0	0	0	0	0	472	292	1792	410	265	380	497	613	730	840	670	900	930	960	990	1020	1049	1079	1109
624350	0	0	0	0	0	472	292	1792	451	295	410	527	643	760	876	986	1018	1046	1078	1106	1135	1185	1195	1225
624400	0	0	0	0	0	472	292	1792	599	325	440	557	673	790	906	1022	1133	1163	1193	1222	1252	1282	1312	1342
624450	0	0	0	0	0	472	292	1792	410	206	470	587	703	820	936	1052	1168	1279	1308	1338	1388	1398	1428	1458
624500	0	0	0	0	0	472	292	1792	410	222	500	617	733	850	966	1082	1198	1314	1424	1454	1484	1514	1544	1573
624550	0	0	0	0	0	419	216	1711	564	265	530	647	763	880	996	1112	1228	1344	1460	1571	1601	1631	1661	1690
624600	0	0	0	0	0	127	0	1294	1290	320	560	677	793	910	972	1087	1195	1312	1490	1607	1588	1747	1776	1806
624650	0	0	0	0	0	0	600	670	1920	686	590	707	684	940	808	1050	1102	1066	1520	1637	1370	1788	1692	1896
624700	0	0	0	0	0	0	347	17	1368	1268	338	580	458	715	642	812	851	917	1189	1444	1182	1470	1430	1378
624750	0	0	0	0	0	0	0	800	718	1920	269	338	382	473	564	656	748	839	931	1015	1081	1146	1212	1278
624800	0	0	0	0	0	0	0	394	64	1415	1112	164	304	395	487	578	670	762	850	916	980	1046	1111	1177
624850	0	0	0	0	0	0	0	0	544	763	1920	181	209	318	409	500	593	884	749	815	880	946	1010	1076
624900	0	0	0	0	0	0	0	0	440	110	1462	1050	90	240	332	424	515	583	648	714	779	845	910	976
624950	0	0	0	0	0	0	0	0	0	481	810	1920	119	144	254	346	418	482	548	613	679	744	810	675
625000	0	0	0	0	0	0	0	0	0	466	157	1508	988	58	168	251	317	382	448	512	578	643	709	774
625050	0	0	0	0	0	0	0	0	0	0	420	857	1916	302	66	134	200	281	347	412	478	542	608	673
625100	0	0	0	0	0	0	0	0	0	0	499	86	1247	1798	811	143	37	126	246	312	377	443	508	574
625150	0	0	0	0	0	0	0	0	0	0	0	600	150	988	1594	1920	1403	767	131	164	276	342	320	463
625200	0	0	0	0	0	0	0	0	0	0	0	0	600	232	172	648	1126	1603	1920	1390	856	264	88	194
625250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	430	600	155	181	658	1135	1613	1920	1378	740
625300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	439	600	143	191	667	1145	1622
625350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	449	600	130	200
625400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	458
625450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vertical Load from Subgrade Fill (sheet 2 of 6)

NORTHING (ft)

(psf) EASTING (ft)	1356800	1356750	1356700	1356650	1356600	1356550	1356500	1356450	1356400	1356350	1356300	1356250	1356200	1356150	1356100	1356050	1356000	1355950	1355900	1355850	1355800	1355750	1355700	1355650
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	359	355	353	350	348	346	343	341	338	335	332	330	328	325	323	320	318	314	312	310	307	305	302	300
623900	179	175	173	170	168	166	163	161	158	155	152	150	148	145	143	140	138	134	132	130	127	125	122	120
623950	1679	1675	1673	1670	1668	1666	1663	1661	1658	1655	1652	1650	1648	1645	1643	1640	1638	1634	1632	1630	1627	1625	1622	1620
624000	901	565	569	572	576	580	583	620	756	593	596	785	874	739	1102	613	617	1034	1150	628	630	719	798	641
624050	558	445	304	394	426	624	470	146	178	186	290	504	583	439	742	383	511	979	1058	266	102	223	312	257
624100	673	703	733	763	630	503	354	277	356	384	515	594	673	752	832	757	990	1069	1148	941	244	323	402	481
624150	790	820	850	880	791	413	710	367	446	526	605	684	763	842	922	1001	1080	1159	839	254	334	413	492	571
624200	906	936	966	996	1025	1055	811	457	536	616	695	774	853	932	1012	1092	1171	1250	1330	901	424	503	582	661
624250	1022	1052	1082	1111	1141	1171	667	547	628	707	786	865	944	1024	1103	1182	1261	1340	1420	899	514	593	672	751
624300	1139	1169	1199	1228	1258	904	559	638	718	797	876	955	1034	1114	1193	1272	1351	1430	1242	610	604	683	763	842
624350	1255	1285	1314	1344	1374	1404	1060	728	808	887	966	1045	1124	1204	1283	1362	1441	1520	1600	1400	695	774	853	932
624400	1372	1400	1430	1460	1352	985	739	818	698	977	1056	1135	1214	1294	1373	1452	1531	1610	1591	857	785	864	943	1022
624450	1487	1517	1547	1577	1460	1310	936	908	988	1067	1146	1225	1304	1384	1463	1542	1621	1700	1721	1108	875	954	1033	1112
624500	1603	1633	1663	1693	1562	1414	1153	998	1078	1157	1236	1315	1394	1474	1553	1632	1711	1790	1870	1650	965	1044	1123	1202
624550	1720	1750	1780	1810	1710	1188	1009	1088	1168	1247	1326	1405	1484	1564	1643	1722	1801	1880	1549	976	1055	1134	1213	1292
624600	1836	1866	1896	1912	1840	1734	1550	1178	1258	1337	1416	1495	1574	1654	1733	1812	1891	1970	2050	1685	1214	1224	1303	1382
624650	1711	1806	1787	1744	1783	1439	1236	1205	1346	1427	1451	1585	1664	1702	1824	1903	1962	2062	2141	1609	1230	1314	1393	1457
624700	1448	1542	1574	1639	1705	1448	1255	1207	1339	1418	1453	1578	1657	1705	1817	1896	1968	2054	2135	1660	1256	1403	1440	1440
624750	1343	1409	1474	1540	1604	1670	1458	1170	1249	1328	1409	1488	1567	1646	1727	1806	1885	1966	2015	1645	1249	1236	1342	1379
624800	1242	1308	1373	1439	1504	1247	1001	1080	1159	1238	1319	1398	1477	1558	1637	1716	1795	1876	1598	971	1050	1129	1210	1289
624850	1141	1207	1272	1338	1403	1356	1123	990	1069	1150	1229	1308	1387	1468	1547	1626	1705	1786	1865	1694	960	1040	1120	1199
624900	1040	1106	1172	1237	1303	1349	821	900	979	1060	1139	1218	1298	1378	1457	1536	1616	1696	1775	1086	870	950	1030	1109
624950	941	1006	1072	1136	1193	960	731	810	890	970	1049	1128	1208	1288	1367	1446	1526	1606	1632	895	780	860	940	1019
625000	840	905	971	1036	1102	1166	917	720	800	880	959	1038	1118	1198	1277	1357	1436	1516	1595	1396	836	770	850	929
625050	739	804	870	935	1001	772	551	631	710	790	869	949	1028	1108	1167	1267	1346	1426	1471	602	601	680	760	840
625100	638	704	769	835	900	935	575	541	620	700	779	859	938	1018	1098	1177	1256	1336	1416	930	511	590	670	750
625150	538	604	668	734	799	761	456	451	530	610	690	769	848	928	1008	1087	1166	1246	1326	844	421	500	580	660
625200	355	503	568	634	698	445	282	361	440	520	600	679	758	838	918	997	1076	1157	869	252	331	410	491	570
625250	104	134	425	533	599	664	422	271	350	430	510	589	668	749	828	839	966	1067	1146	964	241	320	401	480
625300	1920	1364	728	179	498	211	102	137	260	341	235	499	578	382	738	486	556	977	1056	539	134	220	311	250
625350	677	1154	1632	1920	1494	662	797	794	931	880	784	780	1062	858	1193	1036	763	760	1338	905	750	746	890	781
625400	600	116	210	686	1163	1459	1502	1505	1507	1510	1512	1514	1518	1520	1523	1525	1528	1530	1532	1535	1538	1541	1543	1546
625450	0	0	468	600	131	0	2	5	7	10	12	14	18	20	23	25	28	30	32	35	38	41	43	46
625500	0	0	0	0	0	146	182	185	187	190	192	194	198	200	203	205	208	210	212	215	218	221	223	226
625550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vertical Load from Subgrade Fill (sheet 5 of 6)

(psf)		NORTHING (ft)																							
		1353200	1353150	1353100	1353050	1353000	1352950	1352900	1352850	1352800	1352750	1352700	1352650	1352600	1352550	1352500	1352450	1352400	1352350	1352300	1352250	1352200	1352150	1352100	1352050
EASTING (ft)	623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	623850	174	172	169	167	164	161	158	156	154	151	149	146	144	140	138	136	133	131	128	126	124	120	118	115
	623900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	623950	1494	1492	1489	1487	1484	1481	1478	1476	1474	1471	1469	1466	1464	1460	1458	1456	1453	1451	1448	1446	1444	1440	1438	1435
	624000	887	949	815	818	1096	970	1098	1240	835	839	913	979	848	852	1122	1021	1097	1261	869	872	1184	1270	883	886
	624050	236	275	241	310	556	460	674	793	403	378	163	275	208	276	512	592	484	750	421	685	863	745	262	232
	624100	329	408	487	566	646	725	804	883	943	448	286	365	403	523	604	683	762	841	794	965	911	809	707	594
	624150	419	498	577	656	736	815	694	973	379	298	377	456	535	614	694	773	852	931	1010	1079	985	872	770	668
	624200	509	588	667	748	826	905	984	1063	1003	388	467	546	625	704	784	863	942	1021	1100	1180	1099	936	834	732
	624250	599	678	757	836	917	996	1075	1154	992	497	557	636	715	794	874	953	1032	1111	1190	1200	1118	998	896	794
	624300	690	769	848	928	1007	1086	1165	1244	769	568	647	726	805	884	964	1043	1122	1201	1280	1337	1164	1062	960	858
	624350	780	659	938	1018	1097	1176	1255	1334	1414	658	737	816	895	974	1054	1133	1212	1291	1370	1450	1285	1126	1024	922
	624400	870	949	1028	1108	1187	1266	1345	1424	1043	748	827	906	985	1064	1144	1223	1302	1381	1460	1540	1387	1188	1087	985
	624450	960	1039	1118	1198	1277	1356	1435	1514	1223	838	917	996	1075	1154	1234	1313	1392	1471	1550	1630	1430	1252	1150	1048
	624500	1050	1129	1208	1288	1367	1446	1525	1604	1656	1160	1007	1086	1185	1244	1324	1403	1482	1561	1640	1554	1417	1315	1213	1111
	624550	1140	1219	1298	1378	1457	1536	1615	1694	1092	1018	1097	1176	1255	1334	1415	1494	1573	1652	1732	1751	1554	1379	1277	1175
	624600	1230	1309	1388	1468	1547	1626	1705	1784	1756	1109	1188	1267	1346	1426	1505	1584	1663	1742	1822	1901	1746	1445	1340	1238
	624650	1320	1399	1478	1558	1637	1716	1795	1874	1706	1210	1278	1357	1436	1516	1595	1674	1753	1832	1912	1769	1607	1505	1403	1301
	624700	1410	1489	1568	1649	1728	1807	1886	1966	1526	1289	1368	1447	1526	1606	1685	1764	1843	1922	2002	2072	1670	1568	1452	1336
	624750	1501	1580	1660	1739	1818	1897	1976	2056	2135	1489	1458	1537	1616	1696	1775	1854	1933	2012	2092	2138	1854	1598	1482	1366
	624800	1591	1670	1750	1829	1906	1987	2066	2146	1756	1469	1548	1627	1706	1786	1865	1944	2023	2102	2182	2053	1795	1628	1512	1396
	624850	1681	1760	1840	1919	1998	2077	2156	2231	1896	1559	1638	1717	1796	1876	1955	2034	2113	2192	2272	2351	2068	1670	1542	1426
	624900	1771	1850	1945	2009	2088	2186	2479	2417	2370	1852	1680	1745	1878	1920	1964	2111	2160	2232	2356	2400	2135	1715	1717	1474
	624950	1861	1949	2186	2245	2227	2468	2604	2616	2519	2117	1786	1734	1814	1894	1963	2052	2132	2212	2291	2370	2185	1916	1800	1594
	625000	1963	2078	2297	2347	2396	2446	2495	2544	1584	2052	1565	1644	1724	1804	1883	1962	2042	2122	2201	2194	2041	1886	1770	1654
	625050	2089	2138	2188	2237	2287	2336	2388	2435	2044	1668	1475	1554	1634	1714	1793	1873	1952	2032	2111	2130	2036	1856	1740	1624
	625100	1980	2029	2076	2128	2178	2227	2276	2171	1934	1306	1385	1465	1544	1624	1703	1783	1862	1942	2022	2101	1970	1826	1710	1594
	625150	1871	1920	1969	2018	2088	2118	2167	1853	1583	1216	1295	1375	1454	1534	1614	1693	1772	1852	1932	1920	1898	1796	1680	1584
	625200	1760	1811	1860	1909	1958	2009	2058	2107	2125	1234	1206	1285	1364	1444	1524	1603	1682	1762	1842	1920	1822	1734	1650	1534
	625250	1651	1702	1751	1800	1849	1898	1949	1967	1110	1036	1116	1195	1274	1354	1434	1513	1592	1673	1680	1680	1648	1618	1588	1504
	625300	1542	1591	1642	1691	1740	1789	1840	1889	1781	1090	1026	1105	1184	1265	1344	1423	1502	1583	1662	1592	1531	1501	1471	1442
	625350	1433	1482	1532	1582	1631	1680	1729	1780	1394	857	936	1015	1094	1175	1254	1333	1414	1493	1572	1651	1547	1385	1356	1326
	625400	1324	1373	1422	1472	1522	1571	1620	1670	1162	767	846	925	1006	1085	1164	1243	1324	1403	1482	1463	1400	1279	1240	1210
	625450	1214	1264	1313	1363	1412	1462	1511	1560	1410	677	756	835	916	995	1074	1153	1234	1313	1392	1306	1256	1187	1123	1093
	625500	1105	1154	1204	1253	1303	1352	1402	1352	809	587	666	746	826	905	984	1064	1144	1223	1302	1382	1266	1066	1007	977
	625550	996	1045	1094	1144	1194	1243	1292	1342	1391	497	576	656	736	815	894	974	1054	1133	1213	1054	950	920	890	860
	625600	887	936	985	1034	1084	1134	1183	1232	1282	725	486	566	846	725	805	884	964	1043	1123	1195	931	804	774	744
	625650	776	827	876	925	974	1025	1074	833	346	730	397	476	556	635	715	794	874	953	1033	976	718	688	658	628
	625700	667	718	767	816	865	914	965	775	605	293	307	386	444	545	625	704	784	864	888	869	659	571	541	512
	625750	558	607	658	707	756	805	650	510	911	554	181	296	214	376	535	614	581	774	510	845	572	378	328	256
	625800	449	498	548	598	647	431	133	220	469	481	484	655	472	468	780	644	667	1004	451	448	444	440	437	434
	625850	340	389	378	488	538	581	1396	1920	1750	1739	1741	1744	1746	1750	1752	1754	1757	1759	1762	1764	1766	1770	1772	1775
	625900	224	238	109	118	1123	1920	1249	556	251	239	241	244	246	250	252	254	257	259	262	264	266	270	272	275
	625950	263	128	977	1847	1460	707	0	600	434	419	421	424	426	430	432	434	437	439	442	444	446	455	600	455
	626000	866	1607	1672	918	164	547	336	0	0	0	0	0	0	0	0	0	0	0	0	0	156	360	564	400
	626050	1883	1129	376	265	547	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	145	349	553	395
	626100	587	0	600	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	134	338	529	390
	626150	600	216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	122	326	499	385
	626200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	112	316	470	380
	626250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	304	440	374
	626300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89	293	412	370
	626350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	282	382	365
	626400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	270	353	353
	626450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	259	323	323
	626500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	247	294	294
	626550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	236	264	284
	626600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	226	235	235
	626650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	205	205	205
	626700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	176	176	176
	626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	146	146	146
	626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118	118	118
	626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88	88	88
	626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	59	59
	626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	29	29
	627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Vertical Load from Subgrade Fill (sheet 6 of 6)

(psf)	NORTHING (ft)																		
EASTING (ft)	1352000	1351950	1351900	1351850	1351800	1351750	1351700	1351650	1351600	1351550	1351500	1351450	1351400	1351350	1351300	1351250	1351200	1351150	1351100
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623900	0	422	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623950	1331	920	223	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624000	1068	1766	1446	432	565	40	0	0	0	0	0	0	0	0	0	0	0	0	0
624050	145	64	1397	1517	480	502	88	0	0	0	0	0	0	0	0	0	0	0	0
624100	478	269	10	1332	1565	529	437	137	0	0	0	0	0	0	0	0	0	0	0
624150	566	444	211	146	1349	1614	577	372	185	0	0	0	0	0	0	0	0	0	0
624200	630	528	426	324	85	1202	1662	626	307	234	0	0	0	0	0	0	0	0	0
624250	692	590	488	388	286	62	1138	1710	674	242	282	0	0	0	0	0	0	0	0
624300	756	654	552	450	348	246	40	1073	1759	722	178	277	0	0	0	0	0	0	0
624350	820	718	616	514	412	310	186	32	1008	1807	714	428	0	0	0	0	0	0	0
624400	883	781	679	577	475	373	271	156	36	1044	1550	196	486	0	0	0	0	0	0
624450	946	844	742	640	539	437	335	230	116	83	1920	662	600	0	0	0	0	0	0
624500	1009	907	805	703	601	499	397	287	157	20	1691	833	600	0	0	0	0	0	0
624550	1073	971	869	767	685	548	433	317	191	25	1687	834	600	0	0	0	0	0	0
624600	1136	1034	928	811	695	578	463	347	224	32	1687	834	600	0	0	0	0	0	0
624650	1190	1074	958	841	725	608	493	377	260	46	1687	834	600	0	0	0	0	0	0
624700	1220	1104	988	871	755	638	523	407	290	61	1687	834	600	0	0	0	0	0	0
624750	1250	1134	1018	901	785	668	553	437	320	90	1687	834	600	0	0	0	0	0	0
624800	1280	1164	1048	931	815	698	583	467	350	194	1716	834	600	0	0	0	0	0	0
624850	1339	1249	1168	962	922	738	695	515	446	266	1716	834	600	0	0	0	0	0	0
624900	1493	1249	1270	1026	1045	802	821	577	510	68	1687	834	600	0	0	0	0	0	0
624950	1568	1355	1336	1127	1103	899	871	649	468	68	1687	834	600	0	0	0	0	0	0
625000	1538	1422	1306	1189	1073	956	841	722	608	492	1746	834	600	0	0	0	0	0	0
625050	1508	1392	1276	1159	1043	926	811	695	578	310	1746	834	600	0	0	0	0	0	0
625100	1478	1362	1246	1129	1013	896	781	665	548	151	1687	834	600	0	0	0	0	0	0
625150	1448	1332	1216	1099	983	866	751	635	518	132	1687	834	600	0	0	0	0	0	0
625200	1418	1302	1186	1069	953	836	721	605	488	76	1687	834	600	0	0	0	0	0	0
625250	1388	1272	1156	1039	923	806	691	575	416	76	1687	834	600	0	0	0	0	0	0
625300	1358	1242	1126	1009	893	776	661	545	368	50	1687	834	600	0	0	0	0	0	0
625350	1296	1212	1096	979	863	746	631	515	304	50	1687	834	600	0	0	0	0	0	0
625400	1180	1150	1066	949	833	716	601	465	388	252	1716	834	600	0	0	0	0	0	0
625450	1063	1033	1003	919	803	686	571	455	338	131	1706	834	600	0	0	0	0	0	0
625500	947	917	888	858	773	656	541	425	308	88	1687	834	600	0	0	0	0	0	0
625550	830	802	772	742	712	826	511	395	278	46	1687	834	600	0	0	0	0	0	0
625600	715	685	655	625	595	565	481	365	248	35	1687	834	600	0	0	0	0	0	0
625650	599	569	539	509	479	449	420	335	206	26	1699	827	600	0	0	0	0	0	0
625700	482	452	422	392	362	334	304	274	164	118	1920	843	600	0	0	0	0	0	0
625750	239	336	306	276	247	164	155	119	36	1111	1507	162	461	0	0	0	0	0	0
625800	431	578	522	420	416	414	410	582	1325	1747	656	491	0	0	0	0	0	0	0
625850	1777	1780	1782	1784	1787	1790	1793	1693	1262	554	280	222	0	0	0	0	0	0	0
625900	277	280	282	284	287	290	293	204	0	600	134	0	0	0	0	0	0	0	0
625950	457	460	462	464	467	470	473	400	102	0	0	0	0	0	0	0	0	0	0
626000	167	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626050	162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626100	157	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626150	151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626200	146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626250	142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626300	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626350	131	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626400	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626450	121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626500	116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626550	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626600	106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626650	101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626700	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626750	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626800	86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626850	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Written by: STEVEN DAPP Date: 02 / 04 / 30 Reviewed by: ______ Date: __/__/__

Client: OMNI Project: OHD FACILITY Project/Proposal No.: FW0400 Task No.: 03

VERTICAL LOAD FROM SUBGRADE FILL

$h_{E.G.}$ = ELEVATION OF EXISTING GROUND = 80 ft

h_{SUB} = ELEVATION OF SUBGRADE = 89.0 ft

$$\sigma_{VERT(SUB.)} = (h_{SUB} - h_{E.G.})\,\gamma_{SUB}$$

$$\gamma_{SUB} = 120\ lb/ft^3$$

$$\sigma_{VERT(SUB)} = (89 - 80)(120\ lb/ft^3)$$

$$\boxed{\sigma_{VERT(SUB)} = 1{,}080\ lb/ft^2}$$

$\sigma_{VERT(SUB)}$ = 1,075 lb/ft² ← FROM SPREADSHEET SOLN.

∴ O.K. ✓✓

ATTACHMENT 4

Vertical Load from Waste

6/1/04

Vertical Load from Waste (sheet 1 of 6)

NORTHING (ft)

EASTING (ft) / (psf)	1358000	1357950	1357900	1357850	1357800	1357750	1357700	1357650	1357600	1357550	1357500	1357450	1357400	1357350	1357300	1357250	1357200	1357150	1357100	1357050	1357000	1356950	1356900	1356850
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624000	0	0	0	0	0	0	0	0	0	172	812	1103	1107	1104	1101	1099	1016	1093	1090	1087	1085	1082	1079	1058
624050	0	0	0	0	0	0	0	0	191	1356	1877	2062	2044	2019	1993	1976	1958	2027	2000	1985	1936	1896	1854	1837
624100	0	0	0	0	0	0	0	0	861	1888	2465	2831	2821	2801	2782	2762	2743	2735	2704	2685	2666	2647	2628	2609
624150	0	0	0	0	0	0	0	0	1181	2093	2869	3685	3692	3671	3650	3629	3607	3587	3565	3544	3523	3502	3481	3461
624200	0	0	0	0	0	0	0	0	1198	2098	2868	3744	4507	4441	4407	4386	4365	4344	4323	4301	4280	4258	4238	4217
624250	0	0	0	0	0	0	0	0	1198	2058	2849	3724	4638	4559	4536	4516	4494	4473	4451	4429	4408	4387	4366	4344
624300	0	0	0	0	0	0	0	0	1198	2037	2831	3704	4657	4749	4668	4647	4624	4603	4582	4559	4538	4517	4495	4473
624350	0	0	0	0	0	0	0	0	1179	2021	2813	3685	4636	4945	4859	4779	4757	4735	4713	4691	4670	4648	4626	4604
624400	0	0	0	0	0	0	0	0	1109	2005	2795	3665	4614	5145	5058	4972	4890	4868	4846	4824	4803	4780	4758	4736
624450	0	0	0	0	0	0	0	0	1198	2070	2777	3645	4593	5348	5259	5172	5085	5003	4982	4959	4937	4914	4892	4869
624500	0	0	0	0	0	0	0	0	1198	2061	2759	3625	4571	5550	5464	5375	5287	5200	5117	5094	5072	5049	5027	5005
624550	0	0	0	0	0	0	0	0	1071	1950	2585	3338	4155	5036	5671	5581	5492	5403	5315	5231	5209	5185	5163	5141
624600	0	0	0	0	0	0	0	0	532	1603	2195	2914	3696	4541	5492	5834	5748	5658	5520	5431	5445	5323	5302	5278
624650	0	0	0	0	0	0	0	0	36	1105	1826	2510	3357	4067	5125	5974	6058	6087	5729	5638	5845	5520	5441	5435
624700	0	0	0	0	0	0	0	0	0	560	1618	2211	3077	3779	4767	5651	6222	6169	5952	5754	5959	5734	5765	5807
624750	0	0	0	0	0	0	0	0	0	53	1327	1985	2728	3510	4359	5273	6065	5992	5919	5854	5803	5753	5702	5652
624800	0	0	0	0	0	0	0	0	0	0	645	1731	2393	3145	3963	4847	5798	5817	5748	5698	5648	5598	5548	5498
624850	0	0	0	0	0	0	0	0	0	0	70	1393	2081	2794	3582	4436	5356	5644	5594	5544	5495	5445	5396	5347
624900	0	0	0	0	0	0	0	0	0	0	0	692	1795	2456	3214	4038	4928	5300	5442	5392	5343	5294	5246	5197
624950	0	0	0	0	0	0	0	0	0	0	0	87	1447	2143	2860	3654	4055	4340	4631	4930	5193	5145	5096	5049
625000	0	0	0	0	0	0	0	0	0	0	0	0	739	1837	2477	2937	3191	3453	3722	3997	4280	4570	4866	4902
625050	0	0	0	0	0	0	0	0	0	0	0	0	89	1286	1898	2177	2409	2639	2885	3138	3398	3666	3939	4221
625100	0	0	0	0	0	0	0	0	0	0	0	0	0	166	874	1426	1721	1927	2121	2350	2588	2833	3084	3343
625150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	435	910	1437	1661	1852	2074	2351	2544
625200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	444	874	1376	1705	1900
625250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	453	930
625300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vertical Load from Waste (sheet 2 of 6)

NORTHING (ft)

(psf) EASTING (ft)	1356800	1356750	1356700	1356650	1356600	1356550	1356500	1356450	1356400	1356350	1356300	1356250	1356200	1356150	1356100	1356050	1356000	1355950	1355900	1355850	1355800	1355750	1355700	1355650
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624000	919	1071	1068	1065	1062	1060	1057	1038	975	1048	1046	958	917	977	813	1032	1030	839	787	1021	1019	977	940	1010
624050	1820	1878	1952	1903	1884	1778	1858	2031	2013	2006	1949	1833	1790	1865	1705	1893	1823	1579	1538	1949	2037	1970	1921	1949
624100	2591	2571	2552	2533	2610	2683	2770	2815	2766	2747	2668	2620	2572	2525	2478	2519	2384	2337	2291	2407	2815	2766	2717	2669
624150	3440	3419	3398	3377	3432	3677	3481	3704	3650	3596	3543	3490	3437	3385	3333	3281	3230	3178	3379	3758	3704	3650	3596	3543
624200	4196	4175	4154	4133	4113	4092	4259	4507	4451	4395	4339	4283	4228	4173	4118	4063	4009	3955	3901	4193	4513	4442	4370	4299
624250	4323	4302	4281	4261	4239	4218	4571	4657	4600	4542	4486	4429	4374	4318	4262	4208	4152	4098	4043	4403	4663	4590	4518	4445
624300	4452	4431	4409	4389	4367	4618	4865	4808	4750	4692	4636	4578	4522	4465	4409	4354	4297	4242	4373	4824	4814	4740	4667	4594
624350	4582	4561	4540	4518	4496	4475	4720	4961	4903	4844	4787	4729	4672	4614	4558	4501	4445	4389	4333	4473	4966	4892	4817	4744
624400	4714	4693	4671	4649	4726	4994	5176	5116	5058	4998	4940	4881	4824	4765	4708	4651	4594	4537	4550	5084	5121	5045	4970	4895
624450	4848	4826	4803	4782	4865	4975	5253	5274	5214	5154	5095	5036	4977	4918	4860	4803	4744	4687	4672	5120	5277	5201	5125	5050
624500	4982	4960	4937	4915	5011	5121	5315	5432	5372	5312	5252	5192	5133	5073	5014	4956	4897	4839	4781	4940	5435	5358	5282	5205
624550	5118	5096	5073	5051	5124	5518	5654	5593	5532	5471	5411	5350	5290	5229	5170	5111	5051	4993	5238	5674	5596	5518	5440	5362
624600	5256	5233	5210	5198	5251	5331	5469	5756	5694	5632	5571	5509	5449	5388	5328	5268	5208	5149	5089	5361	5704	5678	5600	5522
624650	5578	5506	5520	5553	5521	5788	5946	5970	5859	5795	5776	5671	5610	5580	5486	5426	5381	5305	5245	5847	5925	5841	5762	5695
624700	5752	5679	5655	5605	5555	5754	5906	5944	5840	5779	5752	5656	5595	5559	5474	5413	5360	5294	5235	5600	5932	5834	5822	5840
624750	5602	5551	5502	5452	5403	5353	5516	5738	5677	5616	5554	5495	5434	5375	5314	5255	5196	5136	5100	5381	5703	5731	5666	5655
624800	5449	5399	5351	5301	5253	5447	5637	5576	5515	5455	5394	5335	5275	5216	5157	5098	5040	4981	5187	5669	5626	5582	5538	5494
624850	5298	5248	5201	5151	5104	5139	5314	5415	5355	5295	5236	5177	5118	5059	5001	4943	4886	4827	4770	4900	5465	5421	5378	5335
624900	5149	5100	5051	5004	4956	4922	5316	5256	5197	5138	5079	5021	4962	4905	4847	4790	4732	4675	4619	5128	5306	5263	5220	5178
624950	5000	4952	4905	4858	4817	4988	5158	5100	5040	4982	4924	4867	4809	4752	4695	4638	4582	4525	4507	5047	5150	5107	5065	5022
625000	4854	4807	4760	4713	4667	4620	4801	4944	4886	4829	4771	4715	4657	4601	4545	4488	4433	4377	4323	4469	4887	4952	4910	4869
625050	4509	4663	4617	4570	4524	4688	4849	4790	4733	4677	4620	4564	4507	4452	4396	4340	4286	4231	4200	4824	4841	4799	4758	4717
625100	3609	3881	4161	4429	4384	4359	4615	4639	4582	4527	4471	4415	4359	4305	4249	4194	4141	4086	4032	4375	4689	4649	4608	4567
625150	2782	3031	3289	3553	3824	4174	4486	4490	4434	4379	4323	4268	4213	4160	4104	4050	3997	3944	3890	4228	4526	4471	4422	4365
625200	2072	2254	2489	2730	2979	3437	3655	3605	3555	3505	3455	3406	3357	3308	3259	3211	3163	3114	3296	3696	3647	3596	3546	3496
625250	1459	1686	1783	1980	2205	2438	2634	2725	2680	2634	2588	2544	2500	2455	2411	2406	2323	2279	2236	2340	2763	2717	2671	2626
625300	65	462	940	1427	1506	1879	1969	1952	1887	1845	1903	1765	1725	1830	1645	1777	1742	1527	1489	1755	1971	1927	1879	1913
625350	0	0	0	68	413	835	886	888	828	852	898	899	776	867	721	790	913	915	663	852	923	926	863	913
625400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vertical Load from Waste (sheet 3 of 6)

NORTHING (ft)

EASTING (ft) / (psf)	1355600	1355550	1355500	1355450	1355400	1355350	1355300	1355250	1355200	1355150	1355100	1355050	1355000	1354950	1354900	1354850	1354800	1354750	1354700	1354650	1354600	1354550	1354500	1354450
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624000	1007	860	941	873	784	994	991	711	883	943	910	977	975	834	922	966	964	769	932	955	953	882	932	945
624050	1891	1790	1749	1737	1666	1803	1725	1541	1923	1974	1918	1941	1899	1789	1746	1654	1661	1728	1789	1712	2000	1918	1981	1914
624100	2620	2572	2525	2478	2431	2391	2338	2291	2714	2763	2714	2682	2618	2570	2523	2475	2428	2381	2478	2665	2762	2713	2710	2616
624150	3490	3437	3385	3333	3281	3230	3178	3316	3700	3647	3593	3540	3487	3435	3382	3330	3278	3227	3345	3508	3645	3592	3539	3485
624200	4228	4159	4069	4019	3950	3882	3922	4103	4342	4271	4201	4131	4061	3992	3923	3854	3786	3719	3651	3817	4118	4048	3979	3911
624250	4375	4303	4232	4162	4093	4023	3953	3977	4488	4417	4345	4274	4203	4134	4064	3995	3926	3858	4063	4268	4262	4191	4122	4052
624300	4521	4449	4377	4307	4236	4165	4095	4572	4637	4564	4492	4420	4349	4278	4208	4137	4068	3999	3930	4387	4407	4337	4266	4195
624350	4670	4596	4525	4453	4381	4310	4240	4481	4788	4714	4642	4569	4496	4424	4353	4282	4212	4141	4142	4349	4556	4484	4412	4340
624400	4822	4748	4674	4601	4529	4457	4386	4314	4940	4866	4792	4718	4645	4572	4501	4429	4357	4396	4608	4779	4705	4632	4560	4488
624450	4974	4900	4825	4752	4679	4606	4533	4922	5095	5020	4944	4870	4797	4723	4649	4576	4504	4433	4361	4861	4857	4783	4710	4636
624500	5129	5053	4979	4904	4830	4756	4683	4789	5046	5175	5099	5024	4949	4874	4800	4727	4654	4581	4691	4908	5011	4936	4861	4787
624550	5285	5210	5133	5058	4982	4908	4834	5026	5409	5331	5256	5179	5103	5026	4953	4879	4804	4731	4801	5242	5165	5089	5013	4939
624600	5444	5367	5290	5213	5138	5062	4987	5294	5569	5491	5413	5336	5259	5184	5108	5032	4957	4883	4809	4993	5215	5245	5169	5093
624650	5604	5526	5446	5371	5294	5218	5141	5157	5731	5652	5573	5496	5418	5340	5263	5186	5111	5036	5265	5492	5481	5403	5326	5249
624700	5763	5656	5609	5531	5452	5374	5298	5822	5893	5813	5734	5655	5577	5498	5421	5344	5267	5191	5507	5720	5641	5563	5485	5408
624750	5497	5499	5315	5373	5307	5187	5145	5397	5640	5760	5716	5672	5628	5584	5541	5497	5425	5348	5353	5581	5804	5724	5646	5567
624800	5451	5395	5231	5317	5240	5092	4908	4817	5336	5460	5417	5374	5331	5288	5246	5203	5160	5232	5501	5715	5671	5627	5583	5540
624850	5293	5249	5206	5164	5122	5079	4681	4844	4952	5105	5125	5082	5040	4995	4957	4915	4868	4832	4791	5416	5372	5330	5287	5245
624900	5135	5092	5051	5009	4967	4924	4883	4842	4800	4758	4839	4797	4636	4684	4673	4626	4576	4547	4699	4949	5081	5039	4997	4955
624950	4980	4938	4697	4856	4813	4772	4731	4691	4649	4608	4568	4527	4486	4446	4443	4388	4327	4322	4629	4868	4796	4754	4713	4673
625000	4827	4786	4744	4704	4662	4622	4582	4540	4500	4460	4420	4379	4339	4300	4261	4221	4252	4531	4306	4638	4517	4512	4435	4396
625050	4676	4635	4594	4553	4513	4473	4433	4392	4353	4313	4272	4233	4194	4155	4286	4286	4182	4566	4498	4422	4321	4269	4165	4168
625100	4526	4486	4446	4406	4365	4326	4286	4247	4208	4168	4128	4090	4068	4160	4090	4478	4388	4343	4276	4209	4143	4059	4043	4190
625150	4331	4313	4299	4259	4220	4181	4141	4102	4063	4025	3986	3948	4082	4287	4171	4257	4189	4123	4058	3992	3928	4020	4137	4228
625200	3482	3592	3817	4115	4077	4038	3998	3960	3922	3883	3845	3807	3678	4170	4104	4038	3973	3908	3844	3836	3951	4066	4182	4299
625250	2617	2737	2977	3330	3801	3895	3857	3820	3601	3796	4083	3865	3949	3954	3869	3825	3761	3698	3768	3881	3995	4110	4227	4345
625300	1863	1967	2227	2619	3091	3683	3748	3681	4032	3670	3915	3870	3605	3742	3679	3616	3588	3699	3811	3924	4039	4155	4272	4495
625350	1039	1463	1773	2097	2511	3259	3942	3733	3932	3783	3793	3715	3637	3560	3463	3520	3630	3742	3854	3969	4084	4315	4318	4759
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625450	0	0	0	794	1778	2486	3209	3498	3436	3374	3313	3252	3278	3426	3495	3605	3717	3829	4059	4346	4309	4724	4849	4974
625500	0	0	0	77	1390	2083	2772	3295	3234	3174	3114	3212	3321	3429	3538	3648	3966	4034	4179	4518	4640	4763	4888	5015
625550	0	0	0	0	647	1738	2357	3075	3037	3043	3148	3254	3362	3470	3712	3750	4094	4315	4423	4557	4679	4803	4929	5055
625600	0	0	0	0	55	1222	1973	2660	2979	3083	3189	3295	3488	3513	3998	4115	4233	4353	4473	4596	4719	4843	4968	5095
625650	0	0	0	0	0	588	1696	2236	2943	3124	3230	3337	3805	3898	4035	4152	4271	4391	4512	4635	4758	4883	5009	5136
625700	0	0	0	0	0	33	1254	1847	2519	3267	3553	3640	3841	3956	4072	4190	4309	4429	4551	4673	4798	4923	5050	5177
625750	0	0	0	0	0	0	463	1511	2240	3087	3649	3762	3878	3993	4110	4228	4347	4467	4590	4713	4837	4963	5090	5218
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625850	0	0	0	0	0	0	0	471	1674	2274	2987	3761	3950	4068	4185	4304	4424	4546	4667	4792	4917	5044	5171	5310
625900	0	0	0	0	0	0	0	0	1059	1679	2566	3292	3988	4104	4223	4342	4462	4585	4708	4831	4957	5084	5211	5365
625950	0	0	0	0	0	0	0	0	390	1638	2168	2844	3607	4141	4260	4380	4501	4824	4747	4872	4997	5155	5253	5428
626000	0	0	0	0	0	0	0	0	0	972	1755	2419	3145	3931	4298	4418	4540	4662	4787	4912	5038	5238	5419	5577
626050	0	0	0	0	0	0	0	0	0	318	1624	2122	2705	3454	4266	4456	4579	4702	4943	5109	5245	5410	5562	5657
626100	0	0	0	0	0	0	0	0	0	0	990	1794	2287	3000	3774	4495	4738	4820	4944	5233	5383	5534	5688	5682
626150	0	0	0	0	0	0	0	0	0	0	303	1393	1890	2567	3404	4144	4823	5010	5174	5356	5508	5660	5815	5706
626200	0	0	0	0	0	0	0	0	0	0	0	752	1642	2155	3101	3853	4723	5179	5329	5480	5634	5788	5932	5732
626250	0	0	0	0	0	0	0	0	0	0	0	249	1568	1974	2732	3502	4337	5235	5454	5606	5761	5916	5958	5758
626300	0	0	0	0	0	0	0	0	0	0	0	0	863	1798	2374	3113	3915	4782	5578	5732	5888	6045	5983	5782
626350	0	0	0	0	0	0	0	0	0	0	0	0	196	1556	2086	2739	3510	4344	5244	5861	6018	6176	6008	5807
626400	0	0	0	0	0	0	0	0	0	0	0	0	0	801	1810	2409	3120	3923	4790	5721	6148	6238	6035	5833
626450	0	0	0	0	0	0	0	0	0	0	0	0	0	143	1498	2066	2746	3517	4353	5252	6216	6284	5884	5328
626500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	689	1711	2387	3127	3931	4798	5731	5527	4985	4465
626550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	1424	2045	2752	3525	4360	5179	4651	4144	3659
626600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	679	1760	2394	3134	3938	4326	3833	3363	2913
626650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	1359	2068	2759	3532	3531	3074	2636	2224
626700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	619	1757	2385	2878	2793	2372	1983	1635
626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	1152	1850	2110	2087	1760	1242	463
626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89	834	1266	1215	657	41	0
626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vertical Load from Waste (sheet 4 of 6)

(psf) EASTING (ft) \ NORTHING (ft)	1354400	1354350	1354300	1354250	1354200	1354150	1354100	1354050	1354000	1353950	1353900	1353850	1353800	1353750	1353700	1353650	1353600	1353550	1353500	1353450	1353400	1353350	1353300	1353250
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624000	942	806	933	738	932	929	920	857	911	788	915	913	910	907	891	838	899	898	798	783	833	701	883	880
624050	1787	1745	1806	1682	1977	1963	1913	1869	1899	1783	1927	1874	1656	1817	1958	1885	1938	1893	1756	1713	1794	1629	1980	1965
624100	2588	2521	2473	2549	2695	2757	2709	2660	2612	2564	2605	2490	2598	2706	2726	2677	2660	2581	2534	2487	2440	2393	2624	2733
624150	3432	3380	3328	3278	3694	3640	3587	3533	3480	3428	3376	3507	3661	3598	3606	3553	3500	3447	3395	3343	3291	3236	3651	3565
624200	3842	3774	3707	3828	3965	3990	3921	3853	3765	3718	3651	3584	3584	3692	3834	3766	3699	3633	3566	3500	3434	3522	3738	3723
624250	3983	3914	3846	3780	3915	4132	4063	3994	3925	3857	3789	3742	3923	4033	3975	3906	3838	3770	3703	3636	3570	3504	3667	3861
624300	4125	4056	3987	3918	4348	4277	4206	4136	4066	3997	3928	3860	4159	3921	4073	4048	3978	3909	3841	3773	3706	3639	4071	4002
624350	4270	4199	4129	4189	4402	4423	4351	4280	4209	4140	4070	4001	4070	4183	4261	4190	4120	4050	3982	3913	3845	3819	4014	4145
624400	4416	4344	4273	4203	4463	4570	4498	4427	4355	4284	4213	4310	4425	4478	4407	4335	4265	4194	4124	4054	3985	3917	4198	4289
624450	4564	4491	4420	4620	4752	4720	4648	4575	4502	4430	4359	4288	4220	4333	4554	4483	4411	4339	4268	4198	4128	4277	4467	4435
624500	4714	4641	4568	4568	4699	4872	4798	4724	4651	4579	4507	4454	4579	4696	4705	4631	4559	4486	4415	4344	4272	4203	4391	4584
624550	4865	4790	4717	4644	5101	5026	4951	4876	4803	4729	4655	4582	4909	4769	4856	4782	4708	4636	4563	4490	4418	4348	4808	4734
624600	5018	4943	4869	4972	5181	5181	5105	5030	4955	4880	4806	4733	4736	4874	5009	4935	4860	4786	4712	4639	4567	4565	4652	4886
624650	5173	5098	5022	4947	5125	5339	5262	5165	5109	5034	4959	4989	5109	5232	5165	5089	5013	4938	4864	4790	4717	4643	4774	5040
624700	5331	5254	5177	5101	5576	5497	5420	5342	5266	5190	5114	5038	4996	5249	5321	5245	5168	5093	5018	4943	4868	4805	5272	5195
624750	5489	5411	5334	5415	5545	5657	5578	5501	5423	5346	5269	5193	5273	5397	5480	5401	5325	5248	5172	5096	5021	4980	5207	5351
624800	5497	5453	5410	5367	5764	5820	5741	5662	5583	5505	5428	5351	5663	5719	5640	5562	5484	5406	5329	5253	5176	5100	5432	5510
624850	5202	5159	5117	5301	5558	5588	5646	5452	5409	5365	5322	5280	5243	5716	5672	5628	5585	5542	5488	5411	5333	5526	5699	5672
624900	4914	4872	4831	4804	5182	5583	5513	5235	5116	5074	5032	5023	5177	5334	5374	5331	5289	5246	5203	5161	5119	5105	5306	5545
624950	4632	4592	4574	4724	5418	5578	5381	5105	4835	4789	4748	4776	5095	5125	5083	5040	4998	4957	4915	4874	4832	4791	5283	5176
625000	4356	4421	4569	4722	5191	5529	5250	4977	4710	4509	4469	4429	4467	4788	4797	4756	4715	4674	4633	4593	4553	4769	4983	4829
625050	4270	4416	4564	4714	5053	5397	5121	4851	4585	4326	4198	4259	4405	4553	4518	4478	4438	4547	4551	4318	4648	4618	4712	4631
625100	4272	4422	4559	4709	5402	5266	4992	4724	4462	4206	3955	3894	4191	3990	3962	4188	3991	4163	4575	4440	4553	4535	4516	4497
625150	4318	4467	4555	4870	5197	5136	4915	4600	4341	4132	3899	3689	3681	3732	3744	3743	3743	3742	3742	4080	4419	4401	4382	4363
625200	4418	4553	4708	4974	5280	5066	4854	4546	4344	4148	3936	3728	3626	3625	3625	3624	3624	3623	3622	4204	4287	4268	4249	4231
625250	4464	4783	5039	4781	4790	5062	4834	4609	4389	4172	3960	3750	3546	3508	3507	3507	3505	3505	3504	3606	4155	4137	4118	4100
625300	4510	4879	5144	4879	4956	5088	4859	4635	4413	4196	3983	3774	3569	3391	3390	3389	3389	3389	3388	3477	3917	4007	3989	3971
625350	5020	5061	5116	4959	4848	4738	4715	4659	4437	4220	4006	3797	3591	3390	3274	3274	3273	3273	3272	3473	3898	3880	3861	3843
625400	5061	5189	5157	4977	4749	4526	4876	4684	4462	4244	4029	3820	3614	3412	3214	3160	3160	3159	3158	3158	3187	3571	3734	3717
625450	5101	5226	5178	5002	4774	4551	4701	4592	4465	4267	4053	3843	3636	3434	3236	3047	3046	3046	3046	3046	3044	3350	3611	3593
625500	5142	5255	5257	5028	4800	4575	4355	4420	4510	4292	4077	3866	3659	3456	3258	3063	2935	2935	2935	2935	3321	3493	3487	3469
625550	5183	5282	5286	5052	4824	4600	4380	4531	4535	4315	4100	3889	3682	3479	3279	3084	2894	2825	2825	2824	2946	3021	3161	3303
625600	5223	5384	5312	5078	4850	4624	4403	4186	4019	4339	4124	3912	3704	3501	3302	3106	2915	2727	2717	2716	2715	2884	3245	3228
625650	5268	5492	5338	5104	4874	4649	4428	4210	4033	4364	4147	3935	3727	3523	3324	3127	2935	2747	2610	2608	2608	2841	2967	3110
625700	5353	5602	5363	5129	4900	4673	4452	4234	4061	3964	3953	3958	3750	3545	3345	3148	2957	2768	2584	2503	2503	2502	2795	2992
625750	5461	5627	5390	5155	4925	4698	4476	4257	4044	3834	4139	3981	3773	3568	3367	3170	2978	2788	2604	2423	2398	2446	2803	2876
625800	5690	5654	5416	5180	4950	4724	4501	4282	4068	3865	3949	3848	3796	3590	3389	3191	2998	2809	2624	2444	2295	2295	2294	2666
625850	5925	5681	5442	5207	4975	4749	4524	4306	4090	3880	3673	3755	3818	3613	3411	3214	3020	2831	2644	2463	2285	2193	2258	2649
625900	5951	5708	5468	5233	5000	4773	4549	4330	4114	3903	3695	3854	3813	3636	3433	3236	3040	2651	2665	2483	2305	2131	2092	2153
625950	5499	5595	5494	5258	5026	4798	4574	4354	4137	3926	3718	3515	3327	3658	3455	3257	3062	2872	2685	2503	2324	2150	1993	1957
626000	5435	5454	5520	5284	5051	4823	4598	4378	4161	3949	3741	3536	3499	3681	3477	3279	3083	2892	2705	2523	2344	2205	1802	1351
626050	5783	5748	5469	5310	5076	4648	4623	4402	4165	3972	3764	3559	3376	3280	3464	3300	3104	2913	2726	2373	1942	1730	1310	506
626100	5652	5468	5255	5243	5103	4873	4649	4426	4209	3996	3787	3582	3380	3183	3522	3322	3057	2590	2173	1842	1410	630	63	0
626150	5520	5529	5493	5362	5128	4898	4673	4451	4233	4019	3809	3604	3402	3207	3003	2632	2360	1929	1536	913	195	0	0	0
626200	5535	5442	5305	5071	5154	4923	4698	4475	4257	4042	3833	3490	3001	2535	2203	1860	1740	1174	382	0	0	0	0	0
626250	5559	5384	5172	5173	5180	4949	4722	4499	4262	3735	3234	2757	2306	1879	1765	1412	608	19	0	0	0	0	0	0
626300	5584	5389	5196	5145	4920	4974	4526	3987	3473	2964	2521	2082	1775	1429	651	108	0	0	0	0	0	0	0	0
626350	5609	5412	5219	4939	4537	4244	3719	3217	2744	2324	1941	1481	935	249	0	0	0	0	0	0	0	0	0	0
626400	5634	5132	4606	4101	3744	3176	2968	2506	2093	1753	1275	473	0	0	0	0	0	0	0	0	0	0	0	0
626450	4794	4262	3791	3321	2874	2449	2127	1884	1455	651	52	0	0	0	0	0	0	0	0	0	0	0	0	0
626500	3966	3489	3034	2600	2188	1849	1592	914	179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626550	3196	2762	2365	2022	1690	1141	377	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626600	2465	2094	1799	1378	578	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626650	1832	1461	763	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626700	1011	254	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vertical Load from Waste (sheet 5 of 6)

NORTHING (ft)

EASTING (ft) / (psf)	1353200	1353150	1353100	1353050	1353000	1352950	1352900	1352850	1352800	1352750	1352700	1352650	1352600	1352550	1352500	1352450	1352400	1352350	1352300	1352250	1352200	1352150	1352100	1352050
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624000	842	814	872	870	746	800	743	681	856	854	819	789	848	843	724	766	732	661	830	827	890	653	819	817
624050	1893	1871	1888	1850	1720	1768	1655	1593	1794	1806	1918	1858	1893	1854	1728	1686	1741	1602	1771	1633	1541	1599	1849	1864
624100	2685	2636	2588	2541	2494	2446	2399	2353	2317	2601	2695	2647	2623	2551	2503	2455	2409	2362	2387	2289	2319	2374	2431	2495
624150	3494	3419	3337	3285	3220	3168	3110	3037	3425	3470	3419	3368	3317	3267	3217	3186	3117	3067	3018	2976	3033	3103	3166	3230
624200	3655	3589	3523	3457	3392	3327	3263	3199	3222	3607	3554	3503	3451	3400	3350	3298	3248	3198	3148	3098	3148	3251	3314	3379
624250	3793	3727	3659	3593	3525	3460	3395	3330	3419	3732	3892	3640	3587	3536	3484	3432	3382	3330	3280	3273	3325	3402	3466	3532
624300	3933	3865	3797	3729	3662	3596	3529	3463	3760	3885	3831	3778	3725	3673	3621	3568	3517	3465	3414	3377	3488	3554	3620	3687
624350	4075	4005	3937	3869	3801	3733	3666	3600	3533	4027	3972	3919	3865	3612	3759	3706	3654	3601	3550	3497	3604	3709	3776	3844
624400	4218	4149	4079	4010	3941	3872	3805	3737	3977	4170	4115	4061	4008	3953	3899	3845	3793	3739	3687	3634	3734	3867	3934	4003
624450	4365	4293	4223	4152	4083	4014	3945	3876	4058	4316	4260	4205	4150	4095	4041	3987	3933	3879	3826	3773	3906	4027	4095	4165
624500	4512	4440	4368	4297	4227	4156	4086	4018	3967	4300	4407	4351	4295	4240	4165	4130	4076	4021	3967	4025	4118	4189	4258	4329
624550	4661	4588	4516	4444	4372	4301	4231	4160	4566	4612	4555	4499	4442	4386	4330	4274	4219	4164	4109	4095	4231	4353	4423	4495
624600	4812	4738	4665	4592	4519	4448	4376	4305	4309	4763	4705	4648	4590	4534	4478	4421	4365	4309	4254	4198	4306	4518	4591	4664
624650	4965	4890	4816	4742	4669	4596	4524	4451	4555	4908	4857	4799	4741	4684	4627	4570	4513	4456	4401	4501	4616	4689	4762	4836
624700	5119	5044	4989	4894	4819	4745	4672	4600	4901	5070	5011	4952	4894	4836	4778	4720	4663	4606	4549	4498	4786	4860	4944	5030
624750	5274	5199	5123	5047	4972	4898	4824	4750	4676	5144	5167	5108	5048	4969	4931	4872	4815	4757	4699	4665	4871	5059	5144	5231
624800	5433	5356	5279	5202	5127	5051	4976	4901	5174	5385	5324	5265	5204	5145	5086	5027	4968	4909	4851	4944	5135	5260	5347	5435
624850	5593	5515	5437	5361	5283	5207	5131	5059	5293	5545	5484	5423	5362	5302	5243	5183	5124	5064	5005	4946	5156	5455	5553	5642
624900	5512	5468	5413	5382	5340	5283	5080	5143	5161	5551	5682	5632	5529	5497	5463	5351	5313	5258	5166	5132	5331	5652	5649	5838
624950	5217	5168	5009	4982	5012	4851	4770	4777	4865	5163	5413	5453	5392	5332	5280	5214	5154	5096	5037	4980	5116	5318	5407	5565
625000	4920	4852	4711	4690	4671	4652	4633	4614	5336	4989	5353	5293	5234	5175	5116	5058	4998	4941	4883	4889	5001	5116	5203	5291
625050	4612	4594	4574	4555	4535	4517	4497	4478	4775	5051	5195	5136	5077	5019	4960	4902	4844	4788	4731	4718	4785	4918	5003	5089
625100	4478	4458	4440	4421	4402	4382	4364	4454	4638	5097	5039	4980	4922	4865	4807	4750	4692	4636	4579	4524	4617	4720	4805	4890
625150	4344	4325	4307	4288	4269	4250	4232	4467	4675	4942	4885	4826	4770	4712	4655	4599	4542	4487	4430	4440	4455	4527	4611	4694
625200	4213	4194	4174	4156	4138	4119	4101	4082	4085	4711	4731	4674	4618	4562	4505	4450	4394	4339	4283	4230	4298	4359	4419	4501
625250	4082	4063	4045	4027	4009	3991	3971	3975	4584	4637	4581	4524	4469	4413	4357	4302	4247	4193	4188	4189	4211	4232	4253	4312
625300	3953	3935	3916	3899	3880	3862	3844	3826	3911	4386	4432	4376	4322	4266	4211	4157	4103	4049	3995	4043	4085	4105	4127	4146
625350	3825	3808	3789	3771	3754	3736	3719	3700	3970	4339	4285	4230	4176	4121	4067	4014	3959	3907	3853	3801	3871	3980	4001	4021
625400	3700	3682	3664	3646	3629	3611	3593	3575	3924	4194	4140	4086	4032	3978	3924	3872	3818	3766	3714	3727	3769	3849	3877	3897
625450	3575	3557	3540	3522	3505	3487	3470	3453	3561	4050	3997	3943	3890	3837	3784	3732	3679	3628	3576	3633	3666	3711	3754	3774
625500	3452	3435	3418	3401	3382	3366	3349	3395	3759	3907	3855	3801	3750	3697	3645	3593	3542	3491	3440	3389	3464	3594	3633	3653
625550	3330	3314	3296	3279	3262	3245	3229	3211	3190	3767	3715	3662	3611	3560	3508	3457	3406	3356	3305	3408	3474	3494	3514	3533
625600	3211	3193	3177	3160	3144	3126	3110	3093	3072	3422	3578	3525	3475	3424	3373	3323	3273	3224	3173	3129	3295	3376	3396	3415
625650	3092	3075	3059	3043	3026	3009	2993	3156	3479	3237	3449	3398	3348	3298	3248	3198	3148	3100	3050	3086	3248	3267	3286	3305
625700	2976	2959	2943	2926	2910	2894	2739	2653	2671	2852	2845	2799	2766	2707	2662	2617	2572	2526	2514	2526	2650	2704	2724	2742
625750	2860	2844	2827	2811	2795	2380	2102	1968	1672	1854	2056	1994	2041	1954	1871	1830	1849	1749	1889	1715	1859	1965	1993	2034
625800	2746	2730	2714	2591	2135	1844	1641	1360	1150	1140	1140	1061	1148	1151	1007	1071	1061	908	1165	1167	1170	1174	1177	1179
625850	2634	2618	2405	1926	1509	1122	441	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625900	2526	2178	1838	1447	637	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625950	1869	1548	791	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626000	935	305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Vertical Load from Waste (sheet 6 of 6)

NORTHING (ft)

(psf) EASTING (ft)	1352000	1351950	1351900	1351850	1351800	1351750	1351700	1351650	1351600	1351550	1351500	1351450	1351400	1351350	1351300	1351250	1351200	1351150	1351100
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624000	877	188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624050	1810	1495	439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624100	2387	1971	1565	485	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624150	3024	2479	2029	1520	498	0	0	0	0	0	0	0	0	0	0	0	0	0	0
624200	3444	3078	2518	1994	1576	579	0	0	0	0	0	0	0	0	0	0	0	0	0
624250	3598	3665	3133	2568	2041	1612	627	0	0	0	0	0	0	0	0	0	0	0	0
624300	3754	3821	3789	3187	2620	2089	1649	675	0	0	0	0	0	0	0	0	0	0	0
624350	3911	3980	4049	3848	3241	2671	2149	1677	724	0	0	0	0	0	0	0	0	0	0
624400	4072	4141	4211	4282	3906	3296	2722	2193	1701	696	0	0	0	0	0	0	0	0	0
624450	4235	4306	4376	4448	4519	3965	3351	2776	2175	1478	89	0	0	0	0	0	0	0	0
624500	4400	4472	4543	4616	4689	4678	4024	3221	2398	1659	237	0	0	0	0	0	0	0	0
624550	4567	4640	4712	4786	4860	4944	4112	3204	2381	1658	239	0	0	0	0	0	0	0	0
624600	4737	4810	4887	4973	5059	5078	4091	3185	2362	1654	239	0	0	0	0	0	0	0	0
624650	4915	5001	5086	5173	5260	5056	4071	3166	2342	1647	239	0	0	0	0	0	0	0	0
624700	5115	5202	5288	5376	5464	5034	4050	3148	2325	1639	239	0	0	0	0	0	0	0	0
624750	5317	5405	5493	5582	5672	5012	4030	3129	2308	1624	239	0	0	0	0	0	0	0	0
624800	5522	5612	5701	5791	5883	4989	4010	3110	2291	1571	228	0	0	0	0	0	0	0	0
624850	5708	5778	5841	6003	5964	4960	3934	3081	2237	1535	228	0	0	0	0	0	0	0	0
624900	5822	6014	5997	6191	5867	4914	3849	3042	2201	1635	239	0	0	0	0	0	0	0	0
624950	5585	5750	5766	5930	5821	4843	3816	2998	2225	1635	239	0	0	0	0	0	0	0	0
625000	5379	5467	5557	5647	5737	4801	3836	2953	2147	1422	216	0	0	0	0	0	0	0	0
625050	5176	5263	5351	5440	5529	4823	3856	2970	2163	1513	216	0	0	0	0	0	0	0	0
625100	4975	5061	5149	5236	5323	4844	3876	2988	2180	1593	239	0	0	0	0	0	0	0	0
625150	4778	4863	4949	5035	5121	4866	3896	3007	2197	1603	239	0	0	0	0	0	0	0	0
625200	4584	4667	4752	4837	4922	4888	3916	3025	2213	1632	239	0	0	0	0	0	0	0	0
625250	4393	4475	4559	4642	4725	4810	3938	3043	2254	1632	239	0	0	0	0	0	0	0	0
625300	4205	4286	4368	4450	4532	4616	3957	3062	2281	1645	239	0	0	0	0	0	0	0	0
625350	4042	4100	4180	4261	4342	4424	3977	3081	2317	1645	239	0	0	0	0	0	0	0	0
625400	3918	3938	3996	4075	4155	4236	3997	3099	2281	1542	228	0	0	0	0	0	0	0	0
625450	3795	3815	3836	3892	3971	4050	4018	3118	2298	1603	232	0	0	0	0	0	0	0	0
625500	3674	3693	3713	3733	3789	3868	3945	3136	2314	1626	239	0	0	0	0	0	0	0	0
625550	3553	3572	3593	3612	3632	3689	3765	3155	2331	1647	239	0	0	0	0	0	0	0	0
625600	3434	3453	3473	3493	3512	3532	3587	3174	2348	1653	239	0	0	0	0	0	0	0	0
625650	3324	3343	3363	3382	3402	3421	3440	3180	2365	1651	231	0	0	0	0	0	0	0	0
625700	2762	2781	2800	2820	2839	2659	2878	2698	2130	1447	65	0	0	0	0	0	0	0	0
625750	2044	1993	2010	2028	2045	2081	2099	2011	1664	645	0	0	0	0	0	0	0	0	0
625800	1182	1113	1141	1190	1193	1196	1199	1053	495	0	0	0	0	0	0	0	0	0	0
625850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
625950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Written by: STEVEN DAPP Date: 02/05/03 Reviewed by: ______ Date: __/__/__

Client: OMNI Project: OND FACILITY Project/Proposal No.: FW0400 Task No.: 03

VERTICAL LOAD FROM WASTE

h_{SUB} = ELEVATION OF SUBGRADE = 89.0 ft

h_{COVER} = ELEVATION OF COVER = 161.1 ft

$Z = (h_{COVER} - h_{SUB}) = (161.1\ ft) - (89.0\ ft) = 72.1\ ft$

$\gamma_{WASTE} = 42.7 + 0.30(Z)$ (EQUATION 1)

$\gamma_{WASTE} = 42.7 + 0.30(72.1\ ft)$

$\gamma_{WASTE} = 64.3\ lb/ft^3$

$\sigma_{VERT(WASTE)} = Z\gamma_{WASTE} = (72.1\ ft)(64.3\ lb/ft^2)$

$\sigma_{VERT(WASTE)} = 4{,}636\ lb/ft^2$

$\sigma_{VERT(WASTE)} = 4{,}645\ lb/ft^2$ ← FROM SPREADSHEET SOLN

∴ O.K. ✓✓

ATTACHMENT 5

Total Settlement

Total Settlement (sheet 1 of 6)

NORTHING (ft)

EASTING (ft)	1358000	1357950	1357900	1357850	1357800	1357750	1357700	1357650	1357600	1357550	1357500	1357450	1357400	1357350	1357300	1357250	1357200	1357150	1357100	1357050	1357000	1356950	1356900	1356850
623600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
623900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.02	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
623950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	-0.06	-0.09	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
624000	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	-0.08	-0.17	-0.33	-0.41	-0.41	-0.41	-0.41	-0.41	-0.39	-0.40	-0.40	-0.40	-0.40	-0.40	-0.40	-0.40
624050	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.06	-0.17	-0.47	-0.63	-0.70	-0.69	-0.69	-0.68	-0.68	-0.68	-0.69	-0.68	-0.68	-0.67	-0.66	-0.65	-0.65
624100	0.00	0.00	0.00	0.00	0.00	-0.02	-0.01	-0.09	-0.34	-0.64	-0.84	-0.96	-0.96	-0.96	-0.95	-0.95	-0.94	-0.94	-0.94	-0.93	-0.93	-0.92	-0.92	-0.91
624150	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.11	-0.43	-0.71	-0.97	-1.25	-1.25	-1.25	-1.24	-1.24	-1.24	-1.23	-1.23	-1.22	-1.22	-1.21	-1.21	-1.20
624200	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.11	-0.43	-0.71	-0.98	-1.27	-1.53	-1.51	-1.50	-1.49	-1.49	-1.49	-1.48	-1.48	-1.47	-1.47	-1.46	-1.46
624250	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.11	-0.43	-0.70	-0.97	-1.27	-1.57	-1.55	-1.55	-1.55	-1.54	-1.54	-1.53	-1.53	-1.52	-1.52	-1.51	-1.51
624300	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.11	-0.43	-0.70	-0.97	-1.26	-1.58	-1.62	-1.60	-1.60	-1.59	-1.59	-1.58	-1.58	-1.57	-1.57	-1.56	-1.56
624350	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.11	-0.43	-0.70	-0.97	-1.26	-1.58	-1.68	-1.67	-1.65	-1.64	-1.64	-1.63	-1.63	-1.62	-1.62	-1.61	-1.61
624400	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.11	-0.41	-0.69	-0.96	-1.25	-1.57	-1.75	-1.73	-1.71	-1.69	-1.69	-1.68	-1.68	-1.67	-1.67	-1.66	-1.66
624450	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.11	-0.43	-0.70	-0.96	-1.25	-1.57	-1.82	-1.80	-1.78	-1.76	-1.74	-1.73	-1.73	-1.72	-1.72	-1.71	-1.71
624500	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.11	-0.43	-0.70	-0.95	-1.25	-1.58	-1.89	-1.87	-1.85	-1.83	-1.81	-1.79	-1.78	-1.78	-1.77	-1.76	-1.76
624550	0.00	0.00	0.00	0.00	0.00	-0.03	-0.01	-0.10	-0.40	-0.67	-0.90	-1.15	-1.43	-1.72	-1.94	-1.92	-1.89	-1.87	-1.85	-1.83	-1.83	-1.82	-1.82	-1.81
624600	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.08	-0.26	-0.56	-0.77	-1.02	-1.28	-1.56	-1.88	-2.00	-1.98	-1.95	-1.92	-1.90	-1.90	-1.87	-1.87	-1.86
624650	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.04	-0.13	-0.42	-0.65	-0.89	-1.16	-1.41	-1.75	-2.04	-2.07	-2.08	-1.99	-1.97	-2.02	-1.94	-1.92	-1.92
624700	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.08	-0.27	-0.57	-0.78	-1.05	-1.30	-1.62	-1.92	-2.10	-2.09	-2.04	-1.99	-2.04	-1.99	-2.00	-2.01
624750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.05	-0.13	-0.46	-0.69	-0.93	-1.20	-1.48	-1.78	-2.04	-2.03	-2.01	-2.00	-1.98	-1.97	-1.96	-1.95
624800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	0.00	-0.09	-0.29	-0.59	-0.82	-1.07	-1.35	-1.64	-1.95	-1.97	-1.95	-1.94	-1.93	-1.92	-1.90	-1.89
624850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.05	-0.14	-0.48	-0.71	-0.95	-1.22	-1.50	-1.80	-1.90	-1.89	-1.88	-1.87	-1.86	-1.85	-1.84
624900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.01	-0.09	-0.30	-0.60	-0.83	-1.09	-1.37	-1.66	-1.79	-1.84	-1.83	-1.81	-1.80	-1.79	-1.78
624950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.05	-0.14	-0.49	-0.72	-0.97	-1.23	-1.37	-1.47	-1.57	-1.67	-1.76	-1.75	-1.74	-1.73
625000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.01	-0.09	-0.31	-0.62	-0.84	-0.99	-1.08	-1.17	-1.26	-1.36	-1.46	-1.55	-1.66	-1.67
625050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.05	-0.15	-0.45	-0.64	-0.73	-0.82	-0.90	-0.98	-1.07	-1.16	-1.25	-1.35	-1.44
625100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.01	-0.08	-0.17	-0.35	-0.49	-0.58	-0.65	-0.72	-0.81	-0.89	-0.97	-1.06	-1.15
625150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	-0.06	-0.10	-0.13	-0.23	-0.36	-0.49	-0.57	-0.64	-0.72	-0.81	-0.88
625200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	-0.01	-0.04	-0.07	-0.10	-0.13	-0.24	-0.35	-0.48	-0.57	-0.65
625250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.04	-0.01	-0.01	-0.04	-0.07	-0.10	-0.14	-0.24	-0.36
625300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.04	-0.01	-0.01	-0.04	-0.07	-0.10
625350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.04	-0.01	-0.01
625400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
625450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

70/104

Total Settlement (sheet 2 of 6)

EASTING (ft) \ NORTHING (ft)	1356800	1356750	1356700	1356650	1356600	1356550	1356500	1356450	1356400	1356350	1356300	1356250	1356200	1356150	1356100	1356050	1356000	1355950	1355900	1355850	1355800	1355750	1355700	1355650
623600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623850	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
623900	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
623950	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
624000	-0.37	-0.40	-0.40	-0.40	-0.40	-0.40	-0.39	-0.39	-0.38	-0.39	-0.39	-0.37	-0.37	-0.38	-0.34	-0.39	-0.39	-0.35	-0.34	-0.39	-0.38	-0.38	-0.37	-0.38
624050	-0.65	-0.66	-0.67	-0.66	-0.66	-0.64	-0.65	-0.69	-0.68	-0.68	-0.67	-0.65	-0.64	-0.65	-0.62	-0.66	-0.65	-0.59	-0.59	-0.67	-0.69	-0.67	-0.66	-0.67
624100	-0.91	-0.91	-0.90	-0.90	-0.91	-0.93	-0.95	-0.96	-0.95	-0.94	-0.92	-0.91	-0.90	-0.89	-0.88	-0.89	-0.86	-0.85	-0.84	-0.87	-0.95	-0.94	-0.93	-0.92
624150	-1.20	-1.19	-1.19	-1.18	-1.20	-1.25	-1.21	-1.25	-1.24	-1.23	-1.22	-1.21	-1.19	-1.18	-1.17	-1.16	-1.15	-1.14	-1.18	-1.26	-1.25	-1.24	-1.23	-1.22
624200	-1.45	-1.45	-1.44	-1.44	-1.43	-1.43	-1.47	-1.52	-1.51	-1.50	-1.48	-1.47	-1.46	-1.45	-1.43	-1.42	-1.41	-1.40	-1.38	-1.45	-1.52	-1.50	-1.49	-1.47
624250	-1.50	-1.50	-1.49	-1.49	-1.48	-1.48	-1.56	-1.58	-1.56	-1.55	-1.54	-1.53	-1.51	-1.50	-1.49	-1.47	-1.46	-1.45	-1.44	-1.52	-1.57	-1.56	-1.54	-1.52
624300	-1.55	-1.55	-1.54	-1.54	-1.53	-1.59	-1.64	-1.63	-1.62	-1.61	-1.59	-1.58	-1.57	-1.55	-1.54	-1.53	-1.51	-1.50	-1.53	-1.63	-1.63	-1.61	-1.59	-1.58
624350	-1.60	-1.60	-1.59	-1.59	-1.58	-1.58	-1.63	-1.69	-1.67	-1.66	-1.65	-1.64	-1.62	-1.61	-1.60	-1.58	-1.57	-1.56	-1.54	-1.58	-1.69	-1.67	-1.65	-1.63
624400	-1.65	-1.65	-1.64	-1.64	-1.65	-1.72	-1.76	-1.74	-1.73	-1.72	-1.70	-1.69	-1.68	-1.66	-1.65	-1.64	-1.62	-1.61	-1.61	-1.74	-1.74	-1.72	-1.71	-1.69
624450	-1.70	-1.70	-1.69	-1.69	-1.71	-1.73	-1.80	-1.80	-1.79	-1.77	-1.76	-1.75	-1.73	-1.72	-1.71	-1.69	-1.68	-1.66	-1.66	-1.77	-1.80	-1.78	-1.76	-1.74
624500	-1.75	-1.75	-1.74	-1.74	-1.76	-1.79	-1.83	-1.86	-1.85	-1.83	-1.82	-1.80	-1.79	-1.78	-1.76	-1.75	-1.73	-1.72	-1.70	-1.74	-1.86	-1.84	-1.82	-1.80
624550	-1.81	-1.80	-1.79	-1.79	-1.81	-1.90	-1.93	-1.92	-1.90	-1.89	-1.88	-1.86	-1.85	-1.83	-1.82	-1.80	-1.79	-1.77	-1.83	-1.94	-1.92	-1.90	-1.88	-1.86
624600	-1.86	-1.85	-1.85	-1.84	-1.86	-1.88	-1.91	-1.98	-1.96	-1.95	-1.93	-1.92	-1.90	-1.89	-1.87	-1.86	-1.85	-1.83	-1.82	-1.88	-1.96	-1.95	-1.93	-1.91
624650	-1.95	-1.94	-1.94	-1.95	-1.94	-2.00	-2.04	-2.05	-2.02	-2.01	-2.00	-1.98	-1.96	-1.95	-1.93	-1.92	-1.91	-1.89	-1.87	-1.97	-2.03	-2.01	-1.99	-1.98
624700	-1.99	-1.98	-1.97	-1.96	-1.95	-1.99	-2.03	-2.04	-2.01	-2.00	-1.99	-1.97	-1.96	-1.95	-1.93	-1.91	-1.90	-1.88	-1.87	-1.96	-2.04	-2.02	-2.02	-2.02
624750	-1.94	-1.93	-1.91	-1.90	-1.89	-1.88	-1.92	-1.97	-1.96	-1.94	-1.93	-1.91	-1.90	-1.88	-1.87	-1.86	-1.84	-1.83	-1.82	-1.89	-1.96	-1.97	-1.96	-1.96
624800	-1.88	-1.87	-1.86	-1.85	-1.84	-1.88	-1.93	-1.91	-1.90	-1.88	-1.87	-1.86	-1.64	-1.83	-1.81	-1.80	-1.78	-1.77	-1.82	-1.93	-1.93	-1.92	-1.91	-1.90
624850	-1.83	-1.81	-1.80	-1.79	-1.78	-1.79	-1.63	-1.85	-1.84	-1.83	-1.81	-1.80	-1.78	-1.77	-1.76	-1.74	-1.73	-1.71	-1.70	-1.73	-1.87	-1.86	-1.85	-1.84
624900	-1.77	-1.76	-1.75	-1.74	-1.73	-1.72	-1.81	-1.80	-1.78	-1.77	-1.76	-1.74	-1.73	-1.71	-1.70	-1.69	-1.67	-1.66	-1.65	-1.77	-1.81	-1.80	-1.79	-1.79
624950	-1.72	-1.70	-1.69	-1.68	-1.67	-1.71	-1.75	-1.74	-1.72	-1.71	-1.70	-1.69	-1.67	-1.66	-1.65	-1.63	-1.62	-1.61	-1.60	-1.73	-1.75	-1.74	-1.74	-1.73
625000	-1.66	-1.65	-1.64	-1.63	-1.62	-1.61	-1.65	-1.68	-1.67	-1.66	-1.64	-1.63	-1.62	-1.60	-1.59	-1.58	-1.56	-1.55	-1.54	-1.57	-1.67	-1.69	-1.68	-1.67
625050	-1.54	-1.60	-1.59	-1.58	-1.57	-1.60	-1.64	-1.62	-1.61	-1.60	-1.59	-1.57	-1.56	-1.55	-1.54	-1.52	-1.51	-1.50	-1.49	-1.63	-1.84	-1.63	-1.62	-1.62
625100	-1.24	-1.34	-1.43	-1.52	-1.51	-1.51	-1.56	-1.57	-1.56	-1.54	-1.53	-1.52	-1.51	-1.50	-1.48	-1.47	-1.46	-1.44	-1.43	-1.51	-1.58	-1.58	-1.57	-1.56
625150	-0.96	-1.05	-1.14	-1.23	-1.32	-1.43	-1.51	-1.51	-1.50	-1.49	-1.48	-1.47	-1.45	-1.44	-1.43	-1.42	-1.40	-1.39	-1.38	-1.46	-1.52	-1.51	-1.50	-1.49
625200	-0.72	-0.79	-0.87	-0.95	-1.04	-1.17	-1.23	-1.22	-1.21	-1.20	-1.19	-1.18	-1.17	-1.16	-1.15	-1.14	-1.13	-1.11	-1.16	-1.24	-1.23	-1.22	-1.21	-1.20
625250	-0.50	-0.57	-0.63	-0.70	-0.78	-0.86	-0.91	-0.93	-0.92	-0.91	-0.90	-0.89	-0.88	-0.87	-0.86	-0.86	-0.84	-0.83	-0.82	-0.85	-0.94	-0.93	-0.92	-0.91
625300	-0.14	-0.24	-0.36	-0.49	-0.54	-0.64	-0.66	-0.66	-0.65	-0.64	-0.65	-0.63	-0.62	-0.64	-0.60	-0.63	-0.62	-0.58	-0.57	-0.62	-0.67	-0.66	-0.65	-0.66
625350	-0.04	-0.07	-0.10	-0.14	-0.23	-0.34	-0.35	-0.35	-0.34	-0.34	-0.35	-0.35	-0.33	-0.35	-0.32	-0.33	-0.36	-0.36	-0.31	-0.35	-0.36	-0.36	-0.35	-0.36
625400	-0.04	-0.01	-0.01	-0.04	-0.07	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
625450	0.00	0.00	-0.03	-0.04	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625500	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
625550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Total Settlement (sheet 3 of 6)

NORTHING (ft)

EASTING (ft)	1355600	1355550	1355500	1355450	1355400	1355350	1355300	1355250	1355200	1355150	1355100	1355050	1355000	1354950	1354900	1354850	1354800	1354750	1354700	1354650	1354600	1354550	1354500	1354450
623600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623850	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
623900	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623950	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10	-0.09
624000	-0.38	-0.35	-0.37	-0.35	-0.34	-0.38	-0.38	-0.32	-0.36	-0.37	-0.36	-0.37	-0.37	-0.34	-0.36	-0.37	-0.37	-0.33	-0.36	-0.37	-0.37	-0.35	-0.36	-0.37
624050	-0.66	-0.64	-0.63	-0.63	-0.61	-0.64	-0.62	-0.58	-0.66	-0.67	-0.66	-0.67	-0.66	-0.63	-0.63	-0.65	-0.61	-0.62	-0.63	-0.62	-0.67	-0.66	-0.67	-0.66
624100	-0.91	-0.90	-0.89	-0.88	-0.87	-0.86	-0.85	-0.84	-0.93	-0.94	-0.93	-0.92	-0.91	-0.90	-0.89	-0.88	-0.87	-0.86	-0.88	-0.92	-0.94	-0.93	-0.93	-0.91
624150	-1.20	-1.19	-1.18	-1.17	-1.16	-1.15	-1.13	-1.16	-1.25	-1.24	-1.22	-1.21	-1.20	-1.19	-1.18	-1.17	-1.15	-1.14	-1.17	-1.20	-1.23	-1.22	-1.21	-1.20
624200	-1.45	-1.43	-1.42	-1.40	-1.38	-1.37	-1.37	-1.41	-1.46	-1.44	-1.43	-1.41	-1.39	-1.38	-1.36	-1.34	-1.33	-1.31	-1.29	-1.33	-1.39	-1.38	-1.36	-1.34
624250	-1.51	-1.49	-1.47	-1.45	-1.43	-1.42	-1.40	-1.40	-1.52	-1.50	-1.48	-1.46	-1.45	-1.43	-1.41	-1.40	-1.38	-1.36	-1.41	-1.45	-1.45	-1.43	-1.41	-1.40
624300	-1.56	-1.54	-1.52	-1.51	-1.49	-1.47	-1.45	-1.56	-1.57	-1.55	-1.54	-1.52	-1.50	-1.48	-1.47	-1.45	-1.43	-1.41	-1.40	-1.50	-1.50	-1.48	-1.47	-1.45
624350	-1.61	-1.60	-1.58	-1.56	-1.54	-1.52	-1.50	-1.56	-1.63	-1.61	-1.59	-1.57	-1.56	-1.54	-1.52	-1.50	-1.48	-1.47	-1.46	-1.51	-1.56	-1.54	-1.52	-1.50
624400	-1.67	-1.65	-1.63	-1.61	-1.59	-1.58	-1.56	-1.54	-1.68	-1.66	-1.65	-1.63	-1.61	-1.59	-1.57	-1.56	-1.54	-1.54	-1.59	-1.63	-1.61	-1.59	-1.58	-1.56
624450	-1.72	-1.71	-1.69	-1.67	-1.65	-1.63	-1.61	-1.70	-1.74	-1.72	-1.70	-1.68	-1.67	-1.65	-1.63	-1.61	-1.59	-1.57	-1.55	-1.67	-1.67	-1.65	-1.63	-1.61
624500	-1.78	-1.76	-1.74	-1.72	-1.70	-1.68	-1.67	-1.69	-1.75	-1.78	-1.76	-1.74	-1.72	-1.70	-1.68	-1.66	-1.65	-1.63	-1.65	-1.70	-1.72	-1.70	-1.69	-1.67
624550	-1.84	-1.82	-1.80	-1.78	-1.76	-1.74	-1.72	-1.77	-1.85	-1.83	-1.62	-1.80	-1.78	-1.76	-1.74	-1.72	-1.70	-1.68	-1.70	-1.80	-1.78	-1.76	-1.74	-1.72
624600	-1.89	-1.87	-1.86	-1.84	-1.82	-1.80	-1.78	-1.85	-1.91	-1.89	-1.87	-1.85	-1.83	-1.81	-1.79	-1.77	-1.75	-1.74	-1.72	-1.76	-1.81	-1.82	-1.80	-1.78
624650	-1.95	-1.93	-1.91	-1.89	-1.87	-1.85	-1.83	-1.83	-1.97	-1.95	-1.93	-1.91	-1.89	-1.87	-1.85	-1.83	-1.81	-1.79	-1.85	-1.90	-1.89	-1.87	-1.85	-1.83
624700	-2.00	-1.98	-1.97	-1.95	-1.93	-1.91	-1.89	-2.01	-2.03	-2.01	-1.99	-1.97	-1.95	-1.93	-1.91	-1.89	-1.87	-1.85	-1.92	-1.97	-1.95	-1.93	-1.91	-1.89
624750	-1.92	-1.92	-1.88	-1.90	-1.88	-1.85	-1.84	-1.91	-1.97	-2.00	-1.99	-1.98	-1.97	-1.96	-1.95	-1.94	-1.92	-1.90	-1.90	-1.96	-2.01	-1.99	-1.97	-1.95
624800	-1.89	-1.88	-1.84	-1.86	-1.85	-1.81	-1.77	-1.75	-1.87	-1.91	-1.90	-1.89	-1.88	-1.87	-1.86	-1.85	-1.84	-1.86	-1.93	-1.98	-1.97	-1.98	-1.95	-1.95
624850	-1.83	-1.82	-1.82	-1.81	-1.80	-1.79	-1.74	-1.74	-1.76	-1.80	-1.81	-1.80	-1.79	-1.78	-1.77	-1.76	-1.75	-1.75	-1.74	-1.89	-1.88	-1.87	-1.86	-1.86
624900	-1.78	-1.77	-1.76	-1.75	-1.74	-1.73	-1.73	-1.72	-1.71	-1.70	-1.72	-1.71	-1.67	-1.69	-1.69	-1.67	-1.66	-1.66	-1.70	-1.76	-1.79	-1.78	-1.78	-1.77
624950	-1.72	-1.71	-1.70	-1.70	-1.69	-1.68	-1.67	-1.66	-1.65	-1.85	-1.64	-1.63	-1.62	-1.61	-1.61	-1.60	-1.59	-1.59	-1.66	-1.72	-1.71	-1.70	-1.69	-1.68
625000	-1.66	-1.66	-1.65	-1.64	-1.63	-1.62	-1.62	-1.61	-1.60	-1.59	-1.58	-1.57	-1.57	-1.56	-1.55	-1.54	-1.55	-1.62	-1.57	-1.65	-1.62	-1.62	-1.60	-1.59
625050	-1.61	-1.60	-1.59	-1.59	-1.58	-1.57	-1.56	-1.55	-1.55	-1.54	-1.53	-1.52	-1.51	-1.51	-1.54	-1.54	-1.52	-1.61	-1.59	-1.58	-1.55	-1.55	-1.52	-1.52
625100	-1.55	-1.55	-1.54	-1.53	-1.52	-1.52	-1.51	-1.50	-1.49	-1.48	-1.48	-1.47	-1.46	-1.49	-1.47	-1.57	-1.55	-1.54	-1.52	-1.51	-1.49	-1.47	-1.48	-1.53
625150	-1.48	-1.48	-1.49	-1.48	-1.47	-1.46	-1.46	-1.45	-1.44	-1.43	-1.42	-1.42	-1.45	-1.50	-1.47	-1.50	-1.48	-1.47	-1.45	-1.44	-1.42	-1.46	-1.51	-1.55
625200	-1.20	-1.24	-1.32	-1.42	-1.42	-1.41	-1.40	-1.40	-1.39	-1.38	-1.37	-1.37	-1.38	-1.45	-1.44	-1.42	-1.41	-1.40	-1.38	-1.39	-1.43	-1.48	-1.52	-1.57
625250	-0.91	-0.96	-1.04	-1.16	-1.32	-1.36	-1.35	-1.34	-1.34	-1.34	-1.41	-1.36	-1.38	-1.38	-1.37	-1.36	-1.34	-1.33	-1.36	-1.40	-1.45	-1.49	-1.54	-1.58
625300	-0.65	-0.70	-0.79	-0.92	-1.08	-1.28	-1.31	-1.29	-1.37	-1.29	-1.35	-1.34	-1.33	-1.31	-1.30	-1.29	-1.29	-1.33	-1.37	-1.42	-1.46	-1.51	-1.55	-1.63
625350	-0.39	-0.50	-0.60	-0.73	-0.88	-1.12	-1.34	-1.30	-1.34	-1.31	-1.31	-1.29	-1.27	-1.26	-1.24	-1.26	-1.30	-1.35	-1.39	-1.43	-1.48	-1.55	-1.57	-1.69
625400	-0.10	-0.14	-0.33	-0.56	-0.73	-0.93	-1.23	-1.26	-1.25	-1.24	-1.24	-1.23	-1.22	-1.22	-1.24	-1.27	-1.32	-1.36	-1.41	-1.45	-1.51	-1.64	-1.66	-1.73
625450	-0.01	-0.05	-0.11	-0.33	-0.60	-0.84	-1.08	-1.19	-1.18	-1.17	-1.15	-1.14	-1.16	-1.21	-1.25	-1.29	-1.33	-1.38	-1.45	-1.53	-1.54	-1.66	-1.71	-1.76
625500	-0.03	-0.01	-0.05	-0.14	-0.48	-0.71	-0.94	-1.12	-1.11	-1.10	-1.09	-1.13	-1.17	-1.22	-1.26	-1.30	-1.40	-1.43	-1.48	-1.58	-1.63	-1.68	-1.72	-1.77
625550	0.00	-0.03	-0.01	-0.09	-0.29	-0.59	-0.81	-1.05	-1.05	-1.06	-1.10	-1.15	-1.19	-1.23	-1.31	-1.33	-1.43	-1.50	-1.54	-1.60	-1.84	-1.69	-1.74	-1.79
625600	0.00	0.00	-0.03	-0.05	-0.13	-0.44	-0.68	-0.92	-1.03	-1.07	-1.12	-1.16	-1.22	-1.25	-1.38	-1.42	-1.47	-1.52	-1.56	-1.61	-1.66	-1.71	-1.75	-1.80
625650	0.00	0.00	-0.03	0.00	-0.08	-0.27	-0.58	-0.78	-1.02	-1.09	-1.13	-1.17	-1.30	-1.34	-1.39	-1.44	-1.48	-1.53	-1.58	-1.62	-1.67	-1.72	-1.77	-1.82
625700	0.00	0.00	0.00	-0.04	-0.04	-0.13	-0.44	-0.65	-0.88	-1.13	-1.21	-1.25	-1.31	-1.36	-1.40	-1.45	-1.50	-1.54	-1.59	-1.64	-1.69	-1.73	-1.78	-1.83
625750	0.00	0.00	0.00	-0.02	0.00	-0.08	-0.25	-0.54	-0.78	-1.05	-1.23	-1.28	-1.33	-1.37	-1.42	-1.46	-1.51	-1.56	-1.61	-1.65	-1.70	-1.75	-1.80	-1.85
625800	0.00	0.00	0.00	0.00	-0.04	-0.04	-0.12	-0.42	-0.68	-0.91	-1.17	-1.29	-1.34	-1.39	-1.43	-1.48	-1.53	-1.57	-1.62	-1.67	-1.72	-1.76	-1.81	-1.86
625850	0.00	0.00	0.00	0.00	-0.02	0.00	-0.08	-0.24	-0.56	-0.78	-1.02	-1.28	-1.35	-1.40	-1.45	-1.49	-1.54	-1.59	-1.83	-1.68	-1.73	-1.78	-1.83	-1.88
625900	0.00	0.00	0.00	0.00	0.00	-0.04	-0.04	-0.11	-0.40	-0.65	-0.88	-1.13	-1.37	-1.41	-1.46	-1.51	-1.55	-1.60	-1.65	-1.70	-1.75	-1.79	-1.84	-1.90
625950	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.07	-0.22	-0.55	-0.75	-0.99	-1.25	-1.43	-1.47	-1.52	-1.57	-1.62	-1.66	-1.71	-1.76	-1.82	-1.86	-1.92
626000	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.03	-0.11	-0.38	-0.62	-0.85	-1.10	-1.36	-1.49	-1.54	-1.58	-1.63	-1.68	-1.73	-1.78	-1.84	-1.90	-1.96
626050	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.07	-0.21	-0.54	-0.74	-0.95	-1.21	-1.48	-1.55	-1.60	-1.65	-1.72	-1.78	-1.83	-1.89	-1.94	-1.98
626100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.03	-0.11	-0.38	-0.63	-0.82	-1.06	-1.32	-1.57	-1.64	-1.68	-1.73	-1.81	-1.87	-1.92	-1.98	-1.98
626150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.07	-0.20	-0.50	-0.69	-0.92	-1.19	-1.45	-1.67	-1.73	-1.79	-1.85	-1.90	-1.96	-2.01	-1.98
626200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.02	-0.10	-0.33	-0.59	-0.78	-1.08	-1.34	-1.62	-1.77	-1.83	-1.88	-1.94	-1.99	-2.05	-1.98
626250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.06	-0.19	-0.53	-0.70	-0.95	-1.21	-1.49	-1.79	-1.86	-1.92	-1.97	-2.03	-2.05	-1.98
626300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.02	-0.10	-0.34	-0.62	-0.83	-1.08	-1.35	-1.63	-1.90	-1.95	-2.01	-2.07	-2.05	-1.98
626350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.06	-0.17	-0.52	-0.72	-0.95	-1.21	-1.49	-1.78	-1.99	-2.05	-2.10	-2.05	-1.98
626400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.02	-0.10	-0.33	-0.61	-0.83	-1.07	-1.34	-1.63	-1.94	-2.08	-2.12	-2.05	-1.98
626450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.06	-0.16	-0.50	-0.71	-0.95	-1.20	-1.48	-1.78	-2.10	-2.11	-1.99	-1.81
626500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.01	-0.09	-0.30	-0.59	-0.82	-1.07	-1.34	-1.63	-1.93	-1.87	-1.69	-1.52
626550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.05	-0.15	-0.49	-0.70	-0.94	-1.20	-1.48	-1.75	-1.58	-1.41	-1.25
626600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.01	-0.09	-0.30	-0.60	-0.82	-1.07	-1.34	-1.47	-1.30	-1.15	-1.00
626650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.05	-0.14	-0.47	-0.70	-0.94	-1.20	-1.20	-1.05	-0.90	-0.76
626700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.01	-0.09	-0.28	-0.59	-0.81	-0.98	-0.95	-0.81	-0.68	-0.55
626750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	-0.05	-0.13	-0.42	-0.62	-0.72	-0.70	-0.59	-0.44	-0.24
626800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.07	-0.15	-0.34	-0.45	-0.43	-0.29	-0.13	-0.08
626850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.04	0.00	-0.06	-0.10	-0.11	-0.11	-0.09	-0.05	0.00
626900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.02	-0.01	-0.02	-0.02	0.00	-0.03	-0.02
626950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.04	-0.03	-0.02	0.00	0.00
627000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Total Settlement (sheet 4 of 6)

EASTING (ft) \ NORTHING (ft)	1354400	1354350	1354300	1354250	1354200	1354150	1354100	1354050	1354000	1353950	1353900	1353850	1353800	1353750	1353700	1353650	1353600	1353550	1353500	1353450	1353400	1353350	1353300	1353250
623600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623850	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
623900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623950	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
624000	-0.36	-0.34	-0.36	-0.32	-0.36	-0.36	-0.36	-0.35	-0.36	-0.33	-0.36	-0.36	-0.36	-0.36	-0.35	-0.34	-0.35	-0.35	-0.33	-0.33	-0.34	-0.31	-0.35	-0.35
624050	-0.63	-0.62	-0.64	-0.61	-0.67	-0.67	-0.66	-0.65	-0.65	-0.63	-0.66	-0.65	-0.60	-0.64	-0.66	-0.65	-0.66	-0.65	-0.62	-0.61	-0.63	-0.60	-0.66	-0.66
624100	-0.90	-0.89	-0.88	-0.89	-0.92	-0.93	-0.92	-0.91	-0.90	-0.89	-0.90	-0.88	-0.90	-0.92	-0.93	-0.92	-0.91	-0.90	-0.89	-0.88	-0.87	-0.86	-0.90	-0.93
624150	-1.19	-1.18	-1.16	-1.15	-1.24	-1.23	-1.22	-1.21	-1.20	-1.18	-1.17	-1.20	-1.23	-1.22	-1.22	-1.21	-1.20	-1.19	-1.18	-1.16	-1.15	-1.14	-1.23	-1.21
624200	-1.33	-1.31	-1.29	-1.32	-1.35	-1.35	-1.33	-1.32	-1.30	-1.29	-1.27	-1.25	-1.25	-1.27	-1.30	-1.29	-1.27	-1.25	-1.24	-1.22	-1.21	-1.22	-1.27	-1.26
624250	-1.38	-1.36	-1.35	-1.33	-1.36	-1.40	-1.39	-1.37	-1.35	-1.34	-1.32	-1.31	-1.35	-1.37	-1.35	-1.34	-1.32	-1.31	-1.29	-1.27	-1.26	-1.24	-1.27	-1.32
624300	-1.43	-1.41	-1.40	-1.38	-1.47	-1.46	-1.44	-1.42	-1.41	-1.39	-1.37	-1.36	-1.42	-1.37	-1.40	-1.39	-1.37	-1.36	-1.34	-1.32	-1.31	-1.29	-1.38	-1.37
624350	-1.49	-1.47	-1.45	-1.46	-1.51	-1.51	-1.49	-1.48	-1.46	-1.44	-1.42	-1.41	-1.42	-1.45	-1.46	-1.44	-1.43	-1.41	-1.39	-1.38	-1.36	-1.35	-1.39	-1.42
624400	-1.54	-1.52	-1.50	-1.49	-1.54	-1.57	-1.55	-1.53	-1.51	-1.50	-1.48	-1.50	-1.52	-1.53	-1.52	-1.50	-1.48	-1.46	-1.44	-1.43	-1.41	-1.39	-1.46	-1.47
624450	-1.59	-1.57	-1.56	-1.60	-1.63	-1.62	-1.60	-1.59	-1.57	-1.55	-1.53	-1.51	-1.50	-1.52	-1.57	-1.55	-1.53	-1.52	-1.50	-1.48	-1.46	-1.50	-1.54	-1.53
624500	-1.65	-1.63	-1.81	-1.61	-1.64	-1.68	-1.66	-1.64	-1.62	-1.60	-1.58	-1.57	-1.60	-1.62	-1.62	-1.61	-1.59	-1.57	-1.55	-1.53	-1.51	-1.50	-1.54	-1.58
624550	-1.70	-1.68	-1.66	-1.65	-1.75	-1.73	-1.71	-1.70	-1.68	-1.66	-1.64	-1.62	-1.70	-1.66	-1.68	-1.66	-1.64	-1.62	-1.61	-1.59	-1.57	-1.55	-1.66	-1.64
624600	-1.76	-1.74	-1.72	-1.74	-1.79	-1.79	-1.77	-1.75	-1.73	-1.71	-1.69	-1.67	-1.67	-1.71	-1.74	-1.72	-1.70	-1.68	-1.66	-1.64	-1.62	-1.62	-1.69	-1.69
624650	-1.81	-1.80	-1.78	-1.76	-1.80	-1.85	-1.83	-1.81	-1.79	-1.77	-1.75	-1.75	-1.78	-1.81	-1.79	-1.77	-1.75	-1.73	-1.71	-1.70	-1.68	-1.66	-1.69	-1.75
624700	-1.87	-1.85	-1.83	-1.81	-1.92	-1.90	-1.88	-1.86	-1.64	-1.82	-1.80	-1.79	-1.77	-1.83	-1.85	-1.83	-1.81	-1.79	-1.77	-1.75	-1.73	-1.71	-1.83	-1.81
624750	-1.93	-1.91	-1.89	-1.91	-1.94	-1.96	-1.94	-1.92	-1.90	-1.88	-1.86	-1.84	-1.86	-1.89	-1.91	-1.89	-1.87	-1.85	-1.83	-1.81	-1.79	-1.78	-1.83	-1.86
624800	-1.94	-1.93	-1.92	-1.91	-2.01	-2.02	-2.00	-1.98	-1.96	-1.94	-1.92	-1.90	-1.97	-1.98	-1.96	-1.94	-1.92	-1.90	-1.88	-1.86	-1.84	-1.82	-1.90	-1.92
624850	-1.85	-1.84	-1.83	-1.87	-1.94	-1.95	-1.97	-1.92	-1.91	-1.90	-1.89	-1.88	-1.87	-1.99	-1.98	-1.97	-1.96	-1.95	-1.94	-1.92	-1.90	-1.95	-1.99	-1.98
624900	-1.76	-1.75	-1.74	-1.73	-1.84	-1.96	-1.94	-1.85	-1.82	-1.81	-1.80	-1.80	-1.84	-1.88	-1.89	-1.88	-1.87	-1.86	-1.85	-1.64	-1.83	-1.83	-1.88	-1.94
624950	-1.67	-1.66	-1.66	-1.71	-1.90	-1.96	-1.90	-1.81	-1.73	-1.72	-1.71	-1.72	-1.80	-1.81	-1.80	-1.79	-1.78	-1.77	-1.76	-1.76	-1.75	-1.74	-1.86	-1.64
625000	-1.59	-1.61	-1.66	-1.72	-1.85	-1.95	-1.86	-1.78	-1.70	-1.63	-1.63	-1.62	-1.63	-1.71	-1.71	-1.70	-1.69	-1.69	-1.68	-1.67	-1.66	-1.71	-1.77	-1.73
625050	-1.56	-1.61	-1.67	-1.72	-1.82	-1.91	-1.83	-1.74	-1.66	-1.58	-1.54	-1.56	-1.60	-1.63	-1.63	-1.62	-1.61	-1.64	-1.64	-1.58	-1.67	-1.66	-1.68	-1.67
625100	-1.57	-1.62	-1.67	-1.72	-1.91	-1.87	-1.79	-1.71	-1.63	-1.55	-1.47	-1.45	-1.53	-1.48	-1.47	-1.53	-1.48	-1.53	-1.63	-1.60	-1.63	-1.62	-1.62	-1.62
625150	-1.58	-1.64	-1.67	-1.77	-1.87	-1.84	-1.77	-1.67	-1.59	-1.52	-1.45	-1.38	-1.38	-1.40	-1.40	-1.40	-1.40	-1.41	-1.41	-1.49	-1.57	-1.57	-1.57	-1.57
625200	-1.61	-1.66	-1.72	-1.80	-1.88	-1.81	-1.75	-1.65	-1.59	-1.52	-1.45	-1.39	-1.35	-1.36	-1.36	-1.36	-1.36	-1.36	-1.36	-1.50	-1.52	-1.52	-1.52	-1.52
625250	-1.63	-1.72	-1.80	-1.76	-1.76	-1.81	-1.74	-1.66	-1.59	-1.52	-1.45	-1.39	-1.32	-1.31	-1.31	-1.31	-1.31	-1.31	-1.32	-1.34	-1.47	-1.47	-1.47	-1.47
625300	-1.65	-1.75	-1.84	-1.79	-1.79	-1.81	-1.74	-1.67	-1.59	-1.52	-1.46	-1.39	-1.32	-1.26	-1.27	-1.27	-1.27	-1.27	-1.27	-1.29	-1.40	-1.42	-1.42	-1.42
625350	-1.78	-1.80	-1.83	-1.81	-1.76	-1.72	-1.70	-1.67	-1.60	-1.53	-1.46	-1.39	-1.32	-1.26	-1.22	-1.22	-1.22	-1.22	-1.23	-1.28	-1.38	-1.37	-1.37	-1.37
625400	-1.79	-1.84	-1.85	-1.81	-1.73	-1.66	-1.73	-1.67	-1.60	-1.53	-1.46	-1.39	-1.32	-1.26	-1.19	-1.18	-1.18	-1.18	-1.18	-1.18	-1.19	-1.28	-1.32	-1.32
625450	-1.81	-1.85	-1.86	-1.81	-1.74	-1.66	-1.68	-1.64	-1.60	-1.53	-1.46	-1.39	-1.32	-1.26	-1.19	-1.13	-1.13	-1.14	-1.14	-1.14	-1.14	-1.21	-1.27	-1.27
625500	-1.82	-1.87	-1.88	-1.81	-1.74	-1.66	-1.59	-1.59	-1.60	-1.53	-1.46	-1.39	-1.32	-1.26	-1.20	-1.13	-1.09	-1.09	-1.09	-1.10	-1.19	-1.23	-1.23	-1.22
625550	-1.84	-1.88	-1.89	-1.81	-1.74	-1.67	-1.60	-1.62	-1.60	-1.53	-1.46	-1.39	-1.32	-1.26	-1.20	-1.13	-1.07	-1.05	-1.05	-1.05	-1.08	-1.10	-1.13	-1.17
625600	-1.85	-1.90	-1.89	-1.81	-1.74	-1.67	-1.60	-1.53	-1.47	-1.53	-1.46	-1.39	-1.33	-1.26	-1.20	-1.13	-1.07	-1.01	-1.01	-1.01	-1.01	-1.05	-1.13	-1.13
625650	-1.87	-1.94	-1.89	-1.81	-1.74	-1.67	-1.60	-1.53	-1.47	-1.53	-1.46	-1.39	-1.33	-1.26	-1.20	-1.13	-1.07	-1.01	-0.97	-0.97	-0.97	-1.02	-1.05	-1.08
625700	-1.89	-1.97	-1.89	-1.82	-1.74	-1.67	-1.60	-1.53	-1.47	-1.43	-1.41	-1.39	-1.33	-1.26	-1.20	-1.13	-1.07	-1.01	-0.95	-0.92	-0.93	-0.93	-0.99	-1.04
625750	-1.93	-1.97	-1.89	-1.82	-1.74	-1.67	-1.60	-1.53	-1.46	-1.39	-1.45	-1.39	-1.32	-1.26	-1.20	-1.13	-1.07	-1.01	-0.95	-0.89	-0.88	-0.90	-0.98	-0.99
625800	-1.98	-1.97	-1.89	-1.82	-1.74	-1.67	-1.60	-1.53	-1.46	-1.40	-1.40	-1.36	-1.32	-1.26	-1.19	-1.13	-1.07	-1.01	-0.95	-0.89	-0.84	-0.84	-0.85	-0.93
625850	-2.05	-1.97	-1.89	-1.82	-1.74	-1.67	-1.60	-1.53	-1.48	-1.39	-1.33	-1.33	-1.32	-1.26	-1.19	-1.13	-1.07	-1.01	-0.95	-0.89	-0.83	-0.80	-0.82	-0.90
625900	-2.05	-1.97	-1.89	-1.82	-1.74	-1.67	-1.60	-1.53	-1.46	-1.39	-1.33	-1.35	-1.32	-1.26	-1.19	-1.13	-1.07	-1.01	-0.95	-0.89	-0.83	-0.77	-0.76	-0.78
625950	-1.93	-1.94	-1.89	-1.82	-1.75	-1.67	-1.60	-1.53	-1.46	-1.39	-1.33	-1.26	-1.20	-1.26	-1.19	-1.13	-1.07	-1.01	-0.95	-0.89	-0.83	-0.77	-0.72	-0.71
626000	-1.91	-1.90	-1.89	-1.82	-1.75	-1.67	-1.60	-1.53	-1.46	-1.39	-1.33	-1.26	-1.24	-1.26	-1.19	-1.13	-1.07	-1.00	-0.94	-0.89	-0.83	-0.78	-0.64	-0.50
626050	-1.99	-1.96	-1.88	-1.82	-1.75	-1.67	-1.60	-1.53	-1.46	-1.39	-1.33	-1.26	-1.20	-1.16	-1.18	-1.13	-1.06	-1.00	-0.94	-0.83	-0.69	-0.59	-0.46	-0.25
626100	-1.95	-1.89	-1.82	-1.80	-1.75	-1.67	-1.60	-1.53	-1.46	-1.39	-1.33	-1.26	-1.20	-1.13	-1.19	-1.12	-1.04	-0.89	-0.75	-0.63	-0.49	-0.29	-0.14	-0.08
626150	-1.92	-1.90	-1.87	-1.82	-1.75	-1.67	-1.60	-1.53	-1.46	-1.39	-1.33	-1.26	-1.20	-1.13	-1.04	-0.91	-0.80	-0.66	-0.53	-0.36	-0.17	-0.09	-0.05	0.00
626200	-1.91	-1.87	-1.82	-1.75	-1.74	-1.67	-1.60	-1.53	-1.46	-1.39	-1.33	-1.22	-1.06	-0.91	-0.78	-0.66	-0.58	-0.42	-0.22	-0.11	-0.06	-0.02	-0.03	-0.03
626250	-1.91	-1.85	-1.78	-1.76	-1.74	-1.67	-1.60	-1.53	-1.45	-1.29	-1.12	-0.97	-0.82	-0.68	-0.61	-0.48	-0.28	-0.12	-0.08	-0.03	-0.01	-0.04	0.00	0.00
626300	-1.91	-1.85	-1.78	-1.75	-1.68	-1.67	-1.53	-1.35	-1.19	-1.03	-0.88	-0.74	-0.62	-0.50	-0.30	-0.15	-0.09	-0.04	0.00	-0.04	-0.01	0.00	0.00	0.00
626350	-1.91	-1.85	-1.78	-1.69	-1.55	-1.42	-1.26	-1.09	-0.94	-0.80	-0.67	-0.53	-0.37	-0.19	-0.10	-0.08	-0.01	-0.04	-0.02	0.00	0.00	0.00	0.00	0.00
626400	-1.91	-1.75	-1.58	-1.41	-1.28	-1.10	-1.00	-0.85	-0.72	-0.59	-0.45	-0.24	-0.11	-0.07	-0.02	-0.02	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626450	-1.63	-1.47	-1.30	-1.15	-1.00	-0.86	-0.74	-0.63	-0.50	-0.29	-0.13	-0.08	-0.04	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626500	-1.36	-1.20	-1.05	-0.90	-0.76	-0.84	-0.54	-0.36	-0.17	-0.09	-0.05	0.00	-0.04	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626550	-1.10	-0.95	-0.82	-0.69	-0.57	-0.42	-0.22	-0.10	-0.06	-0.01	-0.03	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626600	-0.86	-0.72	-0.61	-0.48	-0.27	-0.12	-0.07	-0.03	-0.01	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626650	-0.63	-0.51	-0.32	-0.14	-0.09	-0.04	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626700	-0.38	-0.19	-0.10	-0.05	-0.01	-0.04	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626750	-0.11	-0.07	-0.02	-0.02	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626800	-0.03	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626850	-0.04	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Total Settlement (sheet 5 of 6)

EASTING (ft)	NORTHING (ft) 1353200	1353150	1353100	1353050	1353000	1352950	1352900	1352850	1352800	1352750	1352700	1352650	1352600	1352550	1352500	1352450	1352400	1352350	1352300	1352250	1352200	1352150	1352100	1352050
623600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623850	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
623900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623950	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
624000	-0.34	-0.34	-0.35	-0.35	-0.32	-0.33	-0.32	-0.31	-0.34	-0.34	-0.34	-0.33	-0.34	-0.34	-0.32	-0.32	-0.32	-0.30	-0.34	-0.34	-0.31	-0.30	-0.33	-0.33
624050	-0.65	-0.64	-0.65	-0.64	-0.61	-0.62	-0.60	-0.59	-0.63	-0.63	-0.65	-0.64	-0.65	-0.64	-0.61	-0.61	-0.62	-0.59	-0.62	-0.59	-0.57	-0.59	-0.64	-0.64
624100	-0.92	-0.91	-0.90	-0.89	-0.88	-0.87	-0.86	-0.85	-0.84	-0.90	-0.92	-0.91	-0.90	-0.89	-0.88	-0.87	-0.86	-0.85	-0.85	-0.83	-0.84	-0.85	-0.86	-0.87
624150	-1.19	-1.17	-1.15	-1.14	-1.12	-1.11	-1.10	-1.08	-1.16	-1.17	-1.16	-1.15	-1.14	-1.13	-1.12	-1.11	-1.10	-1.08	-1.07	-1.06	-1.08	-1.09	-1.11	-1.12
624200	-1.25	-1.23	-1.22	-1.20	-1.18	-1.17	-1.15	-1.14	-1.14	-1.22	-1.21	-1.20	-1.19	-1.18	-1.17	-1.16	-1.14	-1.13	-1.12	-1.11	-1.12	-1.15	-1.16	-1.17
624250	-1.30	-1.28	-1.27	-1.25	-1.23	-1.22	-1.20	-1.19	-1.20	-1.27	-1.26	-1.25	-1.24	-1.23	-1.22	-1.21	-1.19	-1.18	-1.17	-1.17	-1.18	-1.20	-1.21	-1.23
624300	-1.35	-1.33	-1.32	-1.30	-1.28	-1.27	-1.25	-1.23	-1.30	-1.33	-1.32	-1.30	-1.29	-1.28	-1.27	-1.26	-1.24	-1.23	-1.22	-1.21	-1.24	-1.25	-1.27	-1.28
624350	-1.40	-1.39	-1.37	-1.35	-1.34	-1.32	-1.30	-1.29	-1.27	-1.38	-1.37	-1.36	-1.34	-1.33	-1.32	-1.31	-1.30	-1.28	-1.27	-1.26	-1.28	-1.31	-1.32	-1.34
624400	-1.46	-1.44	-1.42	-1.41	-1.39	-1.37	-1.35	-1.34	-1.39	-1.43	-1.42	-1.41	-1.40	-1.38	-1.37	-1.36	-1.35	-1.33	-1.32	-1.31	-1.33	-1.36	-1.38	-1.39
624450	-1.51	-1.49	-1.46	-1.46	-1.44	-1.42	-1.40	-1.39	-1.43	-1.49	-1.47	-1.46	-1.45	-1.44	-1.42	-1.41	-1.40	-1.39	-1.37	-1.36	-1.39	-1.42	-1.44	-1.45
624500	-1.56	-1.55	-1.53	-1.51	-1.49	-1.47	-1.46	-1.44	-1.43	-1.50	-1.53	-1.52	-1.50	-1.49	-1.48	-1.46	-1.45	-1.44	-1.42	-1.44	-1.46	-1.48	-1.49	-1.51
624550	-1.62	-1.60	-1.56	-1.56	-1.55	-1.53	-1.51	-1.49	-1.59	-1.60	-1.58	-1.57	-1.56	-1.54	-1.53	-1.52	-1.50	-1.49	-1.48	-1.47	-1.51	-1.53	-1.55	-1.57
624600	-1.67	-1.66	-1.64	-1.62	-1.60	-1.58	-1.56	-1.54	-1.54	-1.65	-1.64	-1.62	-1.61	-1.60	-1.58	-1.57	-1.56	-1.54	-1.53	-1.52	-1.54	-1.59	-1.81	-1.63
624650	-1.73	-1.71	-1.69	-1.67	-1.65	-1.64	-1.62	-1.60	-1.62	-1.70	-1.69	-1.68	-1.66	-1.65	-1.64	-1.62	-1.61	-1.60	-1.58	-1.61	-1.63	-1.65	-1.67	-1.69
624700	-1.79	-1.77	-1.75	-1.73	-1.71	-1.69	-1.67	-1.65	-1.72	-1.76	-1.75	-1.73	-1.72	-1.71	-1.69	-1.68	-1.66	-1.65	-1.64	-1.62	-1.69	-1.71	-1.73	-1.75
624750	-1.84	-1.82	-1.80	-1.78	-1.76	-1.74	-1.73	-1.71	-1.69	-1.80	-1.80	-1.79	-1.78	-1.76	-1.75	-1.73	-1.72	-1.71	-1.69	-1.68	-1.73	-1.78	-1.80	-1.82
624800	-1.90	-1.88	-1.86	-1.84	-1.82	-1.80	-1.78	-1.76	-1.83	-1.88	-1.86	-1.85	-1.83	-1.82	-1.80	-1.79	-1.78	-1.76	-1.75	-1.77	-1.82	-1.85	-1.87	-1.89
624850	-1.96	-1.94	-1.92	-1.90	-1.88	-1.86	-1.64	-1.82	-1.87	-1.93	-1.92	-1.90	-1.89	-1.88	-1.86	-1.85	-1.83	-1.82	-1.80	-1.79	-1.84	-1.91	-1.94	-1.96
624900	-1.94	-1.93	-1.92	-1.91	-1.90	-1.89	-1.64	-1.86	-1.86	-1.95	-1.99	-1.97	-1.95	-1.94	-1.93	-1.90	-1.90	-1.88	-1.86	-1.85	-1.90	-1.98	-1.98	-2.02
624950	-1.85	-1.84	-1.80	-1.79	-1.80	-1.76	-1.74	-1.75	-1.77	-1.84	-1.91	-1.92	-1.90	-1.89	-1.87	-1.86	-1.84	-1.83	-1.81	-1.80	-1.83	-1.88	-1.90	-1.94
625000	-1.76	-1.74	-1.71	-1.70	-1.70	-1.70	-1.69	-1.69	-1.87	-1.78	-1.87	-1.86	-1.84	-1.83	-1.81	-1.80	-1.79	-1.77	-1.76	-1.76	-1.79	-1.81	-1.84	-1.86
625050	-1.66	-1.66	-1.66	-1.65	-1.65	-1.65	-1.64	-1.64	-1.71	-1.78	-1.82	-1.80	-1.79	-1.77	-1.76	-1.74	-1.73	-1.72	-1.70	-1.70	-1.72	-1.75	-1.77	-1.79
625100	-1.61	-1.61	-1.61	-1.60	-1.60	-1.60	-1.59	-1.62	-1.66	-1.77	-1.76	-1.74	-1.73	-1.72	-1.70	-1.69	-1.68	-1.66	-1.65	-1.63	-1.66	-1.68	-1.70	-1.72
625150	-1.56	-1.56	-1.56	-1.55	-1.55	-1.55	-1.54	-1.60	-1.65	-1.72	-1.70	-1.69	-1.68	-1.66	-1.65	-1.63	-1.62	-1.61	-1.59	-1.60	-1.60	-1.62	-1.64	-1.66
625200	-1.51	-1.51	-1.51	-1.50	-1.50	-1.50	-1.49	-1.49	-1.49	-1.64	-1.65	-1.63	-1.62	-1.61	-1.59	-1.58	-1.57	-1.55	-1.54	-1.53	-1.54	-1.56	-1.57	-1.59
625250	-1.46	-1.46	-1.46	-1.45	-1.45	-1.45	-1.44	-1.45	-1.59	-1.60	-1.59	-1.58	-1.57	-1.55	-1.54	-1.53	-1.51	-1.50	-1.50	-1.50	-1.51	-1.51	-1.52	-1.53
625300	-1.41	-1.41	-1.41	-1.41	-1.40	-1.40	-1.40	-1.39	-1.41	-1.53	-1.54	-1.52	-1.51	-1.50	-1.49	-1.47	-1.46	-1.45	-1.44	-1.45	-1.46	-1.46	-1.47	-1.47
625350	-1.37	-1.36	-1.36	-1.36	-1.35	-1.35	-1.35	-1.35	-1.41	-1.50	-1.48	-1.47	-1.46	-1.45	-1.43	-1.42	-1.41	-1.40	-1.38	-1.37	-1.39	-1.41	-1.42	-1.42
625400	-1.32	-1.31	-1.31	-1.31	-1.31	-1.30	-1.30	-1.30	-1.38	-1.44	-1.43	-1.42	-1.41	-1.39	-1.38	-1.37	-1.36	-1.34	-1.33	-1.34	-1.34	-1.36	-1.37	-1.37
625450	-1.27	-1.27	-1.26	-1.26	-1.26	-1.26	-1.25	-1.25	-1.28	-1.39	-1.38	-1.36	-1.35	-1.34	-1.33	-1.32	-1.31	-1.29	-1.28	-1.29	-1.30	-1.31	-1.32	-1.33
625500	-1.22	-1.22	-1.22	-1.21	-1.21	-1.21	-1.21	-1.22	-1.30	-1.34	-1.32	-1.31	-1.30	-1.29	-1.28	-1.27	-1.25	-1.24	-1.23	-1.22	-1.24	-1.27	-1.28	-1.28
625550	-1.18	-1.17	-1.17	-1.17	-1.17	-1.16	-1.16	-1.16	-1.15	-1.28	-1.27	-1.26	-1.25	-1.24	-1.23	-1.22	-1.20	-1.19	-1.18	-1.20	-1.22	-1.22	-1.23	-1.23
625600	-1.13	-1.13	-1.12	-1.12	-1.12	-1.12	-1.11	-1.11	-1.11	-1.19	-1.22	-1.21	-1.20	-1.19	-1.18	-1.17	-1.15	-1.14	-1.13	-1.12	-1.16	-1.18	-1.18	-1.19
625650	-1.08	-1.08	-1.08	-1.08	-1.07	-1.07	-1.07	-1.11	-1.18	-1.13	-1.17	-1.16	-1.15	-1.14	-1.13	-1.12	-1.11	-1.10	-1.09	-1.09	-1.13	-1.13	-1.14	-1.14
625700	-1.04	-1.03	-1.03	-1.03	-1.03	-1.03	-0.98	-0.94	-0.93	-0.97	-0.97	-0.96	-0.95	-0.94	-0.93	-0.92	-0.91	-0.90	-0.90	-0.90	-0.93	-0.94	-0.95	-0.95
625750	-0.99	-0.99	-0.99	-0.99	-0.98	-0.84	-0.75	-0.69	-0.62	-0.66	-0.70	-0.69	-0.70	-0.68	-0.66	-0.65	-0.66	-0.64	-0.67	-0.63	-0.66	-0.68	-0.69	-0.70
625800	-0.95	-0.94	-0.94	-0.91	-0.76	-0.65	-0.56	-0.47	-0.42	-0.42	-0.42	-0.40	-0.42	-0.42	-0.39	-0.40	-0.40	-0.37	-0.42	-0.42	-0.42	-0.42	-0.42	-0.43
625850	-0.90	-0.90	-0.83	-0.68	-0.54	-0.42	-0.24	-0.12	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11
625900	-0.86	-0.74	-0.62	-0.49	-0.29	-0.13	-0.08	-0.04	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
625950	-0.64	-0.53	-0.33	-0.16	-0.09	-0.04	0.00	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.04	-0.03
626000	-0.37	-0.20	-0.10	-0.06	-0.01	-0.03	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.04	-0.03
626050	-0.11	-0.07	-0.02	-0.02	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.04	-0.03
626100	-0.04	0.00	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.03	-0.02
626150	-0.04	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.03	-0.02
626200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.03	-0.02
626250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.03	-0.02
626300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.03	-0.02
626350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.02	-0.02
626400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.02	-0.02
626450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.02	-0.02
626500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.02	-0.02
626550	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.02	-0.02
626600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.02
626650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01
626700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01
626750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01
626800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01
626850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01
626900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Total Settlement (sheet 6 of 6)

EASTING (ft)	NORTHING (ft) 1352000	1351950	1351900	1351850	1351800	1351750	1351700	1351650	1351600	1351550	1351500	1351450	1351400	1351350	1351300	1351250	1351200	1351150	1351100
623600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623900	0.00	-0.03	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
623950	-0.08	-0.06	-0.01	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
624000	-0.30	-0.17	-0.09	-0.03	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
624050	-0.61	-0.50	-0.24	-0.09	-0.03	-0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
624100	-0.83	-0.68	-0.52	-0.25	-0.10	-0.03	-0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
624150	-1.05	-0.86	-0.69	-0.52	-0.25	-0.10	-0.04	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
624200	-1.19	-1.06	-0.87	-0.69	-0.53	-0.27	-0.10	-0.04	-0.02	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
624250	-1.24	-1.26	-1.08	-0.88	-0.70	-0.54	-0.26	-0.10	-0.04	-0.02	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
624300	-1.30	-1.31	-1.29	-1.09	-0.90	-0.71	-0.55	-0.30	-0.11	-0.05	-0.01	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
624350	-1.35	-1.37	-1.38	-1.31	-1.10	-0.91	-0.73	-0.56	-0.31	-0.11	-0.05	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
624400	-1.41	-1.43	-1.44	-1.46	-1.33	-1.12	-0.92	-0.74	-0.57	-0.30	-0.09	-0.01	-0.03	0.00	0.00	0.00	0.00	0.00	0.00
624450	-1.47	-1.48	-1.50	-1.51	-1.53	-1.34	-1.13	-0.94	-0.73	-0.50	-0.14	-0.04	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624500	-1.53	-1.54	-1.56	-1.57	-1.59	-1.58	-1.36	-1.09	-0.81	-0.55	-0.16	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624550	-1.58	-1.60	-1.62	-1.63	-1.65	-1.67	-1.39	-1.09	-0.81	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624600	-1.64	-1.66	-1.68	-1.70	-1.72	-1.71	-1.39	-1.08	-0.80	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624650	-1.71	-1.73	-1.74	-1.76	-1.78	-1.71	-1.38	-1.08	-0.80	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624700	-1.77	-1.79	-1.61	-1.83	-1.85	-1.70	-1.38	-1.07	-0.80	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624750	-1.84	-1.86	-1.88	-1.90	-1.92	-1.70	-1.37	-1.07	-0.79	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624800	-1.91	-1.93	-1.95	-1.97	-1.99	-1.69	-1.37	-1.07	-0.79	-0.54	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624850	-1.97	-1.99	-2.00	-2.04	-2.02	-1.69	-1.35	-1.06	-0.78	-0.53	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624900	-2.02	-2.06	-2.06	-2.11	-2.00	-1.68	-1.33	-1.05	-0.77	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
624950	-1.95	-1.99	-1.99	-2.03	-1.99	-1.66	-1.33	-1.04	-0.78	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625000	-1.88	-1.90	-1.92	-1.94	-1.96	-1.65	-1.33	-1.03	-0.76	-0.51	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625050	-1.81	-1.83	-1.85	-1.87	-1.89	-1.66	-1.33	-1.04	-0.76	-0.53	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625100	-1.74	-1.76	-1.78	-1.81	-1.83	-1.66	-1.34	-1.04	-0.77	-0.54	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625150	-1.68	-1.70	-1.72	-1.74	-1.76	-1.67	-1.34	-1.04	-0.77	-0.54	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625200	-1.61	-1.63	-1.65	-1.67	-1.69	-1.67	-1.35	-1.05	-0.77	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625250	-1.55	-1.57	-1.59	-1.61	-1.63	-1.64	-1.35	-1.05	-0.78	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625300	-1.49	-1.50	-1.52	-1.54	-1.56	-1.58	-1.36	-1.06	-0.79	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625350	-1.43	-1.44	-1.46	-1.48	-1.50	-1.52	-1.36	-1.06	-0.79	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625400	-1.38	-1.38	-1.40	-1.42	-1.43	-1.45	-1.37	-1.06	-0.79	-0.53	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625450	-1.33	-1.34	-1.34	-1.35	-1.37	-1.39	-1.37	-1.07	-0.79	-0.54	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625500	-1.28	-1.29	-1.29	-1.30	-1.31	-1.33	-1.34	-1.07	-0.79	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625550	-1.24	-1.24	-1.25	-1.25	-1.25	-1.27	-1.28	-1.08	-0.80	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625600	-1.19	-1.19	-1.20	-1.20	-1.21	-1.21	-1.22	-1.08	-0.80	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625650	-1.15	-1.15	-1.15	-1.16	-1.16	-1.17	-1.17	-1.08	-0.80	-0.55	-0.18	-0.05	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625700	-0.95	-0.96	-0.96	-0.97	-0.97	-0.97	-0.98	-0.92	-0.72	-0.49	-0.14	-0.04	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
625750	-0.70	-0.69	-0.69	-0.70	-0.70	-0.71	-0.71	-0.68	-0.56	-0.29	-0.09	-0.01	-0.03	0.00	0.00	0.00	0.00	0.00	0.00
625800	-0.43	-0.41	-0.42	-0.43	-0.43	-0.43	-0.43	-0.39	-0.25	-0.11	-0.04	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625850	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.10	-0.08	-0.04	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625900	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01	0.00	-0.04	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
625950	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626000	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626050	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626100	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626150	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626200	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626250	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626300	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626350	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626400	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626450	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626500	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626550	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626600	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626650	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626700	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626750	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626800	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626850	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
626950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
627200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Vertical Load from Subgrade Fill (sheet 3 of 6)

(psf)	NORTHING (ft)																						
EASTING (ft)	1355600	1355550	1355500	1355450	1355400	1355350	1355300	1355250	1355200	1355150	1355100	1355050	1355000	1354950	1354900	1354850	1354800	1354750	1354700	1354650	1354600	1354550	1354500	1354450
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	296	294	292	289	287	284	282	280	276	274	271	269	266	264	262	258	256	253	251	246	246	244	241	238
623900	116	114	112	109	107	104	102	100	96	94	91	89	86	84	82	78	76	73	71	68	66	64	61	58
623950	1616	1614	1612	1609	1607	1604	1602	1600	1596	1594	1591	1589	1586	1584	1582	1578	1576	1573	1571	1568	1566	1564	1561	1558
624000	644	966	784	932	1132	661	665	1294	896	762	833	682	685	996	797	695	698	1133	764	709	713	866	755	722
624050	361	550	626	647	782	516	662	1020	281	185	286	241	317	523	602	392	761	629	510	654	108	259	139	260
624100	560	640	719	798	877	944	1036	1115	380	296	376	428	534	613	692	772	851	930	758	437	270	350	353	509
624150	650	730	809	888	967	1046	1126	905	307	386	466	545	624	703	782	862	941	1020	830	574	361	440	520	599
624200	740	820	899	978	1057	1136	1055	766	397	476	556	635	714	793	874	953	1032	1111	1190	919	451	530	610	689
624250	830	910	989	1068	1147	1228	1307	1249	488	568	647	726	805	884	964	1043	1122	1201	875	554	541	620	700	779
624300	922	1001	1080	1159	1238	1318	1397	692	578	658	737	816	895	974	1054	1133	1212	1291	1370	683	631	710	790	869
624350	1012	1091	1170	1249	1328	1408	1487	1120	668	748	827	906	985	1064	1144	1223	1302	1381	1357	1037	721	800	880	959
624400	1102	1181	1260	1339	1418	1498	1577	1656	758	838	917	996	1075	1154	1234	1313	1392	1313	992	732	811	890	970	1049
624450	1192	1271	1350	1429	1508	1588	1667	1104	848	928	1007	1086	1165	1244	1324	1403	1482	1561	1640	918	901	980	1060	1139
624500	1282	1361	1440	1519	1598	1678	1757	1588	1213	1018	1097	1176	1255	1334	1414	1493	1572	1651	1475	1153	991	1070	1150	1229
624550	1372	1451	1530	1609	1688	1768	1847	1562	1028	1108	1187	1266	1345	1424	1504	1583	1662	1741	1621	1002	1082	1162	1241	1320
624600	1462	1541	1620	1699	1778	1858	1937	1501	1118	1198	1277	1356	1435	1514	1594	1673	1752	1831	1910	1636	1314	1252	1331	1410
624650	1552	1631	1710	1789	1868	1948	2027	1985	1208	1288	1367	1446	1525	1606	1685	1764	1843	1922	1591	1270	1262	1342	1421	1500
624700	1561	1721	1800	1879	1960	2039	2118	1412	1300	1379	1458	1537	1616	1696	1775	1854	1933	2012	1572	1273	1352	1432	1511	1590
624750	1606	1626	1891	1837	1946	2129	2208	1896	1602	1469	1548	1627	1706	1786	1865	1944	2023	2102	2074	1752	1442	1522	1601	1680
624800	1368	1464	1704	1612	1736	1957	2230	2377	1699	1559	1638	1717	1796	1876	1955	2034	2113	2040	1708	1453	1532	1612	1691	1770
624850	1278	1358	1438	1517	1596	1676	1967	2040	1915	1732	1728	1807	1886	1970	2045	2124	2210	2282	2362	1543	1622	1702	1781	1860
624900	1188	1268	1348	1427	1507	1586	1666	1745	1825	1904	1816	1896	2143	2099	2135	2224	2317	2381	2190	1868	1712	1792	1871	1950
624950	1099	1178	1258	1337	1417	1496	1576	1655	1735	1814	1894	1974	2053	2132	2160	2261	2371	2400	1988	1680	1802	1882	1961	2040
625000	1009	1088	1168	1247	1327	1406	1486	1566	1645	1724	1804	1884	1963	2042	2122	2202	2178	1804	2147	1699	1891	1920	2052	2131
625050	919	998	1078	1158	1237	1316	1396	1476	1555	1634	1715	1794	1873	1952	1786	1808	1981	1456	1574	1704	1871	1939	2142	2160
625100	829	908	988	1068	1147	1226	1307	1386	1465	1544	1625	1704	1759	1645	1771	1235	1386	1472	1591	1710	1829	1974	2137	2210
625150	739	818	899	978	1057	1136	1217	1296	1375	1454	1535	1614	1438	1164	1354	1253	1372	1490	1609	1728	1847	1966	2084	2240
625200	649	728	809	888	967	1046	1127	1206	1285	1366	1445	1524	1441	1033	1152	1271	1390	1508	1627	1746	1864	1982	2101	2220
625250	559	640	719	798	877	958	1037	1116	1168	1196	793	1139	1037	1051	1170	1289	1408	1525	1644	1763	1882	2000	2119	2238
625300	426	550	629	682	787	668	902	1026	523	1087	742	832	950	1069	1187	1306	1424	1543	1662	1761	1900	2018	2137	2108
625350	604	101	142	365	647	514	509	822	523	746	731	848	967	1086	1205	1324	1442	1561	1680	1799	1918	1871	2154	1822
625400	1672	1920	918	80	348	619	274	391	510	629	748	866	985	1104	1223	1342	1460	1579	1698	1816	1870	1470	1751	1729
625450	210	822	1769	917	136	161	290	409	528	647	766	884	1003	1122	1241	1360	1477	1596	1544	1416	1758	1460	1577	1693
625500	473	223	833	1920	184	181	308	427	546	665	764	902	1020	1139	1256	1376	1188	1375	1453	1256	1373	1489	1606	1722
625550	0	458	106	1438	1110	133	326	445	564	682	800	919	1036	1157	1074	1306	1084	1051	1186	1284	1402	1518	1634	1751
625600	0	0	542	743	1920	472	324	436	561	700	818	937	924	1175	731	847	964	1080	1196	1313	1429	1547	1663	1780
625650	0	0	398	48	1378	1190	154	480	599	718	836	955	526	674	760	876	992	1109	1225	1342	1458	1574	1692	1808
625700	0	0	0	600	683	1920	344	498	617	572	415	570	554	671	788	905	1021	1138	1254	1370	1487	1603	1720	1836
625750	0	0	0	338	0	1318	1433	455	412	305	350	467	583	700	616	934	1050	1166	1283	1399	1516	1632	1748	1865
625800	0	0	0	0	600	623	1920	484	114	283	379	496	612	728	845	961	1079	1195	1312	1428	1544	1661	1777	1894
625850	0	0	0	0	278	0	1258	1351	74	292	408	524	641	757	874	990	1106	1223	1340	1457	1573	1690	1806	1909
625900	0	0	0	0	0	600	563	1891	636	318	416	553	670	786	902	1019	1135	1252	1368	1486	1602	1718	1835	1920
625950	0	0	0	0	0	218	0	1196	1493	84	421	582	698	815	931	1048	1164	1280	1397	1513	1631	1706	1864	1920
626000	0	0	0	0	0	0	600	502	1831	764	493	611	727	644	960	1076	1193	1309	1426	1542	1658	1678	1727	1808
626050	0	0	0	0	0	0	158	17	1136	1614	52	445	755	872	969	1105	1222	1338	1295	1357	1464	1535	1624	1692
626100	0	0	0	0	0	0	0	600	442	1771	666	360	784	900	1018	1134	1082	1258	1375	1276	1364	1454	1543	1577
626150	0	0	0	0	0	0	0	97	97	1076	1592	452	812	929	890	1105	1049	1082	1150	1195	1284	1374	1463	1462
626200	0	0	0	0	0	0	0	0	600	382	1711	1140	592	958	677	840	918	937	1026	1115	1204	1294	1379	1345
626250	0	0	0	0	0	0	0	0	37	178	1016	1673	42	595	589	678	767	857	946	1034	1123	1213	1262	1230
626300	0	0	0	0	0	0	0	0	0	600	322	1651	827	230	509	598	666	776	865	954	1043	1133	1147	1115
626350	0	0	0	0	0	0	0	0	0	0	258	956	1753	5	329	517	606	696	785	874	962	1052	1032	1000
626400	0	0	0	0	0	0	0	0	0	0	600	262	1591	906	148	386	526	616	704	793	882	949	916	883
626450	0	0	0	0	0	0	0	0	0	0	0	338	896	1832	60	305	445	535	624	713	802	833	800	768
626500	0	0	0	0	0	0	0	0	0	0	0	552	202	1530	1104	276	365	455	544	632	721	718	685	653
626550	0	0	0	0	0	0	0	0	0	0	0	0	419	835	1914	148	284	374	463	552	635	602	570	538
626600	0	0	0	0	0	0	0	0	0	0	0	0	492	140	1470	1067	124	294	383	472	518	466	454	421
626650	0	0	0	0	0	0	0	0	0	0	0	0	0	498	775	1920	221	181	302	391	403	371	338	306
626700	0	0	0	0	0	0	0	0	0	0	0	0	0	431	80	1410	1147	68	212	311	288	256	203	108
626750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	578	715	1920	468	69	184	138	79	359	1363
626800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	362	0	1136	1916	866	307	391	1097	1920	1280
626850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	62	923	1584	1867	1619	1426	738	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	533	287	116	382	337	6	534	367
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	344	565	524	248	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Vertical Load from Subgrade Fill (sheet 4 of 6)

(psf)	NORTHING (ft)																							
EASTING (ft)	1354400	1354350	1354300	1354250	1354200	1354150	1354100	1354050	1354000	1353950	1353900	1353850	1353800	1353750	1353700	1353650	1353600	1353550	1353500	1353450	1353400	1353350	1353300	1353250
623600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623650	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
623850	235	233	230	228	226	223	221	217	215	212	210	208	205	203	199	197	194	192	190	187	185	182	179	176
623900	55	53	50	48	46	43	41	37	35	32	30	28	25	23	19	17	14	12	10	7	5	2	0	0
623950	1555	1553	1550	1548	1546	1543	1541	1537	1535	1532	1530	1528	1525	1523	1519	1517	1514	1512	1510	1507	1505	1502	1499	1496
624000	726	1027	740	1180	739	743	761	896	774	1048	760	763	767	770	803	920	780	784	1003	1034	918	1218	800	804
624050	497	576	457	691	131	155	245	324	265	482	209	305	720	408	144	274	173	254	511	590	433	749	79	104
624100	588	667	746	613	362	256	335	414	493	572	499	695	508	322	284	364	390	522	601	680	760	839	437	250
624150	678	757	836	916	266	346	425	504	583	662	742	535	296	390	374	454	533	612	691	770	850	929	260	340
624200	768	847	926	721	496	436	515	594	673	752	832	911	888	702	464	544	623	702	781	860	940	782	428	430
624250	858	937	1016	1093	868	526	605	684	763	842	922	971	677	491	554	634	713	792	871	950	1030	1109	835	520
624300	948	1027	1106	1186	536	818	696	775	854	934	1013	1092	629	955	709	724	804	883	962	1042	1121	1200	532	611
624350	1038	1117	1196	1086	760	707	786	865	944	1024	1103	1182	1057	871	736	815	894	973	1052	1132	1211	1226	914	701
624400	1128	1207	1286	1366	971	797	876	955	1034	1114	1193	1031	845	746	826	905	984	1063	1142	1222	1301	1380	948	791
624450	1218	1297	1376	1072	865	887	966	1045	1124	1204	1283	1362	1438	1252	916	995	1074	1153	1232	1312	1391	1152	859	881
624500	1308	1387	1466	1444	1237	977	1056	1135	1214	1294	1373	1424	1225	1039	1006	1085	1164	1243	1322	1402	1481	1559	1266	971
624550	1399	1478	1558	1637	988	1067	1146	1225	1304	1384	1463	1542	1068	1238	1096	1175	1254	1333	1412	1492	1571	1650	982	1061
624600	1489	1568	1648	1484	1180	1157	1238	1315	1394	1474	1553	1632	1606	1392	1186	1265	1344	1423	1502	1582	1681	1640	1219	1151
624650	1579	1658	1738	1817	1553	1247	1326	1405	1484	1564	1643	1580	1394	1207	1276	1355	1434	1513	1592	1672	1751	1830	1626	1241
624700	1669	1748	1828	1907	1258	1337	1416	1495	1574	1654	1733	1812	1847	1484	1366	1445	1524	1603	1682	1762	1841	1904	1252	1331
624750	1759	1838	1918	1789	1596	1428	1507	1586	1666	1745	1824	1903	1775	1588	1456	1536	1615	1694	1774	1853	1932	1966	1637	1422
624800	1849	1928	2008	2087	1592	1518	1597	1676	1756	1835	1914	1993	1562	1468	1547	1626	1705	1784	1864	1943	2022	2101	1638	1512
624850	1939	2018	2098	1876	1559	1608	1687	1766	1846	1925	2004	2083	2155	1558	1637	1716	1795	1874	1954	2033	2112	1836	1590	1602
624900	2029	2108	2188	2246	1939	1698	1777	1856	1936	2015	2094	2129	1943	1757	1727	1806	1885	1964	2044	2123	2202	2243	1997	1705
624950	2119	2198	2279	2358	1709	1788	1867	1946	2026	2105	2184	2167	1754	1738	1817	1896	1975	2054	2134	2213	2292	2371	1728	1894
625000	2210	2290	2369	2443	2093	1878	1957	2036	2116	2195	2274	2353	2323	1897	1907	1986	2065	2144	2224	2303	2382	2104	1832	2065
625050	2300	2380	2459	2538	2362	1968	2047	2126	2206	2285	2364	2298	2112	1925	1997	2076	2155	2022	2040	2393	1950	2012	1904	2040
625100	2381	2455	2549	2628	1979	2058	2137	2216	2296	2375	2454	2533	2119	2436	2501	2192	2502	2273	1708	1921	1782	1831	1880	1930
625150	2398	2473	2638	2489	2335	2148	2160	2306	2386	2399	2454	2543	2578	2522	2526	2550	2573	2597	2620	2140	1673	1722	1771	1820
625200	2339	2435	2508	2431	2161	2160	2160	2299	2298	2292	2315	2339	2362	2386	2408	2432	2455	2479	2502	1660	1564	1613	1662	1711
625250	2357	2200	2137	2778	2742	2081	2104	2128	2150	2174	2197	2221	2244	2287	2291	2314	2338	2360	2384	2251	1454	1504	1553	1602
625300	2375	2149	2078	2728	2430	1963	1986	2009	2033	2056	2080	2102	2126	2149	2173	2196	2220	2243	2267	2150	1505	1394	1444	1493
625350	1752	1986	2201	2632	2495	2358	2101	1891	1915	1938	1962	1985	2009	2032	2056	2078	2102	2125	2149	1858	1235	1284	1334	1384
625400	1781	1897	2228	2524	2548	2570	1796	1774	1798	1820	1844	1867	1891	1914	1938	1961	1985	2008	2032	2054	2032	1452	1225	1274
625450	1810	1931	2284	2406	2430	2453	1955	1818	1680	1703	1727	1750	1774	1796	1820	1843	1867	1890	1914	1937	1961	1495	1115	1165
625500	1838	1976	2261	2288	2311	2335	2358	1978	1562	1585	1609	1632	1656	1679	1703	1726	1750	1772	1795	1818	1219	974	1006	1056
625550	1867	2023	2147	2171	2194	2218	2240	1738	1445	1468	1492	1514	1537	1561	1584	1608	1631	1655	1678	1702	1523	1423	1219	1016
625600	1896	1998	2029	2053	2076	2100	2123	2147	2102	1350	1373	1397	1420	1444	1466	1490	1513	1537	1560	1584	1607	1349	787	836
625650	1920	1913	1912	1936	1958	1982	2005	2029	1999	1232	1255	1279	1302	1326	1349	1373	1396	1420	1442	1466	1489	1121	936	727
625700	1890	1771	1794	1818	1641	1665	1888	1912	1874	1699	1458	1162	1164	1208	1231	1255	1278	1302	1325	1349	1372	1396	920	618
625750	1806	1654	1676	1700	1723	1747	1770	1794	1817	1840	1102	1044	1067	1091	1114	1138	1160	1164	1207	1231	1254	1192	607	509
625800	1618	1536	1559	1583	1606	1628	1652	1675	1899	1710	1296	1159	949	973	996	1020	1043	1067	1090	1112	1136	1159	1183	562
625850	1394	1417	1441	1464	1488	1511	1535	1558	1582	1604	1628	1216	832	854	878	901	925	948	972	995	1019	1042	948	290
625900	1277	1300	1324	1346	1370	1393	1417	1440	1484	1487	1511	983	756	737	761	784	808	830	854	877	901	924	948	859
625950	1776	1363	1206	1229	1253	1276	1300	1322	1346	1369	1393	1416	1421	619	643	666	690	713	737	760	784	806	830	853
626000	1776	1464	1088	1111	1135	1158	1182	1205	1229	1252	1276	1298	1068	502	526	548	572	595	619	642	665	611	600	736
626050	1242	998	1073	994	1018	1040	1064	1087	1111	1134	1157	1181	1176	1039	463	431	455	478	502	524	548	196	278	1315
626100	1328	1278	1272	1000	899	923	948	970	992	1016	1039	1063	1086	1110	290	313	337	360	337	193	284	1231	1920	1340
626150	1415	1116	875	758	781	805	828	852	875	899	922	946	968	989	636	499	215	242	242	794	1775	1552	797	43
626200	1313	1147	1038	1063	664	688	710	734	757	781	804	828	851	875	704	582	56	439	1504	1763	1008	254	426	427
626250	1198	1165	1133	844	546	570	593	617	640	664	686	710	733	757	221	158	1163	1920	1219	466	144	600	0	0
626300	1082	1050	1018	797	814	452	475	499	522	546	569	593	413	336	1271	1886	1430	677	0	600	95	0	0	0
626350	967	935	902	869	671	335	358	382	401	370	308	443	835	1723	1642	888	134	587	306	0	0	0	0	0
626400	851	818	786	754	530	658	240	263	240	122	319	1368	1853	1099	346	305	517	0	0	0	0	0	0	0
626450	736	703	671	638	606	574	390	85	163	1152	1920	1310	557	24	600	0	0	0	0	0	0	0	0	0
626500	620	588	556	523	491	362	103	761	1786	1522	768	13	600	186	0	0	0	0	0	0	0	0	0	0
626550	505	462	388	251	124	479	1464	1733	979	224	468	397	0	0	0	0	0	0	0	0	0	0	0	0
626600	389	330	125	198	1204	1920	1190	436	184	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626650	274	241	982	1920	1400	647	0	600	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626700	640	1680	1612	858	104	600	276	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626750	1823	1069	316	344	487	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626800	527	64	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626850	600	156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
626950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
627200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Written by: STEVEN [illegible] Date: 02/04/30 (YY/MM/DD) Reviewed by: ______ Date: __/__/__ (YY/MM/DD)

Client: OMNI Project: OHD FACILITY Project/Proposal No.: FW0400 Task No.: 03

TOTAL SETTLEMENT

$$S_{TOTAL} = S_{SUB\text{-}GRADE} + S_{UNDIFF.} + S_{HAWTORNE}$$

SETTLEMENT OF SUBGRADE FILL

$$S_{SUB\text{-}GRADE} = H_o \frac{\Delta \sigma_{WASTE}}{E} SF$$

$$H_o = (89.0\,ft - 80.0\,ft) = 9.0\,ft$$

$$E = \frac{G_{MAX}}{3}\left[2(1+\nu)\right]$$ (EQUATION 8 OF "GEOTECH INVEST. REPORT")

$$G_{MAX} = 1000\,K_2\,(\sigma_m)^{1/2}$$ (EQUATION 9 OF "GEOTECHNICAL INVEST. REPORT")

NOTE: σ_m CALCULATED AT DEPTH OF $\left(\frac{H_o}{2}\right)$

$$\sigma_m = \frac{1}{3}\left(\frac{\gamma_{SUB\text{-}FILL} H_o}{2} + 0.5\frac{\gamma_{SUB\text{-}FILL} H_o}{2} + 0.5\frac{\gamma_{SUB} H_o}{2}\right)$$

$$\sigma_m = \frac{1}{3}\left(\gamma_{SUB\text{-}FILL} H_o\right)$$

$$G_{MAX} = 1000\,K_2\left(\frac{\gamma_{SUB\text{-}FILL} H_o}{3}\right)^{1/2}$$

$$E = \frac{1}{3}\left[1000\,K_2\left(\frac{\gamma_{SUB\text{-}FILL} H_o}{3}\right)^{1/2}\right]\left[2(1+\nu)\right]$$

$$E = \frac{1}{3}\left[1000(70)\left(\frac{(120\,pcf)(9\,ft)}{3}\right)^{1/2}\right]\left[2(1+0.3)\right]$$

$$E = 1{,}151{,}069\ lb/ft^2$$

6T[illegible]

$$S_{SUB\text{-}GRADE} = (9\,ft)\frac{4636\,lb/ft^2}{(1151069\,lb/ft^2)}(1.5)$$

$$S_{SUB\text{-}GRADE} = 0.054\,ft$$

Unit weight × depth = stress

Written by: Steven Rapp Date: 02 / 04 / 30 (YY MM DD) Reviewed by: ______ Date: __/__/__ (YY MM DD)

Client: OMNI Project: OUD Facility Project/Proposal No.: FW0400 Task No.: 03

SETTLEMENT OF POST-HAWTHORN UNDIFF. SANDS

$$S_{UNDIFF\text{-}SANDS} = \sum_{i=1}^{16} H_{0,i} \frac{\Delta \sigma_{WASTE}}{E_i} SF \quad \text{EQUATION 3}$$

NOTE THAT E_i's ARE SHOWN IN FIGURE 4, AND WERE CALCULATED IN "GEOTECH. INVES. REPORT"

$$S_{UNDIFF\text{-}SANDS} = (1.5)(4{,}636\ lb/ft^2) * \left\{ \frac{(10\ ft)}{(744695\ psf)} + \frac{(10\ ft)}{(834085\ psf)} + \frac{(10\ ft)}{(923475\ psf)} + \frac{(10\ ft)}{(1012865\ psf)} + \frac{(10\ ft)}{(1102255\ psf)} + \frac{(10\ ft)}{(1191645\ psf)} + \frac{(10\ ft)}{(1281035\ psf)} + \frac{(10\ ft)}{(1370425\ psf)} + \frac{(10\ ft)}{(1459815\ psf)} + \left[\frac{(10\ ft)}{(1500000\ psf)}\right]*6 + \left(\frac{(5\ ft)}{(1500000\ psf)}\right) \right\}$$

$$\underline{S_{UNDIFF\text{-}SANDS} = 0.896\ ft}$$

$S_{UNDIFF\text{-}SANDS} = 0.8979\ ft$ ← FROM SPREADSHEET SOLN.

∴ O.K. ✓✓

Written by: STEVEN DAPP Date: 02/04/30 (YY/MM/DD) Reviewed by: ____ Date: __/__/__ (YY/MM/DD)

Client: OMNI Project: OHD FACILITY Project/Proposal No.: FW0400 Task No.: 03

SETTLEMENT HAWTHORN

$$S_{HAWTHORN} = \sum_{i=1}^{4} H_{0,i} \frac{\Delta\sigma_{WASTE}}{E_i} SF$$ ← EQUATION 3 FOR FOUR COARSE-GRAIN LAYERS

$$+ H_0 C_{CE} \log\left[\frac{\sigma'_{INITIAL} + \Delta\sigma_{SUBGRADE + WASTE}}{\sigma'_{INITIAL}}\right] SF$$ ← EQUATION 4 FOR TWO FINE-GRAIN LAYERS

NOTE: (1) THAT E_i's FOR COARSE-GRAIN LAYER'S IS SHOWN IN FIGURE 4 AND WERE CALCULATED IN "GEOTECH. INVEST. REPORT"

(2) C_{CE} WAS GIVEN AS 0.10 FOR THE FINE-GRAINE LAYER'S IN "GEOTECH INVEST. REPORT"

$$S_{HAWTHORN} = (1.5)(4{,}636\ lb/ft^2) * \left\{ \frac{(34.65\ ft)}{(2290557\ PSF)} + \frac{(34.65\ ft)}{(2556631\ PSF)} + \frac{(32.3\ ft)}{(2{,}748{,}723\ PSF)} + \frac{(32.3\ ft)}{(2{,}939{,}820\ PSF)} \right\}$$

$$+ (7.7\ ft)(0.10) \log\left[\frac{(\overset{\sigma_{initial}}{10178}\ PSF) + (4636\ PSF + 1018\ PSF)}{(10178\ PSF)}\right](1.5)$$

$$+ (3.4\ ft)(0.10) \log\left[\frac{(13992\ PSF) + (4636\ PSF + 1018\ PSF)}{(13992\ PSF)}\right](1.5)$$

$$S_{HAWTHORN} = \underbrace{0.358\ ft}_{COARSE\ GRAIN} + \underbrace{0.297\ ft}_{FINE\ GRAIN}$$

$$S_{HAWTHORN} = 0.654\ ft$$

$S_{HAWTHORN} = 0.657\ ft$ ← FROM SPREADSHEET SOLN.

∴ O.K. ✓✓

$$S_{TOTAL} = S_{SUB\text{-}GRADE} + S_{SANDIFF\text{-}SANDS} + S_{HAWTHORN}$$

$$S_{TOTAL} = (0.054\ ft) + (0.896\ ft) + (0.654\ ft)$$

$$\boxed{S_{TOTAL} = 1.604\ ft}$$

$S_{TOTAL} = 1.610\ ft$ ← FROM SPREADSHEET SOLN.

∴ O.K. ✓✓

ATTACHMENT 6

Subgrade Elevations: Post-Settlement

Subgrade Elevations: Post-Settlement (sheet 1 of 6)

NORTHING (ft)

EASTING (ft)	1358000	1357950	1357900	1357850	1357800	1357750	1357700	1357650	1357600	1357550	1357500	1357450	1357400	1357350	1357300	1357250	1357200	1357150	1357100	1357050	1357000	1356950	1356900	1356850
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.0	83.2	83.2	83.2	83.2	83.2	83.1	83.1	83.1	83.1	83.0	83.0	83.0	83.0
623900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	82.5	80.3	81.7	81.7	81.7	81.7	81.7	81.6	81.6	81.6	81.6	81.6	81.5	81.5	81.5
623950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.3	88.0	92.3	94.1	94.1	94.1	94.1	94.1	94.1	94.0	94.0	94.0	94.0	93.9	93.9	93.9
624000	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.5	90.8	94.7	87.1	84.0	83.9	84.0	84.0	84.0	85.5	84.1	84.1	84.1	84.2	84.2	84.2	84.6
624050	80.0	80.0	80.0	80.0	80.0	80.0	82.1	88.2	94.5	81.4	80.1	80.4	80.7	81.1	81.5	81.7	82.0	80.9	81.3	81.5	82.2	82.8	83.5	83.7
624100	80.0	80.0	80.0	80.0	80.0	82.5	80.8	92.9	86.5	80.2	81.3	81.4	81.7	81.9	82.2	82.4	82.7	82.8	83.2	83.4	83.7	83.9	84.2	84.5
624150	80.0	80.0	80.0	80.0	80.0	83.8	82.3	94.7	83.2	80.5	81.4	82.1	82.3	82.6	82.9	83.1	83.4	83.6	83.9	84.1	84.4	84.6	84.9	85.1
624200	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.8	83.0	80.6	81.7	82.4	83.0	83.3	83.6	83.8	84.1	84.3	84.6	84.8	85.1	85.3	85.6	85.8
624250	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.8	83.0	81.2	81.9	82.6	83.3	84.2	84.5	84.7	85.0	85.2	85.5	85.8	86.0	86.3	86.5	86.8
624300	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.8	83.0	81.5	82.2	82.9	83.5	84.5	85.4	85.7	85.9	86.2	86.4	86.7	86.9	87.2	87.4	87.7
624350	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.8	83.3	81.8	82.5	83.1	83.8	84.6	85.6	86.6	86.8	87.1	87.3	87.6	87.8	88.1	88.3	88.6
624400	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.8	84.6	82.0	82.7	83.4	84.0	84.8	85.8	86.8	87.7	88.0	88.3	88.5	88.8	89.0	89.3	89.5
624450	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.8	83.0	81.0	83.0	83.6	84.3	85.0	86.0	87.0	88.0	88.9	89.2	89.4	89.7	89.9	90.2	90.4
624500	80.0	80.0	80.0	80.0	80.0	83.9	82.4	94.8	83.0	81.1	83.2	83.9	84.5	85.2	86.2	87.2	68.2	89.1	90.1	90.3	90.6	90.8	91.1	91.4
624550	80.0	80.0	80.0	60.0	80.0	83.5	81.8	94.2	84.3	81.5	83.5	84.2	84.9	85.6	86.4	87.4	88.3	89.3	90.3	91.3	91.5	91.8	92.0	92.3
624600	80.0	80.0	80.0	80.0	80.0	81.1	80.0	90.7	90.5	82.1	83.9	84.6	85.3	86.0	86.2	87.1	88.0	89.0	90.5	91.5	91.3	92.7	92.9	93.2
624650	80.0	80.0	80.0	80.0	80.0	80.0	85.0	85.5	95.9	85.3	84.3	85.0	84.4	86.4	85.0	86.7	87.1	86.8	90.7	91.7	89.4	93.0	93.8	93.9
624700	80.0	80.0	80.0	60.0	80.0	80.0	82.9	80.1	91.3	90.3	82.3	84.1	82.8	84.7	83.7	84.9	85.0	85.5	87.9	90.0	87.8	90.3	89.9	89.5
624750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	85.9	95.9	81.8	82.1	82.2	82.7	83.2	83.7	84.2	65.0	85.7	86.5	87.0	87.6	88.1	88.7
624800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.3	80.5	91.7	89.0	80.8	81.7	82.2	82.7	83.2	83.6	84.4	85.1	85.7	86.2	86.8	87.4	87.9
624850	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	84.5	86.3	95.9	81.0	81.0	81.7	82.2	82.7	83.1	83.8	84.3	84.9	85.5	86.0	86.6	87.1
624900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.6	80.9	92.1	88.4	80.1	81.2	81.7	82.2	82.6	83.1	83.6	84.1	84.7	85.2	85.8	86.3
624950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.0	86.7	95.9	80.5	80.5	81.2	81.6	82.1	82.6	83.0	83.4	83.9	84.5	85.0	85.6
625000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.0	81.3	92.5	87.9	79.9	80.6	81.1	81.6	82.0	82.5	82.9	83.4	83.8	84.3	84.8
625050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.5	87.1	95.8	82.1	79.9	80.4	80.9	81.4	81.9	82.4	82.8	83.3	83.7	84.2
625100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.1	80.7	90.3	94.8	86.4	80.7	79.7	80.4	81.3	81.8	82.3	82.7	83.2	83.6
625150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.2	88.2	93.2	95.9	91.5	86.0	80.6	80.8	81.7	82.1	81.9	83.0
625200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	81.9	81.4	85.4	89.3	93.3	95.9	91.3	86.8	81.7	80.2	81.0
625250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.6	85.0	81.3	81.5	85.4	89.4	93.3	95.9	91.2	85.8
625300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.6	85.0	81.2	81.6	85.5	89.5	93.4
625350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.7	85.0	81.1	81.7
625400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.8
625450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Subgrade Elevations: Post-Settlement (sheet 2 of 6)

EASTING (ft) \ NORTHING (ft)	1356800	1356750	1356700	1356650	1356600	1356550	1356500	1356450	1356400	1356350	1356300	1356250	1356200	1356150	1356100	1356050	1356000	1355950	1355900	1355850	1355800	1355750	1355700	1355650
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	83.0	82.9	82.9	82.9	82.9	82.9	82.8	82.8	82.8	82.8	82.7	82.7	82.7	82.7	82.7	82.6	82.6	82.6	82.6	82.6	82.5	82.5	82.5	82.5
623900	81.5	81.4	81.4	81.4	81.4	81.4	81.3	81.3	61.3	81.3	81.3	81.2	81.2	81.2	81.2	81.2	81.1	81.1	81.1	81.1	81.1	81.0	81.0	81.0
623950	93.9	93.9	93.8	93.8	93.8	93.8	93.8	93.7	93.7	93.7	93.7	93.6	93.6	93.6	93.6	93.6	93.6	93.5	93.5	93.5	93.5	93.4	93.4	93.4
624000	87.1	84.3	84.3	84.4	84.4	84.4	84.5	84.8	85.9	84.5	84.6	86.2	86.9	85.8	88.8	84.7	84.8	88.3	89.2	84.8	84.9	85.6	86.3	85.0
624050	84.0	83.1	81.9	82.6	82.9	84.6	83.3	80.5	80.8	80.9	81.7	83.6	84.2	83.0	85.6	82.5	83.6	87.6	88.2	81.6	80.2	81.2	81.9	81.5
624100	84.7	85.0	85.2	85.5	84.3	83.3	82.0	81.4	82.0	82.3	83.4	84.0	84.7	85.4	86.0	85.4	87.4	88.1	88.7	87.0	81.1	81.7	82.4	83.1
624150	85.4	85.6	85.9	86.1	85.4	82.2	84.7	81.8	82.5	83.2	83.8	84.5	85.2	85.8	86.5	87.2	87.9	88.5	85.8	80.9	81.5	82.2	82.9	83.5
624200	86.1	86.4	86.6	86.9	87.1	87.4	85.3	82.3	83.0	83.6	84.3	85.0	85.7	86.3	87.0	87.7	88.4	89.0	89.7	86.1	82.0	82.7	83.4	84.0
624250	87.0	87.3	87.5	87.8	88.0	88.3	84.0	83.0	83.7	84.3	85.0	85.7	86.4	87.0	87.7	88.4	89.0	89.7	90.4	86.0	82.7	83.4	84.1	84.7
624300	87.9	88.2	88.4	88.7	88.9	85.9	83.0	83.7	84.4	85.0	85.7	86.4	87.1	87.7	88.4	89.1	89.7	90.4	88.8	83.4	83.4	84.1	84.8	85.4
624350	88.9	89.1	89.4	89.6	89.9	90.1	87.2	84.4	85.1	85.7	86.4	87.1	87.7	88.4	89.1	89.8	90.4	91.1	91.8	90.1	84.1	84.8	85.5	86.1
624400	89.8	90.0	90.3	90.5	89.6	86.5	84.4	85.1	85.7	86.4	87.1	87.8	88.4	89.1	89.8	90.5	91.1	91.8	91.6	85.4	84.8	85.5	86.2	86.8
624450	90.7	90.9	91.2	91.5	90.5	89.2	86.0	85.8	86.4	87.1	87.8	88.5	89.1	89.8	90.5	91.2	91.8	92.5	92.7	87.5	85.5	86.2	86.8	87.5
624500	91.6	91.9	92.1	92.4	91.3	90.0	87.8	86.5	87.1	87.8	88.5	89.2	89.8	90.5	91.2	91.9	92.5	93.2	93.9	92.0	86.2	86.9	87.5	88.2
624550	92.5	92.8	93.0	93.3	92.4	88.0	86.5	87.2	87.8	88.5	89.2	89.8	90.5	91.2	91.9	92.5	93.2	93.9	91.1	86.2	86.9	87.6	88.2	88.9
624600	93.4	93.7	94.0	94.1	93.5	92.6	91.0	87.8	88.5	89.2	89.9	90.5	91.2	91.9	92.6	93.2	93.9	94.6	95.3	92.2	88.2	88.2	88.9	89.6
624650	92.3	93.1	92.9	92.6	92.9	90.0	88.3	88.0	89.2	89.9	90.1	91.2	91.9	92.2	93.3	93.9	94.4	95.3	96.0	91.4	88.2	88.9	89.6	90.2
624700	90.1	90.9	91.1	91.7	92.3	90.1	88.4	88.0	89.1	89.8	90.1	91.2	91.9	92.3	93.2	93.9	94.5	95.2	95.9	91.9	88.4	89.7	90.0	90.0
624750	89.3	89.8	90.4	90.9	91.5	92.0	90.2	87.8	88.5	89.1	89.8	90.5	91.2	91.8	92.5	93.2	93.9	94.6	95.0	91.8	88.4	88.3	89.2	89.5
624800	88.5	89.0	89.6	90.1	90.7	88.5	86.4	67.1	87.8	88.4	89.1	89.8	90.5	91.2	91.8	92.5	93.2	93.9	91.5	86.2	86.8	87.5	88.2	88.8
624850	87.7	88.2	88.8	89.4	89.9	89.5	87.5	86.4	87.1	87.8	88.4	89.1	89.8	90.5	91.1	91.8	92.5	93.2	93.8	92.4	86.1	86.8	87.5	88.1
624900	86.9	87.5	88.0	88.6	89.1	89.5	85.0	85.7	86.4	87.1	87.7	88.4	89.1	89.8	90.4	91.1	91.8	92.5	93.1	87.3	85.4	86.1	86.8	87.5
624950	86.1	86.7	87.2	87.8	88.3	86.3	84.3	85.0	85.7	86.4	87.0	87.7	88.4	89.1	89.7	90.4	91.1	91.8	92.0	85.7	84.7	85.4	86.1	86.8
625000	85.3	85.9	86.4	87.0	87.6	88.1	86.0	84.3	85.0	85.7	86.3	87.0	87.7	88.4	89.0	89.7	90.4	91.1	91.8	90.1	85.3	84.7	85.4	86.1
625050	84.6	85.1	85.7	86.2	86.8	84.8	83.0	83.6	84.3	85.0	85.7	86.3	87.0	87.7	88.4	89.0	89.7	90.4	90.8	83.4	83.4	84.0	84.7	85.4
625100	84.1	84.5	85.0	85.4	86.0	86.3	83.2	82.9	83.6	84.3	85.0	85.6	86.3	87.0	87.7	88.3	89.0	89.7	90.4	86.2	82.7	83.3	84.0	84.7
625150	83.5	84.0	84.4	84.9	85.3	84.9	82.3	82.2	82.9	83.6	84.3	84.9	85.6	86.3	87.0	87.6	88.3	89.0	89.7	85.6	82.0	82.7	83.3	84.0
625200	82.2	83.4	83.9	84.3	84.8	82.5	81.1	81.8	82.5	83.1	83.8	84.5	85.2	85.8	86.5	87.2	87.8	88.5	86.1	80.9	81.5	82.2	82.9	83.5
625250	80.4	80.5	82.9	83.7	84.2	84.7	82.6	81.3	82.0	82.7	83.4	84.0	84.7	85.4	86.0	86.1	87.4	88.1	88.7	87.2	81.1	81.7	82.4	83.1
625300	95.9	91.1	85.7	81.0	83.6	81.1	80.2	80.5	81.5	82.2	81.3	83.5	84.2	82.5	85.5	83.4	84.0	87.6	88.2	83.9	80.5	81.2	81.9	81.4
625350	85.6	89.5	93.5	95.9	92.2	86.8	86.3	86.3	87.4	87.0	86.2	86.1	88.5	86.8	89.6	88.3	86.0	86.0	90.8	87.2	85.9	85.9	87.1	86.2
625400	85.0	81.0	81.7	85.7	89.6	92.1	92.4	92.4	92.5	92.5	92.5	92.5	92.6	92.6	92.6	92.6	92.6	92.7	92.7	92.7	92.7	92.7	92.8	92.8
625450	80.0	80.0	83.9	85.0	81.1	80.0	80.0	80.0	80.1	80.1	80.1	80.1	80.1	80.2	80.2	80.2	80.2	80.2	80.3	80.3	80.3	80.3	80.4	80.4
625500	80.0	80.0	80.0	80.0	80.0	81.2	81.5	81.5	81.5	81.6	81.6	81.6	81.6	81.7	81.7	81.7	81.7	81.7	81.8	81.8	81.8	81.8	81.8	81.9
625550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Subgrade Elevations: Post-Settlement (sheet 3 of 6)

EASTING (ft) \ NORTHING (ft)	1355600	1355550	1355500	1355450	1355400	1355350	1355300	1355250	1355200	1355150	1355100	1355050	1355000	1354950	1354900	1354850	1354800	1354750	1354700	1354650	1354600	1354550	1354500	1354450
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	82.5	82.4	82.4	82.4	82.4	82.4	82.3	82.3	82.3	82.3	82.2	82.2	82.2	82.2	82.2	82.1	82.1	82.1	82.1	82.1	82.0	82.0	82.0	82.0
623900	81.0	80.9	80.9	80.9	80.9	80.9	80.8	80.8	80.8	80.8	80.8	80.7	80.7	80.7	80.7	80.8	80.6	80.6	80.6	80.8	80.5	80.5	80.5	80.5
623950	93.4	93.4	93.3	93.3	93.3	93.3	93.3	93.2	93.2	93.2	93.2	93.1	93.1	93.1	93.1	93.1	93.0	93.0	93.0	93.0	93.0	92.9	92.9	92.9
624000	85.0	87.7	86.2	87.4	89.1	85.1	85.2	90.5	87.1	86.0	88.6	85.3	85.3	88.0	86.3	85.4	85.4	89.1	88.0	85.5	85.6	86.9	85.9	85.7
624050	82.4	83.9	84.6	84.8	85.9	83.7	84.9	87.9	81.7	80.9	81.7	81.3	82.0	83.7	84.4	82.6	85.7	84.6	83.6	84.8	80.2	81.5	80.5	81.5
624100	83.8	84.4	85.1	85.8	86.4	87.0	87.8	88.5	82.2	81.5	82.2	82.6	83.5	84.2	84.9	85.6	86.2	86.9	85.4	82.7	81.3	82.0	82.0	83.3
624150	84.2	84.9	85.6	86.2	86.9	87.6	88.2	86.4	81.3	82.0	82.7	83.3	84.0	84.7	85.3	86.0	86.7	87.4	85.8	83.6	81.8	82.4	83.1	83.8
624200	84.7	85.4	86.1	86.8	87.4	88.1	87.4	85.0	81.8	82.5	83.2	83.9	84.6	85.2	85.9	86.6	87.3	87.9	88.6	86.3	82.4	83.0	83.7	84.4
624250	85.4	86.1	86.8	87.4	88.1	88.8	89.5	89.0	82.6	83.2	83.9	84.6	85.3	85.9	86.6	87.3	88.0	88.6	85.9	83.2	83.1	83.7	84.4	85.1
624300	86.1	86.8	87.5	88.2	88.8	89.5	90.2	84.2	83.2	83.9	84.6	85.3	86.0	86.6	87.3	88.0	88.7	89.3	90.0	84.2	83.8	84.4	85.1	85.8
624350	86.8	87.5	88.2	88.9	89.5	90.2	90.9	87.8	83.9	84.6	85.3	86.0	86.7	87.3	88.0	88.7	89.4	90.0	89.8	87.1	84.5	85.1	85.8	86.5
624400	87.5	88.2	88.9	89.5	90.2	90.9	91.6	92.3	84.6	85.3	86.0	86.7	87.4	88.0	88.7	89.4	90.1	89.4	86.7	84.5	85.1	85.8	86.5	87.2
624450	88.2	88.9	89.6	90.2	90.9	91.6	92.3	87.5	85.3	86.0	86.7	87.4	88.0	88.7	89.4	90.1	90.8	91.4	92.1	86.0	85.8	86.5	87.2	87.9
624500	88.9	89.6	90.3	90.9	91.6	92.3	93.0	91.5	88.4	86.7	87.4	88.1	88.7	89.4	90.1	90.8	91.5	92.1	90.6	87.9	86.5	87.2	87.9	88.6
624550	89.6	90.3	91.0	91.6	92.3	93.0	93.7	91.3	86.7	87.4	88.1	88.8	89.4	90.1	90.8	91.5	92.2	92.8	91.8	86.6	87.2	87.9	88.6	89.3
624600	90.3	91.0	91.6	92.3	93.0	93.7	94.4	90.7	87.4	88.1	88.8	89.4	90.1	90.8	91.5	92.2	92.8	93.5	94.2	91.9	89.1	88.6	89.3	90.0
624650	91.0	91.7	92.3	93.0	93.7	94.4	95.1	94.7	88.1	88.8	89.5	90.1	90.8	91.5	92.2	92.9	93.5	94.2	91.4	88.7	88.6	89.3	90.0	90.7
624700	91.0	92.4	93.0	93.7	94.4	95.1	95.8	89.8	88.8	89.5	90.2	90.8	91.5	92.2	92.9	93.6	94.2	94.9	91.2	88.6	89.3	90.0	90.7	91.4
624750	91.5	91.6	93.9	93.4	94.3	95.9	96.6	93.9	91.4	90.2	90.9	91.6	92.2	92.9	93.6	94.3	94.9	95.6	95.4	92.6	90.0	90.7	91.4	92.1
624800	89.5	90.3	92.4	91.6	92.6	94.5	96.8	98.1	92.3	91.1	91.8	92.4	93.1	93.8	94.4	95.1	95.8	95.1	92.3	90.1	90.8	91.5	92.1	92.8
624850	88.8	89.5	90.2	90.8	91.5	92.2	94.6	95.3	94.2	92.6	92.6	93.3	93.9	94.6	95.3	95.9	96.7	97.3	97.9	91.0	91.6	92.3	93.0	93.6
624900	88.1	88.8	89.5	90.1	90.8	91.5	92.2	92.8	93.5	94.2	93.4	94.1	96.2	95.8	96.1	96.9	97.6	98.2	96.6	93.8	92.5	93.1	93.8	94.5
624950	87.4	88.1	88.8	89.4	90.1	90.8	91.5	92.1	92.8	93.5	94.1	94.8	95.5	96.2	96.4	97.2	98.2	98.4	94.9	92.3	93.3	94.0	94.7	95.3
625000	86.7	87.4	88.1	88.7	89.4	90.1	90.8	91.4	92.1	92.8	93.4	94.1	94.8	95.5	96.1	96.8	96.6	93.4	96.3	92.5	94.1	94.4	95.5	96.2
625050	86.1	86.7	87.4	88.1	88.7	89.4	90.1	90.7	91.4	92.1	92.8	93.4	94.1	94.8	93.3	93.5	95.0	90.5	91.5	92.6	94.0	94.6	96.3	96.5
625100	85.4	86.0	86.7	87.4	88.0	88.7	89.4	90.0	90.7	91.4	92.1	92.7	93.2	92.2	93.3	88.7	90.0	90.7	91.7	92.7	93.7	95.0	96.3	96.9
625150	84.7	85.3	86.0	86.7	87.3	88.0	88.7	89.4	90.0	90.7	91.4	92.0	90.5	88.2	89.8	88.9	89.9	91.0	92.0	93.0	94.0	94.9	95.9	97.1
625200	84.2	84.8	85.4	86.0	86.6	87.3	88.0	88.7	89.3	90.0	90.7	91.3	90.6	87.2	88.2	89.2	90.2	91.2	92.2	93.2	94.1	95.0	96.0	96.9
625250	83.7	84.4	84.9	85.5	86.0	86.6	87.3	88.0	88.4	88.6	85.2	88.1	87.3	87.4	88.4	89.4	90.4	91.4	92.3	93.3	94.2	95.2	96.1	97.1
625300	82.9	83.9	84.5	84.8	85.5	85.9	86.2	87.3	83.0	87.8	84.8	85.6	86.6	87.6	88.6	89.6	90.6	91.5	92.5	93.4	94.4	95.3	96.3	95.9
625350	84.6	80.3	80.6	82.5	84.5	83.2	82.9	85.6	83.0	84.9	84.8	85.8	86.8	87.8	88.8	89.8	90.7	91.7	92.6	93.6	94.5	94.0	96.4	93.5
625400	93.8	95.9	87.3	80.1	82.2	84.2	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0	89.9	90.9	91.8	92.7	93.7	94.1	90.6	92.9	92.7
625450	81.7	86.8	94.6	87.3	80.5	80.5	81.3	82.2	83.2	84.2	85.2	86.2	87.2	88.1	89.1	90.0	91.0	91.9	91.4	90.3	93.1	90.5	91.4	92.4
625500	83.9	81.8	86.9	95.9	81.1	80.8	81.6	82.4	83.4	84.4	85.4	86.4	87.3	88.3	89.2	90.2	88.5	90.0	90.6	88.9	89.8	90.7	91.7	92.6
625550	80.0	83.8	80.9	91.9	89.0	80.5	81.9	82.7	83.7	84.6	85.6	86.5	87.5	88.4	87.6	89.5	87.6	87.3	88.3	89.1	90.0	91.0	91.9	92.8
625600	80.0	80.0	84.5	86.1	95.9	83.5	82.0	82.7	83.8	84.8	85.7	86.6	86.5	88.5	84.7	85.6	86.6	87.5	88.4	89.3	90.3	91.2	92.1	93.0
625650	80.0	80.0	83.3	80.4	91.4	89.6	80.7	83.2	84.0	84.9	85.8	86.8	83.1	84.3	84.9	85.9	86.8	87.7	88.6	89.6	90.5	91.4	92.3	93.3
625700	80.0	80.0	80.0	85.0	85.6	95.9	82.4	83.5	84.3	83.6	82.3	83.5	83.3	84.2	85.2	86.1	87.0	87.9	88.9	89.8	90.7	91.6	92.5	93.5
625750	80.0	80.0	80.0	82.8	80.0	90.9	91.7	83.3	82.7	81.5	81.7	82.6	83.5	84.5	85.4	86.3	87.2	88.2	89.1	90.0	90.9	91.9	92.8	93.7
625800	80.0	80.0	80.0	80.0	85.0	85.2	95.9	83.6	80.3	81.3	82.0	82.8	83.8	84.7	85.6	86.5	87.5	88.4	89.3	90.2	91.2	92.1	93.0	93.9
625850	80.0	80.0	80.0	80.0	82.3	80.0	90.4	91.0	80.1	81.7	82.4	83.1	84.0	84.9	85.8	86.8	87.7	88.6	89.5	90.5	91.4	92.3	93.2	94.0
625900	80.0	80.0	80.0	80.0	80.0	85.0	84.7	95.6	84.9	82.0	82.6	83.5	84.2	85.1	86.1	87.0	87.9	88.8	89.8	90.7	91.6	92.5	93.4	94.1
625950	80.0	80.0	80.0	80.0	80.0	81.8	80.0	89.9	92.2	80.1	82.8	83.9	84.6	85.4	86.3	87.2	88.1	89.1	90.0	90.9	91.8	92.4	93.7	94.1
626000	80.0	80.0	80.0	80.0	80.0	80.0	85.0	84.1	95.1	86.0	83.5	84.2	85.0	85.7	86.5	87.4	88.4	89.3	90.2	91.1	92.0	92.1	92.5	93.1
626050	80.0	80.0	80.0	80.0	80.0	80.0	81.3	80.1	89.4	93.2	79.9	83.0	85.3	86.1	86.8	87.7	88.6	89.5	89.1	89.5	90.4	90.9	91.6	92.1
626100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	83.7	94.7	85.2	82.4	85.7	86.4	87.2	87.9	87.4	88.8	89.7	88.8	89.5	90.2	90.9	91.2
626150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.8	80.8	88.9	93.1	83.3	86.1	86.8	86.2	87.8	87.1	87.3	87.8	88.1	88.8	89.5	90.2	90.2
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	83.2	94.2	89.2	84.3	87.2	84.6	85.7	86.0	86.0	86.7	87.4	88.1	88.8	89.4	89.2
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.3	81.5	88.4	93.8	79.8	84.3	84.0	84.4	84.9	85.4	86.0	86.7	87.4	88.1	88.5	88.3
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	82.7	93.7	86.5	81.3	83.4	83.9	84.4	84.8	85.3	86.0	86.7	87.4	87.5	87.3
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.1	87.9	94.4	79.5	82.0	83.4	83.8	84.3	84.8	85.3	86.0	86.7	86.6	86.3
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	82.2	93.2	87.2	80.6	82.4	83.3	83.8	84.2	84.7	85.3	85.8	85.6	85.4
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.8	87.4	95.1	80.0	81.6	82.8	83.3	83.7	84.2	84.6	84.8	84.7	84.6
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.6	81.7	92.7	88.9	81.7	82.2	82.7	83.2	83.6	84.1	84.1	84.0	83.9
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.5	86.9	95.8	80.7	81.7	82.2	82.7	83.1	83.5	83.4	83.3	83.2
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.1	81.2	92.2	88.6	80.4	81.6	82.1	82.6	82.9	82.7	82.6	82.5
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.1	86.4	95.9	81.4	80.8	81.6	82.1	82.2	82.0	81.9	81.8
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.6	80.7	91.7	89.3	80.0	81.0	81.6	81.5	81.3	81.0	80.3
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.8	85.9	95.9	83.5	80.1	80.8	80.4	80.1	82.5	91.1
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	83.0	80.0	89.4	95.8	86.9	82.1	82.8	88.8	95.9	90.6
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	85.0	80.5	87.6	92.9	95.4	95.1	91.8	86.1	80.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	84.4	82.4	81.0	83.2	82.8	80.0	84.4	83.0
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	82.8	84.7	84.3	82.1	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Subgrade Elevations: Post-Settlement (sheet 4 of 6)

NORTHING (ft)

EASTING (ft)	1354400	1354350	1354300	1354250	1354200	1354150	1354100	1354050	1354000	1353950	1353900	1353850	1353800	1353750	1353700	1353650	1353600	1353550	1353500	1353450	1353400	1353350	1353300	1353250
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	81.9	81.9	81.9	81.9	81.9	81.8	81.8	81.8	81.8	81.8	81.7	81.7	81.7	81.7	81.6	81.6	81.6	81.6	81.6	81.5	81.5	81.5	81.5	81.5
623900	80.5	80.4	80.4	80.4	80.4	80.4	80.3	80.3	80.3	80.3	80.2	80.2	80.2	80.2	80.2	80.1	80.1	80.1	80.1	80.1	80.0	80.0	80.0	80.0
623950	92.9	92.8	92.8	92.8	92.8	92.8	92.7	92.7	92.7	92.7	92.7	92.6	92.6	92.6	92.6	92.5	92.5	92.5	92.5	92.5	92.4	92.4	92.4	92.4
624000	85.7	88.2	85.8	89.5	85.8	85.8	86.0	87.1	86.1	88.4	86.0	86.0	86.0	86.1	86.3	87.3	86.1	86.2	88.0	88.3	87.3	89.8	86.3	86.4
624050	83.5	84.2	83.2	85.1	80.4	80.6	81.4	82.1	81.6	83.4	81.1	81.9	85.4	82.8	80.5	81.6	80.8	81.5	83.6	84.3	83.0	85.6	80.0	80.2
624100	84.0	84.7	85.3	84.2	82.1	81.2	81.9	82.5	83.2	83.9	83.3	84.9	83.3	81.8	81.4	82.1	82.3	83.5	84.1	84.8	85.5	86.1	82.7	81.2
624150	84.5	85.1	85.8	86.5	81.0	81.7	82.3	83.0	83.7	84.3	85.0	83.3	61.2	82.0	81.9	82.6	83.2	83.9	84.6	85.3	85.9	86.6	80.9	81.6
624200	85.1	85.7	86.4	84.7	82.8	82.3	83.0	83.6	84.3	85.0	85.7	86.3	86.1	84.6	82.6	83.2	83.9	84.6	85.3	85.9	86.6	85.3	82.3	82.3
624250	85.8	86.4	87.1	87.8	85.9	83.0	83.7	84.3	85.0	85.7	86.4	86.8	84.3	82.7	83.3	83.9	84.6	85.3	86.0	86.6	87.3	88.0	85.7	83.0
624300	86.5	87.1	87.8	88.5	83.0	83.7	84.4	85.0	85.7	86.4	87.1	87.7	83.8	86.6	84.5	84.6	85.3	88.0	86.7	87.4	88.0	88.7	83.0	83.7
624350	87.2	87.8	88.5	87.6	84.8	84.4	85.1	85.7	86.4	87.1	87.8	88.4	87.4	85.8	84.7	85.3	86.0	86.7	87.4	88.1	88.7	88.9	86.2	84.4
624400	87.9	88.5	89.2	89.9	86.5	85.1	85.8	86.4	87.1	87.8	88.5	87.1	85.5	84.7	85.4	86.0	86.7	87.4	88.1	88.8	89.4	90.1	88.4	85.1
624450	88.6	89.2	89.9	87.3	85.6	85.8	86.4	87.1	87.8	88.5	89.2	89.8	90.5	88.9	86.1	86.7	87.4	68.1	88.8	89.4	90.1	88.1	85.6	85.8
624500	89.3	89.9	90.6	90.4	88.7	86.5	87.1	87.8	88.5	89.2	89.9	90.3	88.6	87.0	86.8	87.4	88.1	88.8	89.5	90.1	90.8	91.5	89.0	86.5
624550	90.0	90.6	91.3	92.0	86.5	87.2	87.8	88.5	89.2	89.9	90.6	91.2	87.2	88.7	87.5	88.1	88.8	89.5	90.2	90.8	91.5	92.2	86.5	87.2
624600	90.7	91.3	92.0	90.6	88.0	87.9	88.5	89.2	89.9	90.6	91.2	91.9	91.7	89.9	88.1	88.8	89.5	90.2	90.9	91.5	92.2	92.0	88.5	87.9
624650	91.3	92.0	92.7	93.4	91.1	88.5	89.2	89.9	90.6	91.3	91.9	91.4	89.8	88.3	88.8	89.5	90.2	90.9	91.6	92.2	92.9	93.6	91.9	88.6
624700	92.0	92.7	93.4	94.1	88.6	89.2	89.9	90.6	91.3	92.0	92.6	93.3	93.6	90.5	89.5	90.2	90.9	91.6	92.2	92.9	93.6	94.2	88.6	89.3
624750	92.7	93.4	94.1	93.0	91.4	89.9	90.6	91.3	92.0	92.7	93.3	94.0	92.9	91.3	90.2	90.9	91.6	92.3	93.0	93.6	94.3	94.6	91.8	90.0
624800	93.5	94.1	94.8	95.5	91.3	90.6	91.3	92.0	92.7	93.4	94.0	94.7	91.0	90.2	90.9	91.6	92.3	93.0	93.6	94.3	95.0	95.7	91.7	90.7
624850	94.3	95.0	95.7	93.8	91.1	91.4	92.1	92.8	93.5	94.1	94.8	95.5	96.1	91.0	91.7	92.3	93.0	93.7	94.3	95.0	95.7	93.4	91.3	91.4
624900	95.2	95.8	96.5	97.0	94.3	92.2	92.9	93.6	94.3	95.0	95.6	95.9	94.4	92.8	92.5	93.2	93.8	94.5	95.2	95.8	96.5	96.9	94.8	92.3
624950	96.0	96.7	97.3	97.9	92.3	92.9	93.7	94.4	95.1	95.8	96.5	96.3	92.8	92.7	93.3	94.0	94.7	95.3	96.0	96.7	97.4	98.0	92.5	93.9
625000	96.8	97.5	98.1	98.6	95.6	93.7	94.4	95.2	95.9	96.7	97.3	98.0	97.7	94.1	94.2	94.8	95.5	96.2	96.9	97.5	98.2	95.8	93.5	95.5
625050	97.6	98.2	98.8	99.4	97.9	94.5	95.2	96.0	96.7	97.5	98.2	97.6	96.0	94.4	95.0	95.7	96.4	95.2	95.4	98.4	94.6	95.1	94.2	95.3
625100	98.3	98.8	99.6	100.2	94.6	95.3	96.0	96.8	97.5	98.2	99.0	99.7	96.1	98.8	99.4	96.7	99.4	97.4	92.6	94.4	93.2	93.6	94.1	94.5
625150	98.4	99.0	100.3	99.0	97.6	96.1	96.2	97.5	98.3	98.5	99.0	99.8	100.1	99.6	99.6	99.8	100.0	100.2	100.4	96.3	92.4	92.8	93.2	93.6
625200	97.9	98.6	99.2	98.5	96.1	96.2	96.3	97.5	97.6	97.6	97.8	98.1	98.3	98.5	98.7	98.9	99.1	99.3	99.5	92.3	91.5	91.9	92.3	92.7
625250	98.0	96.6	96.0	101.4	101.1	95.5	95.8	96.1	96.3	96.6	96.9	97.1	97.4	97.6	97.8	98.0	98.2	98.4	98.6	97.4	90.6	91.1	91.5	91.9
625300	98.1	96.2	95.5	100.9	98.5	94.5	94.8	95.1	95.3	95.6	95.9	96.1	96.4	96.6	96.8	97.0	97.2	97.4	97.6	96.6	91.1	90.2	90.6	91.0
625350	92.8	94.7	96.5	100.1	99.0	97.9	95.8	94.1	94.4	94.6	94.9	95.2	95.4	95.7	95.9	96.1	96.3	96.5	96.7	94.2	88.9	89.3	89.7	90.2
625400	93.0	94.0	96.7	99.2	99.5	99.8	93.2	93.1	93.4	93.6	93.9	94.2	94.4	94.7	95.0	95.2	95.4	95.5	95.7	95.9	95.7	90.8	88.9	89.3
625450	93.3	94.2	97.2	98.2	98.5	98.8	94.6	93.5	92.4	92.7	92.9	93.2	93.5	93.7	94.0	94.2	94.4	94.6	94.8	95.0	95.2	91.2	88.0	88.4
625500	93.5	94.6	97.0	97.3	97.5	97.8	98.1	94.9	91.4	91.7	92.0	92.2	92.5	92.7	93.0	93.2	93.5	93.7	93.9	94.1	89.0	86.9	87.2	87.6
625550	93.7	95.0	96.0	96.3	96.5	96.8	97.1	92.9	90.4	90.7	91.0	91.2	91.5	91.8	92.0	92.3	92.5	92.7	92.9	93.1	91.8	90.8	89.0	87.3
625600	93.9	94.7	95.0	95.3	95.6	95.8	96.1	96.4	96.1	89.7	90.0	90.2	90.5	90.8	91.0	91.3	91.5	91.8	92.0	92.2	92.4	90.2	85.4	85.8
625650	94.1	94.0	94.0	94.3	94.6	94.9	95.1	95.4	95.2	88.7	89.0	89.3	89.5	89.8	90.0	90.3	90.6	90.8	91.1	91.3	91.4	88.3	86.7	85.0
625700	93.9	92.8	93.1	93.3	93.6	93.9	94.1	94.4	94.2	92.7	90.7	88.3	88.5	88.8	89.1	89.3	89.6	89.8	90.1	90.3	90.5	90.7	86.7	84.1
625750	93.1	91.8	92.1	92.4	92.6	92.9	93.2	93.4	93.7	93.9	87.7	87.3	87.6	87.8	88.1	88.3	88.6	88.9	89.1	89.4	89.6	89.0	84.1	83.2
625800	91.5	90.8	91.1	91.4	91.6	91.9	92.2	92.4	92.7	92.9	89.4	88.3	86.6	86.9	87.1	87.4	87.6	87.9	88.1	88.4	88.6	88.8	89.0	83.8
625850	89.6	89.8	90.1	90.4	90.7	90.9	91.2	91.4	91.7	92.0	92.2	88.8	85.6	85.9	86.1	86.4	86.6	86.9	87.2	87.4	87.7	87.9	87.1	81.5
625900	88.6	88.9	89.1	89.4	89.7	89.9	90.2	90.5	90.7	91.0	91.3	86.8	85.0	84.9	85.1	85.4	85.7	85.9	86.2	88.4	86.7	86.9	87.1	86.4
625950	92.9	89.4	88.2	88.4	88.7	89.0	89.2	89.5	89.8	90.0	90.3	90.5	90.6	83.9	84.2	84.4	84.7	84.9	85.2	85.4	85.7	85.9	86.2	86.4
626000	92.9	90.3	87.2	87.4	87.7	88.0	88.2	88.5	88.8	89.0	89.3	89.6	87.7	82.9	83.2	83.4	63.7	84.0	84.2	84.5	84.7	84.3	84.4	85.6
626050	88.4	86.4	87.1	86.5	86.7	87.0	87.3	87.5	87.8	88.1	88.3	88.6	88.6	87.5	82.7	82.5	82.7	83.0	83.2	83.5	83.9	81.0	81.9	90.7
626100	89.1	88.8	88.8	86.5	85.7	86.0	86.3	86.5	86.8	87.1	87.3	87.6	87.9	88.1	81.2	61.5	81.8	82.1	82.1	81.0	81.9	90.0	95.9	91.1
626150	89.9	87.4	85.4	84.5	84.8	85.0	85.3	85.6	85.8	86.1	86.4	86.6	86.9	87.1	84.3	83.2	81.0	81.4	81.5	86.3	94.6	92.8	86.6	80.4
626200	89.0	87.7	86.8	87.1	83.6	84.1	84.3	84.6	84.8	85.1	85.4	85.7	86.0	86.4	85.1	84.2	79.9	83.2	92.3	94.6	88.3	82.1	83.5	83.5
626250	88.1	87.9	87.7	85.3	82.8	83.1	83.3	83.6	83.9	84.2	84.6	85.0	85.3	85.6	81.2	80.8	89.4	95.9	90.1	83.9	81.2	85.0	80.0	80.0
626300	87.1	86.9	86.7	84.9	85.1	82.1	82.4	82.8	83.2	83.5	83.9	84.2	82.8	82.3	90.3	95.6	91.8	85.6	80.0	85.0	80.8	80.0	80.0	80.0
626350	86.1	85.9	85.7	85.5	84.0	81.4	81.7	82.1	82.4	82.3	81.9	83.2	86.6	94.2	93.6	87.3	81.1	84.9	82.5	80.0	80.0	80.0	80.0	80.0
626400	85.2	85.1	85.0	84.9	83.1	84.4	81.0	81.3	81.3	80.4	82.2	91.2	95.3	89.1	82.9	82.5	84.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	84.5	84.4	84.3	84.2	84.1	83.9	82.5	80.1	80.9	89.3	95.9	90.8	84.6	80.2	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	83.8	83.7	83.6	83.5	83.3	82.4	80.3	86.0	94.7	92.6	86.4	80.1	85.0	81.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626550	83.1	82.9	82.4	81.4	80.5	83.6	92.2	94.3	88.1	81.9	83.9	83.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	82.4	82.0	80.4	81.2	89.8	95.9	89.8	83.6	81.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	81.6	81.5	87.9	95.9	91.6	85.3	80.0	85.0	80.5	80.0	80.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	84.9	93.8	93.3	87.1	80.9	85.0	82.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	95.1	88.8	82.6	82.8	84.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	84.4	80.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	85.0	81.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

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Subgrade Elevations: Post-Settlement (sheet 5 of 6)

EASTING (ft) \ NORTHING (ft)	1353200	1353150	1353100	1353050	1353000	1352950	1352900	1352850	1352800	1352750	1352700	1352650	1352600	1352550	1352500	1352450	1352400	1352350	1352300	1352250	1352200	1352150	1352100	1352050
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	81.4	81.4	81.4	81.4	81.4	81.3	81.3	81.3	81.3	81.3	81.2	81.2	81.2	81.2	81.1	81.1	81.1	81.1	81.1	81.0	81.0	81.0	81.0	81.0
623900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623950	92.4	92.3	92.3	92.3	92.3	92.2	92.2	92.2	92.2	92.2	92.2	92.1	92.1	92.1	92.1	92.0	92.0	92.0	92.0	92.0	91.9	91.9	91.9	91.9
624000	87.0	87.6	86.4	88.5	88.8	87.7	88.8	90.0	86.8	88.8	87.3	87.8	86.7	86.8	89.0	88.2	88.8	90.2	86.9	86.9	89.6	90.3	87.0	87.0
624050	81.3	81.6	81.4	81.9	84.0	83.2	85.0	88.0	82.7	82.5	80.7	81.8	81.1	81.7	83.7	84.3	83.4	85.7	82.9	85.1	88.8	85.8	81.5	81.3
624100	81.8	82.5	83.2	83.8	84.5	85.2	85.8	88.5	87.0	82.8	81.5	82.1	82.5	83.5	84.2	84.8	85.5	86.2	85.8	87.2	86.8	85.9	85.0	84.1
624150	82.3	83.0	83.7	84.3	85.0	85.7	88.4	87.0	82.0	81.3	82.0	82.7	83.3	84.0	84.7	85.3	88.0	88.7	87.3	87.9	87.1	86.2	85.3	84.4
624200	83.0	83.7	84.3	85.0	85.7	86.4	87.0	87.7	87.2	82.0	82.7	83.3	84.0	84.7	85.4	86.0	86.7	87.4	88.0	88.7	88.0	88.7	85.8	84.9
624250	83.7	84.4	85.0	85.7	88.4	87.1	87.8	88.4	87.1	82.9	83.4	84.0	84.7	85.4	88.1	88.7	87.4	88.1	88.7	88.8	88.1	87.1	88.3	85.4
624300	84.4	85.1	85.8	86.4	87.1	87.8	88.5	89.1	85.1	83.4	84.1	84.7	85.4	86.1	88.8	87.4	88.1	88.8	89.4	89.9	88.5	87.8	86.7	85.9
624350	85.1	85.8	88.4	87.1	87.8	88.5	89.2	89.8	90.5	84.1	84.8	85.4	86.1	88.8	87.5	88.1	88.8	89.5	90.1	90.8	89.4	88.1	87.2	86.3
624400	85.8	88.5	87.1	87.8	88.5	89.2	89.9	90.5	87.3	84.8	85.5	88.1	88.8	87.5	88.2	88.8	89.5	90.2	90.8	91.5	90.2	88.5	87.7	88.8
624450	86.5	87.2	87.8	88.5	89.2	89.9	90.8	91.2	88.8	85.5	88.2	88.8	87.5	88.2	88.9	89.5	90.2	90.9	91.5	92.2	90.5	89.0	88.1	87.3
624500	87.2	87.9	88.5	89.2	89.9	90.6	91.3	91.9	92.4	88.2	86.9	87.5	88.2	88.9	89.6	90.2	90.9	91.6	92.2	91.5	90.3	89.5	88.8	87.8
624550	87.9	88.6	89.2	89.9	90.6	91.3	92.0	92.8	87.5	88.9	87.6	88.2	88.9	89.6	90.3	90.9	91.8	92.3	93.0	93.1	91.4	90.0	89.1	88.2
624600	88.6	89.3	89.9	90.6	91.3	92.0	92.8	93.3	93.1	87.6	88.3	88.9	89.6	90.3	91.0	91.8	92.3	93.0	93.7	94.3	93.0	90.4	89.6	88.7
624650	89.3	89.9	90.8	91.3	92.0	92.7	93.3	94.0	92.6	88.4	89.0	89.6	90.3	91.0	91.7	92.3	93.0	93.7	94.3	93.1	91.8	90.9	90.0	89.2
624700	90.0	90.6	91.3	92.0	92.7	93.4	94.0	94.7	91.0	89.0	89.7	90.3	91.0	91.7	92.3	93.0	93.7	94.4	95.0	95.6	92.2	91.4	90.4	89.4
624750	90.7	91.3	92.0	92.7	93.4	94.1	94.7	95.4	96.1	90.6	90.3	91.0	91.7	92.4	93.0	93.7	94.4	95.1	95.7	96.1	93.7	91.5	90.6	69.6
624800	91.4	92.0	92.7	93.4	94.1	94.8	95.4	96.1	92.8	90.4	91.0	91.7	92.4	93.1	93.7	94.4	95.1	95.8	96.4	95.3	93.1	91.7	90.7	89.7
624850	92.1	92.7	93.4	94.1	94.8	95.5	96.1	96.8	93.9	91.1	91.7	92.4	93.1	93.8	94.4	95.1	95.8	98.5	97.1	97.8	95.4	92.0	90.9	89.9
624900	92.8	93.5	94.3	94.8	95.5	98.3	98.8	98.3	97.9	93.5	92.0	92.6	93.7	94.1	94.4	95.7	98.1	96.7	97.8	98.1	95.9	92.3	92.3	90.3
624950	93.7	94.4	96.4	96.9	96.8	98.8	100.0	100.1	99.2	95.8	93.0	92.5	93.2	93.9	94.5	95.2	95.9	96.6	97.3	98.0	96.4	94.1	93.1	91.3
625000	94.6	95.6	97.4	97.9	98.3	98.7	99.1	99.5	91.3	95.3	91.2	91.8	92.5	93.2	93.9	94.5	95.2	95.9	96.8	96.5	95.2	93.9	92.9	91.9
625050	95.7	96.2	96.6	97.0	97.4	97.8	98.2	98.7	95.3	92.1	90.5	91.1	91.8	92.5	93.2	93.9	94.5	95.2	95.9	96.1	95.3	93.7	92.7	91.7
625100	94.9	95.3	95.7	96.1	98.6	97.0	97.4	98.5	94.5	89.1	89.8	90.5	91.1	91.8	92.5	93.2	93.8	94.5	95.2	95.9	94.8	93.5	92.5	91.6
625150	94.0	94.4	94.9	95.3	95.7	96.1	96.5	93.8	91.5	88.4	89.1	89.8	90.4	91.1	91.8	92.5	93.1	93.8	94.5	94.4	94.2	93.4	92.4	91.4
625200	93.2	93.6	94.0	94.4	94.8	95.2	95.7	96.1	96.2	88.6	88.4	89.1	89.7	90.4	91.1	91.8	92.5	93.1	93.8	94.5	93.6	92.9	92.2	91.2
625250	92.3	92.7	93.1	93.5	94.0	94.4	94.8	94.9	87.7	87.0	87.7	88.4	89.1	89.7	90.4	91.1	91.8	92.4	92.5	92.5	92.2	92.0	91.7	91.0
625300	91.4	91.8	92.3	92.7	93.1	93.5	93.9	94.3	93.4	87.6	87.0	87.7	88.4	89.0	89.7	90.4	91.1	91.7	92.4	91.8	91.3	91.0	90.8	90.5
625350	90.6	91.0	91.4	91.8	92.2	92.6	93.1	93.5	90.2	85.6	86.3	87.0	87.7	88.3	89.0	89.7	90.4	91.0	91.7	92.4	91.5	90.1	89.9	89.6
625400	89.7	90.1	90.5	91.0	91.4	91.8	92.2	92.6	88.3	84.9	85.8	88.3	87.0	87.6	88.3	89.0	89.7	90.3	91.0	90.9	90.3	89.3	89.0	88.7
625450	88.9	89.3	89.7	90.1	90.5	90.9	91.3	91.7	90.5	84.3	84.9	85.6	86.3	86.9	87.6	88.3	89.0	89.6	90.3	89.6	89.2	88.6	88.0	87.8
625500	88.0	88.4	88.8	89.2	89.6	90.1	90.5	90.1	85.4	83.8	84.2	84.9	85.8	86.3	86.9	87.6	88.3	88.9	89.6	90.3	89.3	87.6	87.1	86.9
625550	87.1	87.5	87.9	88.4	88.8	89.2	89.6	90.0	90.4	82.9	83.5	84.2	84.9	85.8	86.2	86.9	87.6	88.2	88.9	87.6	86.7	88.4	86.2	85.9
625600	86.3	86.7	87.1	87.5	87.9	88.3	88.7	89.2	89.6	84.9	82.8	83.5	84.2	84.9	85.5	86.2	86.9	87.5	88.2	88.8	86.6	85.5	85.3	85.0
625650	85.4	85.8	86.2	86.6	87.0	87.5	87.9	85.8	81.7	85.0	82.1	82.8	83.5	84.1	84.8	85.5	86.2	86.8	87.5	87.0	84.9	84.6	84.3	84.1
625700	84.5	84.9	85.4	85.8	86.2	86.6	87.1	85.5	84.1	81.5	81.6	82.3	82.7	83.6	84.3	84.9	85.6	88.3	86.5	86.3	84.6	83.8	83.6	83.3
625750	83.7	84.1	84.5	84.9	85.3	85.9	84.7	83.6	87.0	84.0	80.8	81.8	81.1	82.5	83.8	84.5	84.2	85.8	83.6	86.4	84.1	82.5	82.0	81.4
625800	82.8	83.2	83.6	84.1	84.6	82.9	80.6	81.4	83.5	83.6	83.8	85.1	83.5	83.5	88.1	85.0	85.2	88.0	83.3	83.3	83.3	83.2	83.2	83.2
625850	81.9	82.3	82.3	83.4	83.9	84.4	91.4	95.9	94.5	94.4	94.4	94.4	94.4	94.5	94.5	94.5	94.5	94.6	94.8	94.6	94.6	94.6	94.7	94.7
625900	81.0	81.2	80.3	80.5	89.1	95.9	90.3	84.6	82.1	82.0	82.0	82.0	82.0	82.1	82.1	82.1	82.1	82.1	82.2	82.2	82.2	82.2	82.3	82.3
625950	81.5	80.5	87.8	95.2	92.1	85.8	80.0	85.0	83.6	83.5	83.5	83.5	83.5	83.6	83.6	83.6	83.6	83.6	83.7	83.7	83.7	83.8	85.0	83.8
626000	86.8	93.2	93.8	87.6	81.4	84.5	82.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.3	83.0	84.7	83.3
626050	95.6	89.3	83.1	82.2	84.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.2	82.9	84.6	83.3
626100	84.9	80.0	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.1	82.8	84.4	83.2
626150	85.0	81.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.0	82.7	84.1	83.2
626200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.9	82.6	83.9	83.1
626250	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.8	82.5	83.6	83.1
626300	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.7	82.4	83.4	83.1
626350	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.6	82.3	83.2	83.0
626400	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.5	82.2	82.9	82.9
626450	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.5	82.1	82.7	82.7
626500	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.4	82.0	82.4	82.4
626550	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.3	82.0	82.2	82.2
626600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.2	81.9	81.9	81.9
626650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.1	81.7	81.7	81.7
626700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.5	81.5	81.5
626750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.2	81.2	81.2
626800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.0	81.0	81.0
626850	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.7	80.7	80.7
626900	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.5	80.5	80.5
626950	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.2	80.2	80.2
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Subgrade Elevations: Post-Settlement (sheet 6 of 6)

EASTING (ft)	NORTHING (ft) 1352000	1351950	1351900	1351850	1351800	1351750	1351700	1351650	1351600	1351550	1351500	1351450	1351400	1351350	1351300	1351250	1351200	1351150	1351100
623600	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623650	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623700	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623750	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623800	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623850	80.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623900	80.0	83.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
623950	91.0	87.6	81.8	85.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624000	88.8	94.5	92.0	83.6	84.7	80.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624050	80.8	80.0	91.4	92.5	84.0	84.1	80.7	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624100	83.2	81.8	79.6	90.9	92.9	84.4	83.8	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624150	83.7	82.8	81.1	80.7	91.0	93.4	84.8	83.1	81.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624200	84.1	83.3	82.7	82.0	80.2	89.7	93.7	85.2	82.5	81.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624250	84.5	83.7	83.0	82.3	81.7	80.0	89.2	94.1	85.8	82.0	82.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624300	85.0	84.1	83.3	82.7	82.0	81.3	79.8	88.8	94.8	88.0	81.5	82.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624350	85.5	84.8	83.7	83.0	82.3	81.7	80.8	79.7	88.1	95.0	85.9	83.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0
624400	85.9	85.1	84.2	83.4	82.8	82.0	81.3	80.6	79.7	88.4	92.8	81.8	84.0	80.0	80.0	80.0	80.0	80.0	80.0
624450	86.4	85.5	84.7	83.8	83.0	82.3	81.7	81.0	80.2	80.2	95.9	85.5	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624500	88.9	88.0	85.2	84.3	83.4	82.8	82.0	81.3	80.5	79.6	93.9	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624550	87.4	88.5	85.8	84.8	83.9	82.9	82.2	81.8	80.8	79.7	93.9	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624600	87.8	87.0	88.1	85.1	84.1	83.1	82.5	81.8	81.1	79.7	93.9	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624650	88.2	87.2	88.2	85.2	84.3	83.4	82.7	82.1	81.4	79.8	93.9	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624700	88.4	87.4	88.4	85.4	84.4	83.8	83.0	82.3	81.8	80.0	93.9	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624750	88.6	87.6	86.8	85.8	84.8	83.9	83.2	82.6	81.9	80.2	93.9	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624800	88.8	87.8	86.8	85.8	84.8	84.1	83.5	82.8	82.1	81.1	94.1	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624850	89.2	88.4	87.7	88.0	85.7	84.5	84.4	83.2	82.9	81.7	94.1	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624900	90.4	88.3	88.5	88.4	86.7	85.0	85.5	83.8	83.5	80.0	93.9	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
624950	91.1	89.3	89.1	87.4	87.2	85.8	85.9	84.4	83.1	80.0	93.9	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625000	90.9	90.0	89.0	88.0	87.0	88.3	85.7	85.0	84.3	83.6	94.4	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625050	90.8	89.8	88.8	87.8	86.8	88.1	85.4	84.8	84.1	82.1	94.4	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625100	90.6	89.6	88.6	87.8	86.6	85.8	85.2	84.5	83.8	80.7	93.9	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625150	90.4	89.4	88.4	87.4	88.4	85.8	84.9	84.2	83.6	80.6	93.9	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625200	90.2	89.2	88.2	87.2	86.2	85.3	84.7	84.0	83.3	80.1	93.9	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625250	90.0	89.0	88.0	87.1	86.1	85.1	84.4	83.7	82.7	80.1	93.9	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625300	89.8	88.8	87.9	86.9	85.9	84.9	84.2	83.5	82.3	79.9	93.9	88.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625350	89.4	88.7	87.7	86.7	85.7	84.7	83.9	83.2	81.7	79.9	93.9	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625400	88.5	88.2	87.5	86.5	85.5	84.5	83.6	83.0	82.3	81.6	94.1	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625450	87.5	87.3	87.0	86.3	85.3	84.3	83.4	82.7	82.0	80.5	94.0	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625500	86.6	86.4	86.1	85.9	85.1	84.1	83.2	82.5	81.8	80.2	93.9	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625550	85.7	85.4	85.2	84.9	84.7	84.0	83.0	82.2	81.5	79.8	93.9	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625600	84.8	84.5	84.3	84.0	83.8	83.5	82.8	82.0	81.3	79.7	93.9	86.9	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625650	83.8	83.6	83.3	83.1	82.8	82.8	82.3	81.7	80.9	79.7	94.0	86.8	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625700	83.1	82.8	82.6	82.3	82.1	81.8	81.6	81.4	80.6	80.5	95.9	85.3	85.0	80.0	80.0	80.0	80.0	80.0	80.0
625750	81.3	82.1	81.9	81.6	81.4	80.8	80.6	80.3	79.7	89.0	92.5	81.3	83.8	80.0	80.0	80.0	80.0	80.0	80.0
625800	83.2	84.4	83.9	83.1	83.0	83.0	83.0	84.5	90.8	94.5	85.4	84.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625850	94.7	94.7	94.7	94.8	94.8	94.8	94.8	94.0	90.4	84.6	82.2	81.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625900	82.3	82.3	82.3	82.4	82.4	82.4	82.4	81.7	80.0	85.0	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
625950	83.8	83.8	83.8	83.8	83.9	83.9	83.9	83.3	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626000	81.4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626050	81.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626100	81.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626150	81.3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626200	81.2	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626250	81.2	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626300	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626350	81.1	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626400	81.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626450	81.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626500	81.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626550	80.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626600	80.9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626650	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626700	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626750	80.8	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626800	80.7	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626850	80.7	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626900	80.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
626950	80.2	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627000	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627050	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627100	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627150	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
627200	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Written by: STEVEN [illegible] Date: 02 / 04 / 30 Reviewed by: ______ Date: __ / __ / __

Client: OMNI Project: OHIO FACILITY Project/Proposal No.: FW0400 Task No.: 03

SUBGRADE ELEVATION: POST - SETTLEMENT

$$h_{SUBGRADE(POST)} = h_{SUBGRADE(PRE)} + S_{TOTAL}$$

$$h_{SUBGRADE(POST)} = 89.0\,ft + (-1.60\,ft)$$

$$\boxed{h_{SUBGRADE(POST)} = 87.4\,ft}$$

$h_{SUBGRADE(POST)} = 87.4\,ft$ ← FROM SPREAD SHEET SOLN.

∴ O.K. ✓✓

ATTACHMENT 7

Maximum Subgrade Slope: Post-Settlement

Maximum Subgrade Slope: Post-Settlement (sheet 1 of 6)

NORTHING (ft)

EASTING (ft) (%)	1358000	1357950	1357900	1357850	1357800	1357750	1357700	1357650	1357600	1357550	1357500	1357450	1357400	1357350	1357300	1357250	1357200	1357150	1357100	1357050	1357000	1356950	1356900	1356850
623600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3.0	3.0	3.0	3.0
623850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	3.2	3.2	2.1	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5
623900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	2.8	9.2	10.4	11.0	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
623950	0.0	0.0	0.0	0.0	0.0	0.0	7.0	2.0	6.6	16.5	9.2	2.9	2.2	2.3	2.3	2.4	3.9	2.5	2.5	2.6	2.6	2.7	2.7	3.1
624000	0.0	0.0	0.0	0.0	0.0	5.0	2.5	6.7	18.7	7.5	16.3	14.1	13.4	13.0	12.6	12.4	12.1	13.2	12.7	12.5	11.7	11.1	10.4	10.6
624050	0.0	0.0	0.0	0.0	0.0	3.2	9.2	16.9	8.0	20.5	5.9	2.6	2.4	2.2	1.9	1.7	2.9	1.5	1.1	1.2	1.4	1.3	0.9	0.5
624100	0.0	0.0	0.0	0.0	2.5	3.9	10.4	8.7	17.0	5.3	1.8	1.7	1.7	1.6	1.5	1.5	1.4	2.8	2.7	2.7	2.2	1.9	1.5	1.5
624150	0.0	0.0	0.0	0.0	3.8	2.7	11.0	2.1	14.7	1.8	1.7	1.3	1.5	1.5	1.5	1.5	1.5	1.6	1.5	1.5	1.5	1.5	1.5	1.5
624200	0.0	0.0	0.0	0.0	3.9	2.4	10.9	0.6	14.2	1.5	1.9	1.4	1.3	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
624250	0.0	0.0	0.0	0.0	3.9	2.4	10.9	0.6	13.6	1.4	1.5	1.4	1.7	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
624300	0.0	0.0	0.0	0.0	3.9	2.4	10.9	0.6	13.3	1.0	1.5	1.4	1.7	1.9	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
624350	0.0	0.0	0.0	0.0	3.9	2.4	10.9	0.9	13.2	1.0	1.5	1.4	1.6	1.9	2.0	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
624400	0.0	0.0	0.0	0.0	3.9	2.4	10.9	2.2	12.8	2.0	1.5	1.4	1.5	1.8	2.0	2.0	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9
624450	0.0	0.0	0.0	0.0	3.9	2.4	10.9	0.6	13.9	0.9	2.7	1.4	1.5	1.7	2.0	2.0	2.0	1.7	1.9	1.9	1.9	1.9	1.9	1.9
624500	0.0	0.0	0.0	0.0	3.9	2.5	10.9	0.9	13.7	0.6	2.8	1.5	1.4	1.7	2.0	2.0	2.0	2.0	1.7	1.9	1.9	1.9	1.9	1.9
624550	0.0	0.0	0.0	0.0	3.5	3.4	11.0	4.8	14.7	1.2	2.8	1.6	1.6	1.7	1.7	2.0	2.0	2.0	2.0	1.7	0.9	1.9	1.9	1.9
624600	0.0	0.0	0.0	0.0	1.1	3.5	10.2	13.6	14.4	7.6	2.6	1.6	1.5	1.2	1.7	1.9	2.3	3.6	2.5	0.9	2.4	2.0	1.9	1.7
624650	0.0	0.0	0.0	0.0	0.0	5.1	6.2	15.2	0.9	14.2	1.7	0.6	2.9	1.5	2.5	3.1	3.0	4.9	5.5	1.9	3.7	5.1	3.2	4.0
624700	0.0	0.0	0.0	0.0	0.0	2.9	5.0	8.5	14.2	13.9	6.7	2.9	2.2	3.8	1.8	3.3	3.0	3.4	6.7	5.2	2.4	5.8	5.8	5.2
624750	0.0	0.0	0.0	0.0	0.0	0.0	5.7	6.7	15.3	4.4	15.3	3.3	1.2	2.6	1.4	1.9	1.9	1.9	3.1	4.5	1.9	3.6	2.8	1.9
624800	0.0	0.0	0.0	0.0	0.0	0.0	3.3	5.0	8.6	12.8	17.8	7.4	1.9	1.4	1.4	1.4	1.6	1.9	1.9	1.9	1.9	1.9	1.9	1.9
624850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	7.0	15.7	6.1	16.7	1.7	1.6	1.4	1.4	1.5	1.8	1.9	1.9	1.9	1.9	1.9	1.9
624900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	4.6	8.8	11.9	19.0	7.3	2.0	1.4	1.4	1.4	1.6	1.7	1.8	1.9	1.9	1.9	1.9
624950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	7.4	16.0	7.4	17.2	1.5	1.6	1.4	1.4	1.4	1.4	1.5	1.7	1.8	1.9	1.9
625000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	4.2	9.1	11.0	19.8	7.5	1.7	1.6	1.6	1.4	1.4	1.4	1.4	1.5	1.6	1.8
625050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	7.6	17.1	5.6	21.8	6.1	1.0	2.1	1.9	1.5	1.4	1.4	1.4	1.4	1.5
625100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	3.5	6.5	20.3	7.2	19.4	16.9	10.6	4.9	1.9	1.8	1.5	1.5	2.1	1.5
625150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	1.4	6.2	17.6	9.2	5.0	13.7	16.8	15.5	9.6	4.7	1.0	3.1	3.1
625200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	2.3	8.9	10.2	13.5	12.9	8.0	5.2	12.5	15.1	15.2	9.4	3.5
625250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	4.0	5.2	5.8	9.9	10.5	13.5	12.9	8.3	4.3	13.7	16.5
625300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	5.0	3.9	5.2	6.0	10.0	10.6	13.5	12.9	7.6
625350	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	5.0	3.9	5.2	6.1	10.0	10.6
625400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	5.0	3.9	5.2
625450	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8
625500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625550	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626350	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626450	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626550	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Maximum Subgrade Slope: Post-Settlement (sheet 2 of 6)

(%)	NORTHING (ft) 1356800	1356750	1356700	1356650	1356600	1356550	1356500	1356450	1356400	1356350	1356300	1356250	1356200	1356150	1356100	1356050	1356000	1355950	1355900	1355850	1355800	1356750	1355700	1355650
EASTING (ft) 623600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623800	3.0	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.5
623850	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0
623900	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
623950	5.7	2.9	2.9	3.0	3.0	3.1	3.1	3.5	4.6	3.3	3.3	4.9	5.7	4.6	7.7	3.6	3.6	7.2	8.2	3.8	3.8	4.6	5.3	4.0
624000	9.9	11.2	12.0	11.2	10.9	9.2	10.5	13.3	12.9	12.9	12.0	10.4	9.4	10.8	8.1	11.8	10.6	7.5	6.3	12.7	13.3	12.3	11.5	12.0
624050	2.5	2.2	1.0	1.5	1.9	1.2	4.7	4.2	3.9	2.5	2.9	3.3	2.3	1.4	2.8	2.1	5.7	4.6	6.0	8.3	3.8	4.3	3.9	1.9
624100	1.5	2.6	4.1	3.6	3.3	3.3	2.4	1.3	1.9	2.6	2.7	1.6	1.6	3.1	1.0	4.8	5.0	1.6	2.7	7.7	5.4	1.7	1.6	2.5
624150	1.5	1.5	1.5	1.5	4.8	4.2	3.3	2.4	1.6	1.9	1.6	1.6	1.6	1.6	1.6	2.6	1.7	2.3	7.7	4.4	1.6	1.6	1.6	1.6
624200	1.7	1.7	1.7	1.7	2.7	6.4	5.1	2.6	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	5.5	9.2	3.6	1.8	1.8	1.8
624250	1.9	1.9	1.9	1.9	1.9	4.3	5.8	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.9	8.1	2.9	1.9	1.9	1.9
624300	1.9	1.9	1.9	1.9	3.3	6.2	3.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.7	7.1	6.8	1.5	2.0	2.0	1.9
624350	1.9	1.9	1.9	1.9	0.8	2.7	5.9	2.6	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.0	7.9	5.5	1.9	1.9	1.9
624400	1.9	1.9	1.9	2.0	4.1	5.3	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	6.5	7.3	1.4	1.9	1.9	1.9
624450	1.9	1.9	1.9	2.0	2.8	5.7	4.8	1.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.6	5.5	9.8	1.9	1.9	1.9	1.9
624500	1.9	1.9	1.9	2.0	3.1	3.7	3.6	1.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	7.8	5.3	1.9	1.9	1.9
624550	1.9	1.9	1.9	1.8	5.7	6.5	3.3	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.6	7.8	4.2	2.4	1.9	1.9	1.9
624600	0.6	0.6	0.4	0.9	1.6	3.2	5.1	2.6	1.9	1.9	1.6	1.9	1.9	1.7	1.9	1.9	1.8	1.9	5.5	8.8	4.1	1.6	1.9	1.8
624650	3.5	2.9	2.9	2.4	2.9	5.3	3.3	1.0	2.0	1.1	1.4	1.9	1.2	1.4	1.8	1.3	1.5	1.7	3.9	7.8	2.5	2.0	1.6	1.4
624700	3.4	3.5	2.7	2.0	2.2	4.4	2.8	0.7	1.9	1.2	1.4	1.9	1.3	1.4	1.8	1.5	1.5	1.6	3.5	7.5	2.2	1.7	0.5	1.2
624750	2.0	2.2	1.9	1.9	1.9	2.0	4.7	2.0	1.9	1.9	1.7	1.9	1.9	1.8	1.9	1.9	1.9	1.8	5.2	8.7	3.8	2.3	2.2	2.5
624800	1.9	1.9	1.9	1.9	2.3	5.0	3.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	7.8	4.7	2.7	2.0	2.2	1.9
624850	1.9	1.9	1.9	1.9	1.6	2.6	3.4	1.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	7.8	5.7	1.9	1.9	1.9
624900	1.9	1.9	1.9	1.9	1.9	5.2	5.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	5.5	10.2	1.8	1.9	1.9	1.9
624950	1.9	1.9	1.9	1.9	2.2	4.2	1.6	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.7	6.2	7.8	0.3	1.9	1.9	1.9
625000	1.9	1.9	1.9	1.9	1.9	2.1	4.0	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.6	6.9	5.5	1.4	1.9	1.9
625050	1.6	1.7	1.8	1.9	2.1	4.2	3.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	7.1	8.3	2.7	1.9	1.9	1.9
625100	1.4	1.4	1.5	1.7	1.7	2.8	3.4	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.6	8.0	3.2	1.9	1.9	1.9
625150	2.1	1.5	1.4	1.4	1.2	4.8	3.4	1.3	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	5.5	9.4	3.1	1.8	1.8	1.6
625200	4.0	3.8	1.8	1.5	2.1	3.7	0.8	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	2.0	1.6	2.0	7.7	4.6	1.6	1.6	1.6	1.6
625250	14.6	8.1	3.7	3.6	1.5	2.1	3.5	1.4	1.6	1.6	2.8	1.6	1.6	3.5	1.2	4.0	4.3	1.7	2.3	8.2	5.5	1.7	1.6	2.5
625300	5.7	13.6	14.7	12.3	8.0	4.1	3.7	5.1	5.7	4.3	3.1	3.6	4.0	2.0	3.7	2.7	4.4	4.7	4.3	7.8	5.5	4.4	4.7	3.2
625350	13.5	12.9	7.5	4.8	10.8	12.5	12.3	12.0	11.0	10.4	11.2	9.3	8.4	10.1	7.2	9.9	8.9	7.0	4.6	10.1	12.3	11.6	10.8	11.6
625400	6.3	10.1	10.7	13.5	12.8	7.4	6.3	6.2	7.4	6.9	6.1	6.0	8.4	6.6	9.4	8.1	5.6	5.7	10.6	6.9	5.6	5.5	6.7	5.9
625450	5.0	4.0	5.3	6.3	10.8	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	11.0
625500	0.0	0.0	3.9	5.0	1.6	1.5	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	2.1
625550	0.0	0.0	0.0	0.0	0.0	1.2	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.9
625600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626350	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626450	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626550	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

90/104

Maximum Subgrade Slope: Post-Settlement (sheet 3 of 6)

NORTHING (ft)

EASTING (ft) (%)	1355600	1355550	1355500	1355450	1355400	1355350	1355300	1355250	1355200	1355150	1355100	1355050	1355000	1354950	1354900	1354850	1354800	1354750	1354700	1354650	1354600	1354550	1354500	1354450
623600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623800	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0
623850	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5
623900	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
623950	4.0	6.8	5.2	6.5	8.2	4.3	4.3	9.6	6.3	5.2	5.8	4.6	4.6	7.3	5.6	4.8	4.8	8.5	5.4	5.0	5.0	6.3	5.4	5.2
624000	11.4	9.5	8.7	9.0	7.7	10.4	9.9	5.7	12.4	12.3	11.5	11.9	11.5	9.4	9.1	10.5	8.2	8.4	10.0	8.2	12.8	11.4	12.5	11.4
624050	2.8	4.0	1.3	2.1	2.9	2.1	5.0	3.8	8.6	4.5	4.4	2.7	3.0	4.5	1.8	1.3	2.1	3.1	0.6	4.4	5.4	4.9	3.9	3.8
624100	2.3	1.6	1.7	2.0	1.6	4.1	3.6	5.8	6.9	1.1	1.5	2.4	2.6	1.6	1.6	3.6	1.6	2.8	4.7	4.3	1.7	1.2	3.0	3.0
624150	1.7	1.7	1.7	1.7	1.7	1.7	1.3	7.8	4.4	1.7	1.7	1.8	1.7	1.7	1.7	1.7	1.7	1.4	4.9	5.4	1.5	1.7	2.2	1.7
624200	1.8	1.8	1.8	1.8	1.8	1.2	3.4	6.2	2.7	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.6	6.3	3.5	1.9	1.9	1.9
624250	1.9	2.0	2.0	2.0	2.0	2.0	2.8	7.0	5.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	2.5	5.7	3.5	1.5	1.9	1.9	1.9
624300	1.9	2.0	2.0	2.0	2.0	1.9	5.5	7.0	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	6.5	7.4	1.4	1.9	1.9	1.9
624350	1.9	1.9	1.9	1.9	1.9	1.9	2.8	10.6	3.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	0.5	4.4	5.4	2.4	1.9	1.9	1.9
624400	1.9	1.9	1.9	1.9	1.9	1.9	1.9	7.0	7.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.4	3.7	5.4	1.9	1.9	1.9	1.9	1.9
624450	1.9	1.9	1.9	1.9	1.9	1.9	4.3	7.0	4.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.1	6.7	7.2	1.5	1.9	1.9	1.9
624500	1.9	1.9	1.9	1.9	1.9	1.9	1.6	5.9	5.0	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.6	4.2	4.1	1.8	1.9	1.9	1.9
624550	1.9	1.9	1.9	1.9	1.9	1.9	2.2	7.0	4.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.4	7.2	6.0	2.9	1.9	1.9	1.9
624600	1.9	1.9	1.9	1.9	1.9	1.9	3.3	7.8	2.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.7	5.5	3.5	1.4	1.9	1.9
624650	1.7	1.9	1.9	1.9	1.9	2.0	1.4	7.0	6.1	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.6	6.3	4.3	0.6	1.9	1.9	1.9
624700	2.4	2.0	2.0	1.4	1.5	2.0	5.5	7.0	3.3	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	3.4	7.4	4.4	1.9	1.9	1.9	1.9
624750	2.6	3.2	1.9	2.2	3.0	2.3	2.3	9.8	5.0	1.7	2.1	2.1	2.1	2.1	2.0	2.0	2.0	0.5	3.2	5.6	2.4	2.0	2.0	2.0
624800	3.0	3.6	3.9	2.6	4.1	5.6	4.0	4.7	7.5	2.4	2.1	2.1	2.1	2.2	2.1	2.1	1.7	3.8	5.6	2.2	2.1	2.1	2.1	2.1
624850	1.9	2.0	3.2	2.0	2.3	4.4	5.6	5.3	2.9	3.5	1.8	2.1	3.4	2.4	2.1	2.2	2.3	3.3	7.6	7.3	2.1	2.1	2.1	2.1
624900	1.9	1.9	1.9	1.9	1.9	1.9	3.5	3.4	1.9	0.9	1.6	3.2	2.3	1.5	1.5	2.0	2.0	1.6	5.3	4.3	1.8	2.1	2.1	2.1
624950	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.3	1.3	1.9	1.0	1.1	1.8	1.6	5.8	6.1	2.1	2.4	1.8	2.1	2.1
625000	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.3	3.7	4.7	7.9	3.5	2.2	2.0	1.5	2.5	1.8
625050	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	3.3	3.1	8.3	7.3	4.4	5.0	2.5	2.0	2.4	2.0	1.5
625100	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	3.6	6.6	5.0	5.6	5.4	1.8	2.1	2.0	2.2	2.6	2.0	2.0
625150	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.6	4.6	5.1	5.2	0.5	2.0	2.1	2.1	2.1	2.0	1.9	2.2	2.5
625200	1.6	1.5	1.8	1.7	1.9	1.9	1.9	1.9	2.1	2.5	6.3	3.9	5.3	2.6	2.5	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9
625250	1.8	1.5	1.5	1.6	1.6	1.9	2.2	1.8	6.4	3.9	5.9	6.1	4.1	1.2	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.1
625300	2.6	4.3	4.5	3.2	1.9	3.5	4.6	4.0	5.4	4.1	2.2	2.9	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.2	0.7	4.0
625350	12.4	12.6	3.6	6.1	3.4	2.4	5.7	5.3	0.6	4.2	0.9	2.0	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	0.6	5.1	3.4	4.8
625400	4.2	9.2	21.1	7.1	5.7	2.9	2.7	3.9	2.0	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.2	3.5	3.4	3.7	5.4	1.1
625450	11.8	19.0	0.7	21.1	6.9	3.5	1.8	1.9	2.0	2.1	2.1	2.0	1.9	1.9	1.9	1.9	3.0	1.8	2.7	5.1	4.3	1.7	2.2	1.8
625500	1.7	4.2	19.6	7.4	17.3	0.6	1.7	1.9	2.0	2.0	2.0	1.9	1.9	1.9	2.4	0.9	3.4	5.1	3.3	1.4	3.6	1.9	1.9	1.9
625550	5.4	2.1	8.4	12.6	18.7	7.5	2.2	1.8	2.0	1.9	1.9	1.9	2.1	0.3	4.6	4.5	3.0	2.6	2.9	1.8	1.9	1.9	1.9	1.9
625600	0.0	5.9	6.6	16.2	3.6	16.6	1.4	1.9	2.1	1.9	1.9	0.8	4.8	4.5	4.0	4.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9
625650	0.0	3.3	4.5	8.2	13.8	16.4	6.4	3.4	1.7	2.2	3.9	4.2	4.0	4.7	1.6	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
625700	0.0	0.0	6.0	6.1	15.8	3.5	16.6	1.8	1.3	3.9	4.2	4.3	0.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.4
625750	0.0	0.0	2.8	5.0	8.1	15.9	15.5	9.0	4.4	2.6	1.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	0.6
625800	0.0	0.0	0.0	5.7	5.6	15.4	2.0	17.4	3.5	1.7	1.7	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5
625850	0.0	0.0	0.0	2.3	5.0	8.1	15.7	15.9	10.4	2.4	1.6	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	3.7
625900	0.0	0.0	0.0	0.0	5.5	5.0	14.9	1.1	18.3	2.8	1.5	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.6	4.9
625950	0.0	0.0	0.0	0.0	1.8	5.0	8.1	16.8	14.1	10.3	3.8	2.0	1.7	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.6	1.9	1.9	1.3
626000	0.0	0.0	0.0	0.0	0.0	5.3	4.3	14.1	3.4	17.5	3.4	1.7	1.6	1.7	1.8	1.9	1.9	1.9	2.1	2.3	1.8	1.6	2.3	2.0
626050	0.0	0.0	0.0	0.0	0.0	1.3	5.0	8.1	17.4	12.9	10.4	5.8	3.2	1.6	1.7	1.9	2.1	0.7	0.5	2.6	2.9	2.3	2.0	3.8
626100	0.0	0.0	0.0	0.0	0.0	0.0	5.1	3.7	13.0	4.6	18.0	0.6	4.1	1.6	1.5	0.2	1.8	3.2	1.3	1.4	2.1	2.0	1.7	2.6
626150	0.0	0.0	0.0	0.0	0.0	0.0	0.8	5.0	8.2	16.8	10.6	9.7	3.8	0.8	2.8	2.4	1.4	2.9	3.1	1.7	2.0	2.0	1.6	2.0
626200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	3.2	11.8	7.6	14.4	6.6	2.6	2.7	3.6	2.2	2.1	2.2	2.0	2.0	2.0	1.8	2.0
626250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	5.2	8.3	16.8	9.7	9.7	7.2	1.2	2.0	1.9	1.6	1.9	2.0	2.0	1.8	1.9	2.0
626300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	3.0	10.7	7.0	19.1	5.7	3.2	1.4	1.4	1.4	1.7	2.0	2.0	1.6	1.9	2.0
626350	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	8.2	16.8	10.7	13.8	4.7	2.4	1.4	1.4	1.5	1.8	2.0	1.7	2.0	2.0
626400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	3.0	9.7	8.7	20.0	5.2	3.1	1.8	1.4	1.4	1.5	1.8	1.9	1.9	1.8
626450	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	7.8	16.8	9.2	15.7	2.9	1.8	1.4	1.4	1.3	1.4	1.7	1.6	1.5
626500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	3.3	9.0	10.9	19.2	6.8	1.5	1.5	1.4	1.4	1.1	1.4	1.4	1.4
626550	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	7.3	16.9	7.0	15.7	2.3	1.5	1.4	1.4	1.3	1.4	1.4	1.4
626600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	3.7	8.8	12.0	19.1	7.0	2.2	1.4	1.3	1.4	1.4	1.4	1.5
626650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	6.8	16.4	5.9	17.5	1.7	1.7	1.1	1.4	1.4	1.6	2.2
626700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	4.2	8.3	13.2	18.8	8.7	2.2	1.3	1.7	2.0	1.2	10.1
626750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.4	16.1	2.4	22.3	6.5	0.6	1.6	7.8	18.5	16.2
626800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	4.8	6.5	22.0	4.9	18.8	15.2	16.1	17.5	4.0	16.0
626850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.5	5.7	18.3	9.8	2.4	3.7	12.5	16.4	7.6
626900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	2.4	8.4	10.1	10.9	11.2	9.9	6.8	4.4
626950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	3.7	4.8	3.5	3.8	4.3	4.9	3.0
627000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	4.7	4.3	2.1	0.0	0.0
627050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Maximum Subgrade Slope: Post-Settlement (sheet 4 of 6)

(%)	NORTHING (ft)																							
EASTING (ft)	1354400	1354350	1354300	1354250	1354200	1354150	1354100	1354050	1354000	1353950	1353900	1353850	1353800	1353750	1353700	1353650	1353600	1353550	1353500	1353450	1353400	1353350	1353300	1353250
623600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623800	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.5
623850	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
623900	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
623950	5.2	7.8	5.4	9.1	5.4	5.5	5.6	6.8	5.8	8.1	5.7	5.8	5.8	5.9	6.2	7.2	6.0	6.1	7.9	8.2	7.3	9.8	6.3	6.4
624000	9.7	8.7	9.7	7.7	12.9	12.1	11.4	10.7	11.2	9.3	11.8	10.7	7.2	9.8	12.1	10.9	11.8	11.2	9.1	8.2	9.6	6.9	12.9	12.2
624050	3.2	3.6	1.1	6.0	5.8	4.7	4.4	4.6	3.2	4.5	3.1	4.5	2.8	6.5	5.0	5.2	3.8	3.9	4.8	3.6	2.3	4.8	6.5	5.4
624100	1.6	1.6	2.7	3.5	3.1	1.1	1.6	1.6	2.5	0.9	4.1	1.4	5.2	2.0	1.4	1.3	2.8	3.0	1.6	1.6	3.2	2.9	5.1	1.7
624150	1.7	1.7	1.7	4.8	4.9	1.7	1.7	1.7	1.7	1.7	2.6	4.0	3.1	2.9	1.2	1.8	2.1	1.8	1.8	1.8	1.8	5.1	5.0	1.8
624200	1.9	1.9	1.7	3.9	5.5	1.3	1.9	1.9	1.9	1.9	1.9	3.6	3.5	3.6	1.9	1.9	1.9	1.9	1.9	1.9	1.5	4.5	5.6	1.6
624250	1.9	1.9	1.9	4.0	4.8	2.6	1.9	2.0	2.0	2.0	1.8	2.5	4.7	2.3	2.3	1.9	2.0	2.0	2.0	2.0	2.0	3.8	5.0	2.4
624300	1.9	1.9	1.9	4.8	4.9	2.0	2.0	2.0	2.0	2.0	2.0	3.6	3.3	3.2	2.4	1.6	2.0	2.0	2.0	2.0	2.0	5.1	5.0	2.0
624350	1.9	1.9	1.4	4.0	4.8	1.4	1.9	1.9	1.9	1.9	1.9	0.8	3.1	3.3	1.0	2.0	1.9	1.9	1.9	1.9	1.6	2.9	5.6	1.8
624400	1.9	1.9	1.9	2.7	4.9	1.6	1.9	1.9	1.9	1.9	1.6	3.3	3.9	3.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.1	5.0	1.5
624450	1.9	1.9	2.4	4.4	2.6	1.6	1.9	1.9	1.9	1.9	1.9	3.5	3.2	5.0	2.6	1.9	1.9	1.9	1.9	1.9	1.9	4.7	3.5	1.6
624500	2.0	2.0	1.5	5.1	4.1	2.1	1.9	1.9	1.9	1.9	1.8	1.9	4.6	1.9	1.4	1.9	1.9	1.9	1.9	1.9	1.9	4.5	5.1	2.3
624550	2.0	2.0	2.0	4.8	4.9	1.9	1.9	1.9	1.9	1.9	1.9	3.7	4.0	2.9	1.5	1.9	1.9	1.9	1.9	1.9	1.9	5.0	5.0	1.9
624600	1.9	1.9	1.6	4.2	5.4	1.5	1.9	1.9	1.9	1.9	1.9	0.5	3.3	3.6	1.8	1.9	1.9	1.9	1.9	1.9	1.5	4.0	6.8	1.4
624650	1.9	1.9	1.9	3.8	4.9	2.4	1.9	1.9	1.9	1.9	1.4	2.5	3.7	1.2	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.4	5.0	2.9
624700	1.9	1.9	1.9	4.9	4.8	1.9	1.9	1.9	1.9	1.9	2.0	2.8	4.2	5.1	1.4	1.9	1.9	1.9	2.0	2.0	1.9	5.1	4.9	1.9
624750	2.0	2.0	1.5	3.1	4.1	1.6	1.9	1.9	1.9	1.9	1.9	1.5	3.7	2.7	1.5	2.0	1.9	1.9	1.9	1.9	1.7	2.9	5.6	1.8
624800	2.1	2.1	2.1	3.6	4.9	1.5	2.0	2.0	2.0	2.0	2.0	3.3	5.5	0.4	2.0	2.0	2.0	1.9	1.9	1.9	1.9	3.5	5.0	1.4
624850	2.1	2.1	2.1	4.8	3.8	1.9	2.1	2.1	2.1	2.1	2.1	1.8	5.6	5.1	2.1	2.1	2.0	2.0	2.0	2.0	2.2	4.6	3.6	1.8
624900	2.1	2.1	2.0	4.7	5.0	2.1	2.1	2.2	2.2	2.1	1.9	1.6	4.6	2.5	1.7	2.1	2.1	2.1	2.1	2.1	1.9	5.0	4.8	3.2
624950	2.1	2.1	2.0	5.3	5.2	2.0	2.1	2.2	2.2	2.1	1.8	4.2	5.0	1.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.9	4.3	3.4
625000	2.1	2.0	1.9	2.9	7.4	1.9	2.2	2.2	2.1	2.2	2.1	1.3	5.0	4.0	1.8	2.1	2.1	1.3	1.5	2.1	3.3	5.5	1.7	1.8
625050	2.3	1.8	1.9	1.8	5.0	3.1	2.2	2.2	2.2	2.1	1.7	2.7	3.6	4.8	5.3	2.3	3.9	1.6	5.3	3.2	5.9	2.2	0.6	1.9
625100	2.1	1.5	2.0	5.0	4.9	2.1	1.8	2.2	2.2	1.8	1.6	3.6	4.2	6.1	5.1	4.2	3.7	8.4	5.9	2.1	2.4	2.5	1.3	1.9
625150	1.9	1.9	0.4	3.2	3.3	1.6	1.5	2.2	0.9	1.0	1.8	1.9	2.2	0.5	0.7	2.2	0.5	1.9	7.9	8.3	4.0	1.9	1.9	1.9
625200	1.7	2.7	4.3	3.9	4.2	0.5	1.4	2.0	2.0	1.9	2.2	2.7	2.7	2.1	1.9	1.9	1.9	1.9	7.2	8.1	1.8	1.9	1.9	1.9
625250	0.5	3.2	6.0	5.7	6.3	5.5	1.5	2.5	2.3	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.1	9.0	6.4	1.9	1.9	1.9
625300	5.2	3.2	4.8	3.2	6.7	4.4	0.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	7.2	6.7	1.8	1.9	1.9
625350	5.2	4.3	5.5	3.1	2.4	6.1	4.1	2.4	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.9	7.8	6.7	1.0	1.9	1.9
625400	1.4	3.7	5.3	3.4	0.7	6.3	6.8	0.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	0.8	8.1	7.1	2.3	1.9
625450	1.9	3.9	4.0	2.4	2.0	4.4	7.1	2.8	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	7.7	8.2	3.3	1.9
625500	2.1	3.5	2.9	2.0	2.0	2.0	3.8	6.7	3.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	5.2	8.0	1.9	1.2	1.4
625550	2.2	2.3	2.3	2.0	2.0	2.0	4.4	6.8	5.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.3	4.1	4.2	3.9	2.6
625600	1.8	1.5	2.0	2.0	2.0	2.0	2.0	2.5	8.2	6.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	7.4	4.9	2.5
625650	0.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	6.9	6.9	0.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	3.5	4.7	3.6	2.2
625700	1.2	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.3	6.2	4.6	2.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	3.9	7.1	2.8
625750	3.0	2.2	2.0	2.0	2.0	2.0	2.0	2.0	1.5	5.9	6.8	0.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	5.8	6.2	0.6
625800	4.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.8	6.4	3.2	2.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.2	5.9	6.5
625850	5.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	3.7	6.8	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	6.6	5.8
625900	6.2	0.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.6	6.5	5.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	7.8
625950	6.3	4.9	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.7	7.2	6.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.7	2.8	4.7
626000	5.3	6.5	3.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.6	6.9	5.7	1.6	2.0	2.0	2.0	2.0	2.0	1.8	4.9	4.5	5.0
626050	6.9	2.0	1.6	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.1	7.9	5.4	2.0	2.0	1.9	2.2	3.5	3.8	6.0	15.0	14.8
626100	2.8	1.1	2.8	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.8	6.6	6.8	1.0	1.8	1.6	2.1	2.7	14.0	18.3	4.9	15.1
626150	2.8	4.6	3.5	0.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	3.1	5.5	4.2	2.7	1.2	11.4	18.9	9.2	11.2	17.5	7.7
626200	2.4	2.2	2.3	3.1	3.6	2.0	2.0	2.0	2.0	1.9	1.8	1.8	1.7	1.8	3.7	5.7	8.5	19.1	14.2	4.6	18.3	9.2	6.7	3.5
626250	2.0	0.9	2.6	5.3	2.6	2.0	2.0	1.9	1.8	1.8	1.7	1.6	3.3	5.8	7.1	14.0	19.2	2.5	17.2	13.1	7.6	2.4	6.1	3.5
626300	2.0	2.0	2.8	1.6	3.0	3.2	1.8	1.7	1.6	2.1	2.8	2.1	2.3	11.3	18.1	6.7	13.0	16.2	7.6	3.9	5.1	5.0	0.0	0.0
626350	2.0	1.9	1.8	1.7	4.6	3.3	1.6	1.6	1.9	3.1	1.9	8.4	16.7	9.7	10.1	18.0	8.0	5.8	4.9	5.6	0.8	0.0	0.0	0.0
626400	1.7	1.6	1.5	2.3	0.5	3.3	3.1	2.0	1.8	7.1	17.6	15.2	2.9	18.7	10.8	7.5	2.8	6.5	2.5	0.0	0.0	0.0	0.0	0.0
626450	1.4	1.4	1.4	1.4	0.3	2.5	3.9	4.9	16.3	19.3	4.4	15.8	14.9	7.6	2.9	5.6	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626500	1.4	1.5	1.9	2.8	3.8	3.0	10.3	20.3	9.8	11.2	17.3	7.7	4.8	5.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626550	1.5	1.8	3.5	3.0	6.8	17.9	14.4	4.7	18.2	8.7	6.5	3.9	6.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626600	1.5	2.4	5.5	17.2	18.4	1.8	17.3	12.5	7.7	2.4	6.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626650	2.6	13.3	19.3	7.0	13.8	15.9	7.6	3.6	5.2	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626700	19.0	11.1	8.5	18.0	7.9	5.5	5.0	5.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626750	2.4	18.2	10.3	7.2	3.0	6.4	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626800	14.3	7.6	2.7	5.7	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626850	4.5	5.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626900	5.8	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
626950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

921/04

Maximum Subgrade Slope: Post-Settlement (sheet 5 of 6)

(%) EASTING (ft) \ NORTHING (ft)	1353200	1353150	1353100	1353050	1353000	1352950	1352900	1352850	1352800	1352750	1352700	1352650	1352600	1352550	1352500	1352450	1352400	1352350	1352300	1352250	1352200	1352150	1352100	1352050
623600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623800	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0
623850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
623900	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
623950	7.0	7.6	6.4	6.5	8.8	7.7	8.8	10.0	6.6	6.6	7.3	7.8	6.7	6.8	9.0	8.2	8.8	10.2	6.9	6.9	9.6	10.3	7.0	7.1
624000	11.1	10.7	11.0	10.6	8.4	9.0	7.6	6.6	10.0	9.7	11.5	10.5	11.1	10.7	8.5	7.7	6.8	6.6	9.7	7.3	6.3	6.8	10.8	10.7
624050	5.4	5.1	3.3	3.7	4.5	2.8	4.1	4.2	3.5	4.3	5.9	5.7	4.3	4.2	5.6	3.4	3.6	4.1	1.3	3.7	2.9	6.7	4.8	3.1
624100	1.7	1.9	2.7	2.7	1.7	2.8	1.9	1.6	3.8	5.7	1.5	1.4	2.6	2.9	1.7	1.7	2.9	1.0	4.6	3.0	1.4	1.8	4.2	3.7
624150	1.8	1.8	1.8	1.8	1.8	1.8	1.8	4.5	5.7	0.8	1.8	1.8	2.1	1.8	1.8	1.8	1.8	1.8	2.6	1.5	2.2	2.0	1.9	1.8
624200	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.4	7.6	4.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	0.9	2.3	2.4	2.0	2.0
624250	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.6	6.0	3.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.6	1.4	1.8	2.1	2.0	2.0
624300	2.0	2.0	2.0	2.0	1.9	1.9	1.9	3.6	6.7	1.6	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	2.2	2.7	2.0	2.0	2.0
624350	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	6.1	5.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.7	3.3	2.4	2.0	2.0
624400	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.9	6.0	2.3	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	3.2	2.7	2.0	2.0
624450	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.3	7.7	4.3	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.0	3.2	2.6	2.0	2.0
624500	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	4.0	5.7	1.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.4	2.1	2.2	2.0	2.0	2.0
624550	1.9	1.9	1.9	1.9	1.9	1.9	1.9	4.7	5.8	0.6	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.6	3.2	4.1	2.5	2.0	2.0
624600	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	7.7	5.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	0.6	3.9	3.6	2.0	2.0
624650	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.6	6.0	3.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	2.9	2.4	2.0	1.9	1.9
624700	1.9	1.9	2.0	2.0	2.0	2.0	2.0	3.4	6.7	2.6	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	4.1	4.7	2.0	2.1	2.0
624750	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	5.1	5.9	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	2.0	4.7	3.2	2.0	2.0
624800	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.0	6.2	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	3.7	4.0	2.5	2.0	2.0
624850	2.0	2.0	2.1	2.0	2.0	2.1	3.6	3.1	7.7	3.8	1.7	1.6	1.9	1.7	1.5	1.9	1.7	1.7	1.9	3.3	6.4	4.5	2.6	1.8
624900	2.0	2.2	3.3	3.1	2.5	4.7	4.3	3.4	7.2	7.6	1.5	1.7	1.5	0.7	1.6	1.7	1.0	1.7	1.4	1.9	5.9	4.1	3.0	2.4
624950	1.8	3.5	4.0	3.0	3.4	4.0	1.3	1.4	7.8	6.5	3.4	0.8	1.8	1.5	1.5	1.8	1.6	1.6	1.8	1.9	3.9	3.6	2.8	2.6
625000	2.1	3.3	2.3	0.8	1.1	1.3	1.9	7.9	5.7	3.7	4.3	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	2.3	2.8	2.3	2.0	2.0
625050	0.9	0.9	1.9	1.9	1.9	1.9	1.9	4.2	7.2	7.9	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.6	0.9	2.4	2.5	2.0	2.0
625100	1.9	1.9	1.9	1.9	1.9	1.9	1.8	5.6	8.3	6.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.7	2.6	2.2	2.0	2.0
625150	1.9	1.9	1.9	1.9	1.9	1.9	2.8	5.0	5.7	2.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	1.4	1.5	2.0	2.0	2.0
625200	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.2	8.4	7.9	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.4	1.9	2.5	2.0	1.8	2.0
625250	1.9	1.9	1.9	1.9	1.9	1.9	1.8	7.3	8.4	1.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.6	1.4	2.7	2.4	1.9	1.7	1.8
625300	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	7.3	6.6	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	0.8	1.1	1.1	1.9	1.9	1.7
625350	1.9	1.9	1.9	1.9	1.9	1.9	1.9	3.3	9.4	4.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.0	2.5	2.4	1.9	1.9
625400	1.9	1.9	1.9	1.9	1.9	1.9	1.9	4.3	7.7	3.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	2.9	2.8	2.1	1.9	1.9
625450	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.7	8.0	5.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.4	1.3	1.4	2.0	2.0	1.9
625500	1.9	1.9	1.9	1.9	1.9	1.9	1.7	5.3	6.5	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	3.6	3.1	2.0	1.9
625550	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.2	8.3	7.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	2.7	2.9	2.2	1.9	1.9
625600	1.9	1.9	1.9	1.9	1.9	1.9	1.9	4.3	9.7	7.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.7	3.8	2.3	1.9	1.9
625650	1.9	1.9	1.9	1.9	1.9	1.9	2.3	7.2	5.5	3.4	2.5	1.8	2.0	1.8	1.8	1.8	1.8	1.8	1.7	3.7	3.2	1.8	1.8	1.8
625700	1.9	1.9	1.9	1.9	1.9	1.8	3.4	3.7	6.6	2.7	1.5	1.5	2.7	2.3	1.7	1.7	2.4	1.4	3.9	2.0	2.6	2.4	2.4	2.7
625750	1.9	1.9	1.9	1.9	1.8	3.7	6.9	4.8	0.7	6.5	3.0	2.8	1.0	2.7	2.7	0.4	1.4	1.8	3.2	3.1	4.1	2.1	1.1	0.8
625800	1.8	1.9	2.3	1.8	1.8	4.3	6.9	12.7	7.8	10.4	13.7	12.6	13.5	12.3	10.8	10.1	10.8	8.9	12.0	8.2	10.5	12.2	12.6	13.2
625850	2.0	2.0	3.5	3.9	4.6	14.9	15.1	4.5	2.1	1.6	1.6	3.0	1.5	1.4	4.0	2.9	3.0	5.9	1.2	1.1	1.1	1.0	1.0	0.9
625900	5.2	1.9	5.5	14.7	17.4	1.9	16.0	13.7	11.2	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	9.7	10.9
625950	8.3	13.5	20.0	8.3	12.2	16.6	7.6	5.8	2.6	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	0.9	1.5	2.4	1.6
626000	15.9	11.2	7.3	18.0	8.2	6.0	4.5	5.7	3.6	3.5	3.5	3.5	3.5	3.6	3.6	3.6	3.6	3.6	3.7	3.9	3.9	3.5	0.5	3.3
626050	2.4	18.2	11.4	7.7	2.6	6.4	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	2.9	3.4	0.5	3.2
626100	15.3	7.6	3.1	5.4	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.8	3.3	0.6	3.1
626150	5.1	5.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.7	3.1	0.7	2.9
626200	6.1	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.6	3.0	0.7	2.7
626250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.5	2.8	0.8	2.5
626300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.4	2.7	0.8	2.3
626350	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.3	2.5	0.8	2.1
626400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.2	2.4	0.8	1.9
626450	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.2	2.2	0.7	1.7
626500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.1	2.1	0.6	1.5
626550	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.0	1.9	0.5	1.4
626600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.9	1.8	0.5	1.2
626650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.7	1.7	0.5	1.0
626700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	0.5	0.8
626750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.3	0.5	0.7
626800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.1	0.5	0.6
626850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.9	0.5	0.5
626900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.7	0.5	0.5
626950	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.5	0.5
627000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2
627050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
627200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Maximum Subgrade Slope: Post-Settlement (sheet 6 of 6)

EASTING (ft)	NORTHING (ft) → (%)	1352000	1351950	1351900	1351850	1351800	1351750	1351700	1351650	1351600	1351550	1351500	1351450	1351400	1351350	1351300	1351250	1351200	1351150	1351100
	623600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	623650	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	623700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	623750	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	623800	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	623850	1.0	3.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	623900	11.2	9.1	4.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	623950	9.6	14.4	7.5	4.0	6.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	624000	12.8	8.3	14.6	10.5	5.1	6.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	624050	5.6	16.9	17.6	10.4	11.8	5.2	5.5	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	624100	4.0	4.6	13.9	17.9	9.6	13.1	5.2	4.7	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	624150	1.8	3.2	3.8	13.3	18.0	8.2	14.4	5.2	4.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	624200	1.8	1.6	2.3	3.0	12.1	19.1	6.4	15.8	5.2	3.2	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	624250	2.0	1.7	1.5	1.5	3.0	11.3	19.9	5.0	17.1	5.2	2.5	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	624300	2.0	1.9	1.7	1.4	1.5	2.8	11.1	20.7	3.7	18.4	5.1	3.8	2.3	0.0	0.0	0.0	0.0	0.0	0.0
	624350	2.0	2.0	1.9	1.6	1.4	1.6	2.5	10.9	21.3	3.3	16.1	5.9	5.4	0.0	0.0	0.0	0.0	0.0	0.0
	624400	2.0	2.0	2.0	1.8	1.5	1.4	1.7	2.0	11.1	19.7	12.0	9.0	5.2	4.0	0.0	0.0	0.0	0.0	0.0
	624450	2.0	2.0	2.0	2.0	1.7	1.4	1.5	1.6	1.1	17.9	5.4	12.1	5.6	5.0	0.0	0.0	0.0	0.0	0.0
	624500	2.0	2.0	2.0	2.0	1.9	1.6	1.4	1.6	1.8	13.4	7.5	9.1	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	624550	2.0	2.0	2.0	1.9	2.0	1.8	1.4	1.5	2.0	13.1	7.2	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	624600	1.9	1.9	2.0	2.0	2.0	1.7	1.4	1.5	2.2	12.8	7.2	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	624650	2.0	2.0	2.0	2.0	1.9	1.6	1.4	1.4	2.3	12.5	7.1	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	624700	2.0	2.0	2.0	2.0	1.8	1.5	1.4	1.5	2.4	12.3	6.9	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	624750	2.0	2.0	2.0	2.0	1.8	1.5	1.4	1.5	2.4	12.1	6.7	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	624800	2.1	2.1	2.3	2.0	2.0	1.4	1.8	1.5	2.0	12.1	5.8	9.2	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	624850	2.2	1.6	3.0	2.2	2.4	1.5	2.4	1.8	2.0	11.2	5.2	9.2	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	624900	2.7	2.1	2.4	2.3	2.1	1.8	1.9	2.3	3.7	10.5	6.9	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	624950	2.1	2.6	2.0	2.5	1.6	1.8	1.5	3.1	4.4	11.3	6.9	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625000	2.0	2.0	2.0	2.0	1.7	1.3	1.4	1.4	1.7	10.3	3.3	9.4	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625050	2.0	2.0	2.0	2.0	1.8	1.5	1.4	1.5	2.7	10.7	4.9	9.4	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625100	2.0	2.0	2.0	2.0	1.8	1.5	1.4	1.5	3.6	10.2	6.2	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625150	2.0	2.0	2.0	2.0	1.9	1.6	1.4	1.5	3.7	10.3	6.3	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625200	2.0	2.0	2.0	2.0	2.0	1.7	1.4	1.5	4.0	10.6	6.8	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625250	2.0	2.0	2.0	2.0	2.0	1.7	1.4	1.8	3.8	11.2	6.8	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625300	1.8	2.0	2.0	2.0	2.0	1.8	1.5	1.9	3.7	11.6	7.0	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625350	1.7	1.8	2.0	2.0	2.0	1.8	1.6	2.2	3.4	12.3	7.0	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625400	1.9	1.7	1.8	2.0	2.0	1.9	1.6	1.5	1.4	11.9	5.3	9.2	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625450	1.9	1.9	1.7	1.8	2.0	2.0	1.7	1.5	2.2	12.1	6.4	9.1	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625500	1.9	1.9	1.9	1.7	1.8	2.0	1.7	1.5	2.3	12.1	6.7	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625550	1.9	1.9	1.9	1.9	1.7	1.8	1.8	1.5	2.4	12.4	7.1	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625600	1.9	1.9	1.9	1.9	1.9	1.7	1.7	1.6	2.3	12.6	7.2	8.9	6.9	5.0	0.0	0.0	0.0	0.0	0.0
	625650	1.8	1.8	1.8	1.8	1.8	1.8	1.5	1.5	2.1	13.1	7.4	9.2	6.8	5.0	0.0	0.0	0.0	0.0	0.0
	625700	2.6	1.6	1.6	1.6	1.5	1.8	1.8	1.7	1.5	17.8	5.1	12.2	5.4	5.0	0.0	0.0	0.0	0.0	0.0
	625750	0.7	1.7	1.5	0.9	1.3	1.4	1.5	3.2	13.3	18.9	12.9	8.7	5.1	3.8	0.0	0.0	0.0	0.0	0.0
	625800	13.5	12.6	13.0	13.2	13.4	14.0	14.3	15.8	14.6	6.9	14.6	5.5	5.6	0.0	0.0	0.0	0.0	0.0	0.0
	625850	0.9	2.1	1.6	0.7	0.7	0.6	1.0	5.2	14.3	12.6	5.1	4.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0
	625900	10.9	10.9	10.9	10.9	10.9	10.9	10.9	11.0	10.1	4.7	5.4	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	625950	0.9	2.3	2.3	2.4	2.4	2.4	2.5	3.5	3.3	5.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626000	4.1	4.0	3.6	3.8	3.9	3.9	3.9	3.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626050	3.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626100	3.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626150	3.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626200	3.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626250	3.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626300	3.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626350	3.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626400	2.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626450	2.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626500	2.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626550	2.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626600	1.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626650	1.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626700	1.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626750	1.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626800	1.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626850	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626900	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	626950	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	627000	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	627050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	627100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	627150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	627200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Written by: STEVEN [illegible] Date: 02 / 04 / 30 Reviewed by: ____ Date: __/__/__

Client: OMNI Project: OND FACILITY Project/Proposal No.: FW0400 Task No.: 03

MAXIMUM SUBGRADE SLOPE

$$M_{MAX} = \left(M_{N-S}^{2} + M_{E-W}^{2}\right)^{\frac{1}{2}}$$ EQUATION 5

$$M_{N-S} = \frac{(86.67ft) - (88.03ft)}{2(50ft)}$$ } CENTRAL DIFFERENCE APPROXIMATION IN NORTH-SOUTH DIRECTION

$$M_{N-S} = -0.0136$$

$$M_{E-W} = \frac{(88.05ft) - (86.66ft)}{2(50ft)}$$ } CENTRAL DIFFERENCE APPROXIMATION IN EAST-WEST DIRECTION

$$M_{E-W} = 0.0139$$

$$M_{MAX} = \left[(-0.0136)^{2} + (0.139)^{2}\right]^{\frac{1}{2}}$$

$$\boxed{M_{MAX} = 0.0195 = 1.95\ \%}$$

M_{MAX} = 1.94% ← FROM SPREADSHEET SOLN.

∴ O.K. ✓

ATTACHMENT 8

Major Principal Strain, Tensile: Post-Settlement

Major Principal Strain, Tensile: Post-Settlement (sheet 1 of 6)

NORTHING (ft)

EASTING (ft) (%)	1358000	1357950	1357900	1357850	1357800	1357750	1357700	1357650	1357600	1357550	1357500	1357450	1357400	1357350	1357300	1357250	1357200	1357150	1357100	1357050	1357000	1356950	1356900	1356850
623600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.121	0.072	0.039	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.241	0.213	0.223	0.415	0.108	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001
623950	0.000	0.000	0.000	0.000	0.000	0.000	0.241	0.364	0.768	0.343	0.368	0.305	0.037	0.038	0.037	0.037	0.152	0.144	0.036	0.035	0.035	0.035	0.034	0.055
624000	0.000	0.000	0.000	0.000	0.000	0.121	0.219	0.756	0.913	1.447	0.354	0.095	0.078	0.075	0.073	0.070	0.069	0.093	0.073	0.071	0.070	0.063	0.050	0.070
624050	0.000	0.000	0.000	0.000	0.000	0.070	0.255	0.391	1.419	1.479	0.207	0.014	0.012	0.011	0.009	0.047	0.056	0.012	0.010	0.009	0.008	0.000	0.000	0.052
624100	0.000	0.000	0.000	0.000	0.031	0.052	0.420	0.476	0.356	0.189	0.000	0.002	0.002	0.002	0.001	0.001	0.008	0.004	0.003	0.008	0.005	0.003	0.001	0.001
624150	0.000	0.000	0.000	0.000	0.040	0.025	0.203	0.378	0.096	0.012	0.000	-0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001
624200	0.000	0.000	0.000	0.000	0.002	0.001	0.004	0.057	0.085	0.008	0.003	0.002	-0.001	0.004	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
624250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.084	0.007	0.001	0.001	0.004	0.004	0.000	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
624300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.080	0.005	0.001	0.001	0.002	0.000	0.004	0.008	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
624350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.077	0.027	0.001	0.001	0.001	0.003	0.007	0.004	0.000	0.004	0.004	0.004	0.004	0.004	0.004	0.004
624400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.153	0.075	0.040	0.006	0.001	0.001	0.002	0.004	0.007	0.004	0.000	0.004	0.004	0.004	0.004	0.004	0.004
624450	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.198	0.069	0.010	0.001	0.001	0.001	0.002	0.004	0.004	0.007	0.004	0.008	0.004	0.004	0.004	0.004	0.004
624500	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.104	0.130	0.026	0.005	0.002	0.002	0.003	0.005	0.004	0.004	0.007	0.004	0.008	0.004	0.004	0.004	0.004
624550	0.000	0.000	0.000	0.000	0.015	0.037	0.046	0.322	0.505	0.356	0.008	0.004	0.004	0.004	0.002	0.001	0.001	0.002	0.001	0.004	0.003	0.005	0.004	0.004
624600	0.000	0.000	0.000	0.000	0.054	0.037	0.269	0.376	0.201	0.555	0.006	0.004	0.005	0.008	0.001	0.020	0.005	0.018	0.055	0.002	0.029	0.042	0.006	0.002
624650	0.000	0.000	0.000	0.000	0.006	0.126	0.014	0.631	0.647	0.582	0.152	0.027	0.019	0.017	0.014	0.011	0.017	0.028	0.020	0.030	0.071	0.033	0.021	0.037
624700	0.000	0.000	0.000	0.000	0.000	0.081	0.082	0.291	0.473	0.365	0.613	0.017	0.024	0.020	0.026	0.000	0.002	0.104	0.005	0.034	0.073	0.016	0.015	0.058
624750	0.000	0.000	0.000	0.000	0.000	0.041	0.161	0.002	0.633	0.408	0.764	0.203	0.032	0.006	0.009	-0.003	0.003	0.041	0.070	0.053	0.051	0.005	0.004	0.009
624800	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.066	0.271	0.128	0.640	0.808	-0.002	0.002	0.000	0.000	0.004	0.007	0.008	0.008	0.008	0.008	0.008	0.008
624850	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.150	0.157	0.667	0.429	0.791	0.269	0.006	0.001	0.000	0.003	0.006	0.007	0.008	0.008	0.008	0.008	0.008
624900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.069	0.247	0.030	0.713	0.901	-0.002	0.002	0.000	0.002	0.003	0.005	0.005	0.007	0.008	0.008	0.008
624950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.066	0.139	0.241	0.671	0.407	0.767	0.273	0.002	0.001	0.000	0.001	0.002	0.003	0.004	0.005	0.008	0.008
625000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.078	0.219	0.168	0.780	0.941	0.004	0.001	0.002	0.002	0.001	0.001	0.002	0.003	0.004	0.005
625050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.081	0.130	0.311	0.722	0.645	1.473	0.890	0.180	0.000	0.005	0.007	0.001	0.001	0.001	0.001	0.002
625100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.098	0.310	0.606	0.571	0.802	0.576	0.640	0.461	0.101	0.000	0.008	0.001	-0.001	0.010
625150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.085	0.201	0.132	0.123	0.689	0.330	0.540	0.198	0.590	0.541	0.602	0.347	0.106	0.007	0.009
625200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.123	0.233	0.180	0.384	0.244	0.485	0.339	0.453	0.360	0.174	0.473	0.502	0.651	0.416
625250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.123	0.102	0.070	0.077	0.013	0.318	0.235	0.488	0.365	0.306	0.604	0.232	0.610
625300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.063	0.059	0.113	0.062	0.078	0.014	0.320	0.224	0.491	0.341	0.522
625350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.066	0.056	0.114	0.062	0.080	0.013	0.322	0.214
625400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.053	0.115	0.063	0.082
625450	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.072	0.050
625500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625550	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626450	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626550	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Major Principal Strain, Tensile: Post-Settlement (sheet 2 of 6)

		NORTHING (ft)																						
	(%)	1356800	1356750	1356700	1356650	1356600	1356550	1356500	1356450	1356400	1356350	1356300	1356250	1356200	1356150	1356100	1356050	1356000	1355950	1355900	1355850	1355800	1355750	1355700	1355650
	623600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	623650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	623700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	623750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	623800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	623850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	623900	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001
	623950	0.213	0.239	0.033	0.032	0.032	0.032	0.031	0.048	0.109	0.127	0.030	0.142	0.063	0.088	0.194	0.285	0.028	0.260	0.049	0.288	0.026	0.074	0.061	0.110
	624000	0.097	0.087	0.074	0.068	0.061	0.054	0.059	0.131	0.072	0.072	0.069	0.080	0.050	0.114	0.046	0.141	0.080	0.056	0.107	0.133	0.107	0.089	0.069	0.074
	624050	0.062	0.014	0.016	0.007	0.009	0.034	0.057	0.037	0.080	0.015	0.029	0.011	0.041	0.080	0.138	0.031	0.034	0.072	0.179	0.124	0.262	0.036	0.065	0.019
	624100	0.000	0.021	0.016	0.009	0.007	0.014	0.040	0.045	0.002	0.013	0.017	0.004	0.065	0.027	0.052	0.046	0.084	0.004	0.204	0.209	0.181	0.004	0.001	0.011
	624150	0.001	0.001	0.001	0.006	0.038	0.097	0.017	0.013	0.004	0.000	0.004	0.004	0.004	0.004	0.000	0.015	0.004	0.039	0.224	0.074	0.093	0.004	0.004	0.004
	624200	0.002	0.002	0.002	0.004	0.099	0.113	0.031	0.038	0.000	0.000	0.000	0.000	0.006	0.006	0.007	0.007	0.006	0.042	0.237	0.083	0.011	0.007	0.007	0.007
	624250	0.004	0.004	0.004	0.004	0.004	0.082	0.082	0.012	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.026	0.072	0.059	0.009	0.009	0.009
	624300	0.004	0.004	0.004	0.004	0.050	0.113	0.116	0.051	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.020	0.153	0.058	0.216	0.009	0.009	0.009
	624350	0.004	0.004	0.004	0.004	0.074	0.064	0.151	0.047	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.016	0.287	0.304	0.183	0.009	0.009	0.009
	624400	0.004	0.004	0.004	0.008	0.040	0.099	0.042	0.004	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.007	0.191	0.069	0.026	0.009	0.009	0.009
	624450	0.004	0.004	0.004	0.005	0.077	0.039	0.008	0.012	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.003	0.121	0.046	0.185	0.009	0.009	0.009
	624500	0.004	0.004	0.004	0.005	0.017	0.057	0.039	0.015	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.007	0.143	0.259	0.162	0.009	0.009	0.009
	624550	0.004	0.004	0.004	0.011	0.074	0.092	0.063	0.064	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.048	0.229	0.077	0.123	0.007	0.009	0.009
	624600	0.009	0.005	0.004	0.005	0.141	0.037	0.130	0.056	0.007	0.009	0.007	0.008	0.009	0.007	0.008	0.009	0.008	0.052	0.272	0.105	0.035	0.000	0.009	0.008
	624650	0.005	0.021	0.008	0.004	0.042	0.068	0.040	0.006	0.005	0.002	0.006	0.005	0.002	0.005	0.005	0.063	0.005	0.005	0.036	0.014	0.014	0.009	0.007	0.000
	624700	0.023	0.001	0.002	0.000	0.005	0.034	0.039	0.024	0.001	0.004	0.005	0.002	0.004	0.005	0.003	0.004	0.005	0.004	0.024	0.034	0.012	0.012	0.009	0.001
	624750	0.012	0.005	0.008	0.008	0.009	0.028	0.100	0.017	0.009	0.004	0.011	0.009	0.000	0.010	0.009	0.008	0.009	0.010	0.063	0.215	0.039	0.008	0.004	0.063
	624800	0.008	0.008	0.008	0.008	0.014	0.091	0.048	0.001	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.020	0.252	0.198	0.145	0.013	0.005	0.034
	624850	0.008	0.008	0.008	0.008	0.010	0.025	0.044	0.005	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.013	0.264	0.301	0.193	0.009	0.009	0.009
	624900	0.008	0.008	0.008	0.008	0.000	0.130	0.122	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.176	0.220	0.014	0.009	0.009	0.009
	624950	0.008	0.008	0.008	0.008	0.011	0.095	0.045	0.004	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.011	0.095	0.138	0.139	0.000	0.009	0.009
	625000	0.006	0.007	0.008	0.007	0.008	0.017	0.087	0.002	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.004	0.109	0.313	0.121	0.009	0.009	0.009
	625050	0.003	0.005	0.006	0.007	0.009	0.090	0.002	0.001	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.010	0.278	0.288	0.026	0.009	0.009	0.009
	625100	0.002	0.002	0.003	0.004	0.004	0.009	0.038	0.003	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.005	0.185	0.100	0.021	0.009	0.009	0.009
	625150	0.019	0.010	0.001	0.002	0.002	0.054	0.041	0.008	0.008	0.006	0.006	0.006	0.000	0.006	0.000	0.000	0.006	0.000	0.083	0.212	0.055	0.000	0.000	0.000
EASTING	625200	0.029	-0.002	0.047	0.005	0.023	0.075	0.041	0.001	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.001	0.012	0.019	0.249	0.151	0.156	0.004	0.004	0.004
(ft)	625250	0.501	0.815	0.274	0.011	0.056	0.038	0.055	0.001	0.009	0.004	0.008	0.033	0.004	0.025	0.060	0.025	0.010	0.091	0.272	0.307	0.147	0.005	0.005	0.003
	625300	0.354	0.375	0.540	0.483	0.340	0.373	0.027	0.030	0.081	0.036	0.040	0.027	0.096	0.057	0.153	0.098	0.031	0.057	0.109	0.023	0.043	0.023	0.008	0.059
	625350	0.494	0.343	0.465	0.000	0.243	0.221	0.068	0.103	0.084	0.076	0.123	0.073	0.068	0.167	0.081	0.091	0.063	0.122	0.038	0.121	0.091	0.083	0.061	0.112
	625400	0.013	0.323	0.203	0.426	0.343	0.122	0.011	0.064	0.028	0.054	0.013	0.123	0.087	0.121	0.048	0.128	0.014	0.207	0.130	0.088	0.016	0.078	0.063	0.115
	625450	0.116	0.063	0.084	0.022	0.150	0.023	0.000	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.114
	625500	0.000	0.075	0.047	0.115	0.013	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.031
	625550	0.000	0.000	0.000	0.000	0.007	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059
	625600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	625650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	625700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	625750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	625800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	625850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	625900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	625950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626450	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626550	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	626950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	627000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	627050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	627100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	627150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	627200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Major Principal Strain, Tensile: Post-Settlement (sheet 3 of 6)

NORTHING (ft) across; EASTING (ft) down

(%)	1355600	1355550	1355500	1355450	1355400	1355350	1355300	1355250	1355200	1355150	1355100	1355050	1355000	1354950	1354900	1354850	1354800	1354750	1354700	1354650	1354600	1354550	1354500	1354450
623600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623900	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002
623950	0.025	0.195	0.101	0.089	0.087	0.248	0.023	0.286	0.146	0.079	0.050	0.097	0.021	0.173	0.101	0.067	0.020	0.210	0.170	0.039	0.019	0.094	0.063	0.025
624000	0.061	0.058	0.046	0.050	0.073	0.117	0.156	0.091	0.241	0.092	0.076	0.072	0.062	0.071	0.045	0.076	0.054	0.184	0.098	0.046	0.188	0.100	0.100	0.085
624050	0.088	0.071	0.026	0.052	0.088	0.047	0.077	0.280	0.045	0.048	0.073	0.017	0.100	0.086	0.035	0.082	0.003	0.122	0.016	0.143	0.030	0.076	0.040	0.047
624100	0.011	0.004	0.004	0.007	0.029	0.031	0.040	0.022	0.112	0.005	0.001	0.009	0.014	0.004	0.016	0.040	0.004	0.009	0.040	0.009	0.004	0.004	0.018	0.023
624150	0.004	0.004	0.004	0.004	0.005	0.005	0.025	0.100	0.074	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.001	0.007	0.087	0.080	0.004	0.009	0.005
624200	0.007	0.007	0.007	0.007	0.007	0.007	0.044	0.007	0.201	0.007	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.014	0.020	0.091	0.083	0.008	0.008	0.008
624250	0.009	0.009	0.009	0.009	0.009	0.000	0.074	0.156	0.207	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.046	0.143	0.150	0.001	0.009	0.009	0.009
624300	0.009	0.009	0.009	0.009	0.009	0.009	0.184	0.138	0.090	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.050	0.030	0.056	0.048	0.009	0.009	0.009
624350	0.009	0.009	0.009	0.009	0.009	0.009	0.168	0.116	0.266	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.007	0.079	0.098	0.043	0.009	0.009	0.009
624400	0.009	0.009	0.009	0.009	0.009	0.009	0.063	0.179	0.265	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.053	0.152	0.222	0.005	0.009	0.009	0.009
624450	0.009	0.009	0.009	0.009	0.009	0.009	0.125	0.154	0.119	0.018	0.009	0.009	0.009	0.009	0.009	0.009	0.001	0.085	0.087	0.112	0.013	0.009	0.009	0.009
624500	0.009	0.009	0.009	0.009	0.009	0.009	0.132	0.075	0.058	0.021	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.018	0.069	0.025	0.016	0.009	0.009	0.009
624550	0.009	0.009	0.009	0.009	0.009	0.009	0.014	0.050	0.049	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.011	0.092	0.011	0.081	0.002	0.009	0.009
624600	0.009	0.009	0.009	0.009	0.009	0.009	0.029	0.036	0.207	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.005	0.199	0.157	0.051	0.008	0.009	0.009
624650	0.003	0.007	0.009	0.009	0.009	0.009	0.088	0.168	0.219	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.048	0.060	0.062	0.006	0.009	0.009	0.009
624700	0.003	0.012	0.001	0.007	0.002	0.008	0.189	0.167	0.088	0.008	0.010	0.010	0.009	0.009	0.009	0.009	0.009	0.018	0.066	0.114	0.045	0.009	0.009	0.009
624750	0.001	0.005	0.023	0.012	0.010	0.027	0.213	0.081	0.170	0.007	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.092	0.057	0.131	0.044	0.010	0.010	0.010
624800	0.004	0.038	0.013	0.019	0.025	0.016	0.092	0.033	0.141	0.026	0.009	0.013	0.013	0.013	0.013	0.013	0.013	0.058	0.160	0.246	0.012	0.012	0.012	0.012
624850	0.011	0.039	0.011	0.015	0.040	0.055	0.022	0.016	0.022	0.032	0.005	0.013	0.037	0.005	0.011	0.014	0.004	0.097	0.128	0.147	0.014	0.013	0.013	0.013
624900	0.009	0.009	0.009	0.009	0.009	0.049	0.019	0.017	0.003	0.004	0.013	0.032	0.032	0.008	0.008	0.011	0.011	0.020	0.100	0.074	0.020	0.013	0.013	0.013
624950	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.000	0.001	0.009	0.000	0.004	0.001	0.003	0.009	0.157	0.107	0.031	0.013	0.010	0.013	0.013
625000	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.004	0.028	0.012	0.014	0.240	0.018	0.082	0.006	0.007	0.013	0.009
625050	0.000	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.007	0.025	0.017	0.134	0.044	0.027	0.120	0.001	0.003	0.011	0.010	0.007
625100	0.008	0.008	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.010	0.026	0.103	0.045	0.032	0.130	0.002	0.004	0.002	0.007	0.004	0.002	0.004
625150	0.000	0.006	0.006	0.007	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.002	0.058	0.034	0.050	0.001	0.005	0.005	0.005	0.005	0.002	0.003	0.004	0.003
625200	0.003	0.003	0.003	0.005	0.006	0.008	0.009	0.009	0.007	0.005	0.127	0.132	0.061	0.038	0.018	0.005	0.005	0.005	0.004	0.003	0.002	0.002	0.009	0.004
625250	0.020	0.007	0.001	0.001	0.006	0.006	0.005	0.016	0.133	0.109	0.036	0.048	0.048	0.001	0.005	0.005	0.005	0.003	0.002	0.002	0.002	0.002	0.002	0.008
625300	0.031	0.052	0.004	0.055	0.036	0.017	0.005	0.016	0.167	0.061	0.009	0.023	0.000	0.005	0.005	0.004	0.003	0.002	0.002	0.002	0.002	0.010	0.022	0.041
625350	0.239	0.396	0.930	0.055	0.040	0.007	0.005	0.012	0.069	0.045	0.001	0.005	0.005	0.005	0.004	0.002	0.002	0.002	0.002	0.002	0.000	0.074	0.044	0.038
625400	0.635	0.225	1.043	0.597	0.040	0.073	0.039	0.064	0.011	0.008	0.005	0.005	0.004	0.003	0.002	0.002	0.002	0.002	0.011	0.037	0.012	0.059	0.071	0.003
625450	0.091	0.890	0.736	1.033	1.005	0.065	0.003	0.004	0.005	0.005	0.005	0.004	0.003	0.002	0.002	0.002	0.034	0.039	0.017	0.046	0.019	0.009	0.010	0.004
625500	0.022	0.534	0.924	0.397	0.851	0.327	0.001	0.003	0.005	0.005	0.003	0.002	0.002	0.002	0.015	0.016	0.007	0.033	0.014	0.063	0.060	0.003	0.003	0.003
625550	0.126	0.061	0.213	0.019	0.621	0.787	0.001	0.002	0.003	0.002	0.002	0.002	0.007	0.014	0.043	0.012	0.023	0.016	0.030	0.002	0.003	0.003	0.003	0.003
625600	0.072	0.165	0.185	0.709	0.810	0.721	0.271	0.013	0.004	0.002	0.002	0.001	0.067	0.040	0.010	0.066	0.009	0.002	0.003	0.003	0.003	0.003	0.003	0.003
625650	0.000	0.045	0.060	0.259	0.346	0.408	0.726	0.026	0.002	0.011	0.048	0.030	0.023	0.097	0.001	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
625700	0.000	0.054	0.173	0.073	0.702	0.684	1.016	0.323	0.009	0.015	0.026	0.051	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.009
625750	0.000	0.000	0.083	0.059	0.320	0.327	0.364	0.464	0.041	0.020	0.010	0.008	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004
625800	0.000	0.000	0.039	0.159	0.013	0.593	0.507	0.883	0.496	0.000	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.031
625850	0.000	0.000	0.000	0.096	0.046	0.413	0.455	0.249	0.519	0.032	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.076
625900	0.000	0.000	0.000	0.026	0.147	0.021	0.609	0.962	0.884	0.463	0.021	0.003	0.003	0.064	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.000	0.058
625950	0.009	0.000	0.000	0.000	0.106	0.040	0.464	0.573	0.259	0.242	0.008	0.000	0.004	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.001	0.003	0.003	0.151
626000	0.000	0.000	0.000	0.009	0.016	0.137	0.066	0.465	1.011	0.810	0.375	0.076	0.012	0.004	0.004	0.003	0.003	0.003	0.010	0.003	0.014	0.019	0.012	0.001
626050	0.009	0.000	0.000	0.000	0.000	0.114	0.040	0.474	0.648	0.341	0.094	0.029	0.008	0.004	0.004	0.004	0.011	0.017	0.011	0.012	0.006	0.009	0.011	0.071
626100	0.000	0.000	0.000	0.000	0.000	0.009	0.129	0.107	0.300	0.816	0.882	0.513	0.023	0.004	0.004	0.010	0.005	0.013	0.002	0.007	0.008	0.010	0.010	0.013
626150	0.009	0.000	0.000	0.000	0.000	0.009	0.120	0.048	0.493	0.574	0.215	0.108	0.003	0.026	0.007	0.010	0.017	0.018	0.007	0.011	0.009	0.010	0.007	0.001
626200	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.121	0.127	0.251	0.491	0.504	0.200	0.166	0.010	0.003	0.004	0.010	0.000	0.009	0.009	0.010	0.002	0.005
626250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.123	0.073	0.463	0.628	0.196	0.206	0.146	0.042	0.001	-0.004	0.004	0.007	0.009	0.009	0.011	0.001	0.004
626300	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.110	0.145	0.132	0.593	0.931	0.677	0.036	0.013	0.000	0.002	0.005	0.007	0.009	0.008	0.003	0.004
626350	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.123	0.108	0.449	0.634	0.087	0.485	0.062	0.020	0.006	0.000	0.003	0.005	0.008	0.005	0.004	0.004
626400	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.098	0.153	0.022	0.506	0.008	0.846	0.005	0.002	0.000	0.001	0.003	0.007	0.000	0.003	0.001
626450	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.123	0.136	0.408	0.668	0.230	0.757	0.230	-0.002	0.000	0.000	0.001	0.004	0.000	0.000	-0.001
626500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.063	0.116	0.077	0.345	0.736	0.744	0.006	0.001	0.000	0.000	0.000	0.000	-0.001	-0.001
626550	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.104	0.147	0.342	0.690	0.278	0.815	0.224	0.010	0.000	0.000	-0.003	-0.001	-0.001	-0.001
626600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.083	0.205	0.070	0.747	0.882	0.002	0.004	0.002	-0.001	-0.001	-0.001	-0.001
626650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.158	0.248	0.712	0.628	0.869	0.352	0.005	0.002	0.000	-0.001	0.000	0.004
626700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.064	0.239	0.106	0.619	0.791	0.010	0.002	0.001	0.001	0.011	0.690
626750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.063	0.172	0.126	0.715	0.838	1.464	0.964	0.171	0.020	0.404	1.102	0.756
626800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.061	0.450	0.933	0.717	0.770	0.454	0.177	0.508	1.540	0.665
626850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045	0.165	0.237	0.328	0.784	0.075	0.197	0.662	0.440	0.531	0.695
626900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.123	0.214	0.136	0.383	0.270	0.069	0.357	0.542	0.087	0.081
626950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.097	0.067	0.063	0.073	0.009	0.051	0.038	0.070	0.045
627000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.009	0.009	0.000	0.041	0.068	0.014	0.071	0.021	0.000	0.000
627050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000
627150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Major Principal Strain, Tensile: Post-Settlement (sheet 4 of 6)

NORTHING (ft)

EASTING (ft) (%)	1354400	1354350	1354300	1354250	1354200	1354150	1354100	1354050	1354000	1353950	1353900	1353850	1353800	1353750	1353700	1353650	1353600	1353550	1353500	1353450	1353400	1353350	1353300	1353250
623600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623900	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001
623950	0.017	0.152	0.142	0.190	0.191	0.016	0.023	0.076	0.064	0.127	0.133	0.014	0.014	0.015	0.026	0.062	0.069	0.013	0.102	0.014	0.042	0.096	0.153	0.009
624000	0.063	0.062	0.148	0.058	0.249	0.067	0.073	0.065	0.092	0.082	0.152	0.074	0.102	0.085	0.148	0.092	0.091	0.063	0.125	0.051	0.114	0.073	0.296	0.068
624050	0.069	0.087	0.131	0.245	0.066	0.033	0.066	0.066	0.113	0.150	0.024	0.105	0.125	0.067	0.053	0.088	0.025	0.071	0.029	0.057	0.069	0.294	0.027	0.084
624100	0.004	0.003	0.027	0.023	0.059	0.006	0.004	0.001	0.014	0.030	0.031	0.082	0.080	0.011	0.003	0.062	0.013	0.023	0.004	0.007	0.029	0.124	0.018	0.016
624150	0.005	0.005	0.003	0.100	0.112	0.000	0.005	0.005	0.008	0.001	0.030	0.072	0.041	0.048	0.028	0.006	0.008	0.006	0.008	0.006	0.006	0.101	0.102	0.004
624200	0.008	0.008	0.021	0.006	0.046	0.055	0.008	0.008	0.008	0.000	0.019	0.077	0.064	0.047	0.027	0.009	0.000	0.009	0.000	0.009	0.016	0.019	0.054	0.049
624250	0.009	0.009	0.020	0.054	0.055	0.050	0.009	0.009	0.009	0.009	0.008	0.035	0.005	0.102	0.041	0.007	0.009	0.009	0.009	0.009	0.011	0.094	0.056	0.043
624300	0.009	0.009	0.009	0.131	0.114	0.003	0.009	0.009	0.009	0.009	0.009	0.029	0.072	0.082	0.020	0.007	0.009	0.009	0.009	0.009	0.009	0.124	0.086	0.021
624350	0.009	0.009	0.011	0.047	0.064	0.015	0.009	0.009	0.009	0.009	0.009	0.088	0.096	0.022	0.011	0.009	0.009	0.009	0.009	0.009	0.007	0.129	0.006	0.003
624400	0.009	0.009	0.003	0.015	0.062	0.016	0.009	0.009	0.009	0.009	0.016	0.048	0.066	0.008	0.053	0.009	0.009	0.009	0.009	0.009	0.007	0.026	0.049	0.014
624450	0.009	0.009	0.041	0.077	0.051	0.034	0.009	0.009	0.009	0.009	0.011	0.050	0.017	0.100	0.044	0.009	0.009	0.009	0.009	0.009	0.028	0.081	0.083	0.043
624500	0.009	0.009	0.046	0.045	0.016	0.032	0.009	0.009	0.009	0.009	0.008	0.020	0.024	0.040	0.010	0.009	0.009	0.009	0.009	0.009	0.027	0.080	0.053	0.039
624550	0.009	0.009	0.005	0.127	0.112	0.005	0.009	0.009	0.009	0.009	0.009	0.058	0.097	0.025	0.015	0.009	0.009	0.009	0.009	0.009	0.009	0.120	0.069	0.001
624600	0.009	0.009	0.016	0.020	0.053	0.046	0.009	0.009	0.009	0.009	0.009	0.105	0.092	0.025	0.022	0.009	0.009	0.009	0.009	0.009	0.007	0.082	0.006	0.069
624650	0.009	0.009	0.012	0.075	0.048	0.041	0.009	0.009	0.009	0.009	0.008	0.026	0.056	0.091	0.005	0.009	0.009	0.009	0.009	0.009	0.005	0.100	0.081	0.062
624700	0.009	0.009	0.009	0.126	0.137	0.013	0.009	0.009	0.009	0.009	0.002	0.036	0.026	0.040	0.004	0.009	0.009	0.009	0.009	0.009	0.008	0.137	0.091	0.022
624750	0.010	0.009	0.013	0.061	0.045	0.008	0.009	0.009	0.009	0.009	0.009	0.012	0.009	0.012	0.013	0.009	0.009	0.009	0.009	0.009	0.007	0.135	0.004	0.008
624800	0.011	0.011	0.007	0.055	0.055	0.010	0.010	0.011	0.010	0.010	0.010	0.061	0.126	0.157	0.010	0.009	0.009	0.009	0.009	0.009	0.008	0.043	0.060	0.011
624850	0.013	0.013	0.029	0.059	0.090	0.033	0.011	0.013	0.012	0.012	0.012	0.091	0.113	0.102	0.005	0.011	0.011	0.011	0.011	0.011	0.037	0.084	0.079	0.049
624900	0.013	0.013	0.028	0.090	0.034	0.033	0.013	0.013	0.013	0.013	0.011	0.015	0.024	0.025	0.011	0.013	0.013	0.013	0.013	0.013	0.042	0.073	0.033	0.054
624950	0.013	0.012	0.010	0.110	0.045	0.025	0.013	0.013	0.013	0.013	0.009	0.056	0.071	0.117	0.010	0.013	0.013	0.013	0.013	0.013	0.012	0.137	0.142	0.033
625000	0.011	0.010	0.008	0.148	0.042	0.063	0.014	0.013	0.013	0.013	0.008	0.118	0.084	0.060	0.010	0.013	0.013	0.013	0.000	0.014	0.101	0.022	0.043	0.013
625050	0.010	0.008	0.008	0.055	0.043	0.070	0.013	0.013	0.013	0.013	0.012	0.029	0.045	0.105	0.038	0.056	0.082	0.066	0.050	0.038	0.141	0.011	0.004	0.001
625100	0.000	0.005	0.007	0.152	0.176	0.017	0.010	0.012	0.013	0.010	0.004	0.022	0.104	0.066	0.071	0.087	0.020	0.154	0.043	0.064	0.045	0.006	0.010	0.006
625150	0.000	0.003	0.014	0.073	0.049	0.015	0.009	0.008	0.006	0.001	0.002	0.069	0.073	0.002	0.043	0.049	0.034	0.255	0.225	0.172	0.081	0.000	0.000	0.006
625200	0.009	0.010	0.031	0.044	0.031	0.116	0.003	0.002	0.005	0.009	0.015	0.008	0.004	0.001	0.003	0.003	0.003	0.003	0.217	0.292	0.170	0.006	0.000	0.000
625250	0.010	0.015	0.174	0.127	0.201	0.119	0.016	0.004	0.003	0.005	0.006	0.005	0.004	0.003	0.003	0.003	0.003	0.003	0.184	0.209	0.057	0.000	0.006	0.006
625300	0.073	0.026	0.023	0.089	0.069	0.034	0.047	0.001	0.006	0.005	0.006	0.005	0.005	0.004	0.003	0.003	0.003	0.003	0.007	0.016	0.139	0.003	0.000	0.000
625350	0.113	0.030	0.045	0.008	0.085	0.045	0.006	0.013	0.006	0.000	0.005	0.005	0.005	0.005	0.004	0.003	0.003	0.003	0.034	0.163	0.160	0.198	0.004	0.000
625400	0.011	0.010	0.019	0.021	0.014	0.153	0.103	0.013	0.003	0.008	0.005	0.005	0.005	0.005	0.004	0.004	0.003	0.003	0.008	0.234	0.163	0.057	0.009	0.008
625450	0.004	0.014	0.004	0.002	0.008	0.065	0.104	0.061	0.022	0.006	0.005	0.005	0.005	0.005	0.005	0.004	0.003	0.003	0.003	0.000	0.175	0.177	0.047	0.006
625500	0.005	0.001	0.005	0.000	0.006	0.049	0.008	0.068	0.052	0.000	0.005	0.005	0.005	0.006	0.005	0.005	0.004	0.003	0.003	0.129	0.276	0.080	0.052	0.012
625550	0.005	0.010	0.001	0.008	0.008	0.000	0.066	0.140	0.018	0.141	0.005	0.000	0.005	0.000	0.005	0.005	0.004	0.004	0.003	0.072	0.064	0.022	0.098	0.006
625600	0.000	0.003	0.003	0.008	0.006	0.000	0.050	0.119	0.225	0.056	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.003	0.000	0.013	0.145	0.133	0.003
625650	0.000	0.006	0.066	0.000	0.006	0.006	0.006	0.000	0.068	0.145	0.058	0.009	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.003	0.044	0.045	0.048	0.002
625700	0.010	0.011	0.006	0.000	0.000	0.000	0.000	0.001	0.131	0.046	0.049	0.031	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.004	0.020	0.043	0.108	0.033
625750	0.024	0.011	0.006	0.006	0.008	0.005	0.000	0.001	0.000	0.150	0.124	0.019	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.002	0.112	0.178	0.165
625800	0.035	0.003	0.000	0.006	0.000	0.005	0.006	0.005	0.000	0.068	0.067	0.053	0.007	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.001	0.113	0.115	0.118
625850	0.022	0.006	0.006	0.006	0.000	0.000	0.008	0.006	0.004	0.032	0.022	0.076	0.043	0.002	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.001	0.126	0.142
625900	0.102	0.082	0.003	0.006	0.006	0.006	0.000	0.000	0.005	0.005	0.070	0.139	0.028	0.163	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.002	0.157	0.175
625950	0.082	0.012	0.012	0.000	0.006	0.006	0.006	0.008	0.005	0.005	0.057	0.092	0.268	0.181	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.003	0.040
626000	0.075	0.124	0.043	0.002	0.006	0.000	0.000	0.008	0.005	0.005	0.005	0.014	0.105	0.058	0.094	0.001	0.905	0.005	0.005	0.005	0.004	0.043	0.017	0.024
626050	0.141	0.092	0.005	0.028	0.003	0.006	0.005	0.008	0.005	0.000	0.005	0.002	0.152	0.139	0.023	0.005	0.005	0.005	0.001	0.016	0.014	0.451	1.026	0.463
626100	0.015	0.020	0.062	0.042	0.002	0.006	0.005	0.006	0.005	0.005	0.005	0.003	0.001	0.092	0.120	0.029	0.008	0.004	-0.003	0.147	1.084	0.550	1.508	0.655
626150	0.029	0.036	0.060	0.027	0.025	0.000	0.000	0.008	0.005	0.005	0.005	0.005	0.005	0.125	0.037	0.026	0.015	0.011	0.711	0.713	1.272	0.660	0.638	0.745
626200	0.001	0.012	0.016	0.080	0.047	0.006	0.006	0.005	0.005	0.000	0.005	0.004	0.003	0.009	0.064	0.053	0.611	1.106	0.620	1.030	0.613	0.690	0.057	0.100
626250	0.008	0.003	0.032	0.055	0.033	0.018	0.000	0.005	0.004	0.004	0.004	0.004	0.018	0.103	0.541	1.074	0.722	1.643	0.663	0.612	0.279	0.253	0.119	0.061
626300	0.004	0.004	0.012	0.000	0.055	0.024	0.004	0.004	0.004	0.002	0.003	0.009	0.074	1.002	0.449	1.418	0.662	0.653	0.604	0.232	0.003	0.124	0.000	0.000
626350	0.004	0.002	0.000	0.009	0.025	0.068	0.031	0.004	0.001	0.002	0.008	0.409	0.041	1.056	0.665	0.616	0.749	0.094	0.059	0.149	0.003	0.000	0.000	0.000
626400	0.000	0.000	-0.001	0.006	0.009	0.082	0.022	0.001	-0.002	0.438	1.116	0.625	1.120	0.681	0.631	0.121	0.161	0.173	0.031	0.000	0.000	0.000	0.000	0.000
626450	-0.001	-0.001	-0.901	-0.001	0.004	0.015	0.063	0.216	1.207	0.687	1.546	0.666	0.639	0.450	0.285	0.061	0.090	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626500	-0.001	-0.001	0.001	0.011	0.019	0.022	0.672	0.789	1.435	0.671	0.644	0.737	0.187	0.019	0.132	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626550	-0.001	0.000	0.018	0.000	0.524	0.967	0.885	1.030	0.597	0.710	0.049	0.089	0.162	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626600	-0.001	0.011	0.314	1.240	0.670	1.503	0.557	0.011	0.236	0.242	0.140	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626650	0.054	0.921	0.594	1.639	0.659	0.663	0.566	0.251	0.005	0.122	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626700	0.656	1.105	0.772	0.635	0.753	0.112	0.050	0.145	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626750	1.240	0.629	0.650	0.094	0.130	0.174	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626800	0.623	0.388	0.275	0.080	0.080	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626850	0.192	0.010	0.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626900	0.158	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Major Principal Strain, Tensile: Post-Settlement (sheet 5 of 6)

(%) EASTING (ft) \ NORTHING (ft)	1353200	1353150	1353100	1353050	1353000	1352950	1352900	1352850	1352800	1352750	1352700	1352650	1352600	1352550	1352500	1352450	1352400	1352350	1352300	1352250	1352200	1352150	1352100	1352050
623600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
623900	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000
623950	0.043	0.028	0.062	0.008	0.106	0.039	0.041	0.030	0.132	0.007	0.035	0.027	0.054	0.006	0.092	0.025	0.021	0.030	0.112	0.005	0.093	0.011	0.104	0.003
624000	0.101	0.060	0.065	0.054	0.111	0.075	0.092	0.041	0.159	0.052	0.142	0.089	0.078	0.056	0.122	0.048	0.084	0.082	0.154	0.051	0.034	0.115	0.224	0.099
624050	0.044	0.081	0.024	0.108	0.084	0.033	0.037	0.149	0.076	0.123	0.059	0.088	0.027	0.117	0.081	0.030	0.055	0.173	0.056	0.026	0.018	0.194	0.059	0.140
624100	0.004	0.001	0.009	0.018	0.001	0.019	0.000	0.063	0.214	0.088	0.012	0.000	0.011	0.020	0.005	0.061	0.021	0.045	0.050	0.028	0.006	0.092	0.003	0.013
624150	0.007	0.007	0.006	0.006	0.007	0.007	0.007	0.135	0.244	0.159	0.007	0.007	0.008	0.007	0.007	0.007	0.007	0.003	0.015	0.002	0.007	0.013	0.007	0.007
624200	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.155	0.096	0.020	0.000	0.000	0.000	0.009	0.009	0.009	0.009	0.009	0.000	0.005	0.004	0.004	0.008	0.007
624250	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.038	0.071	0.006	0.009	0.000	0.000	0.009	0.009	0.009	0.009	0.007	0.003	0.019	0.007	0.006	0.008
624300	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.069	0.130	0.231	0.009	0.009	0.009	0.000	0.009	0.009	0.009	0.009	0.006	0.005	0.017	0.016	0.008	0.008
624350	0.009	0.009	0.000	0.009	0.009	0.009	0.009	0.102	0.164	0.187	0.009	0.009	0.009	0.000	0.009	0.009	0.009	0.009	0.009	0.000	0.012	0.017	0.008	0.008
624400	0.009	0.009	0.009	0.009	0.009	0.000	0.009	0.061	0.023	0.041	0.009	0.009	0.000	0.009	0.009	0.009	0.009	0.009	0.009	0.006	0.017	0.009	0.008	0.008
624450	0.009	0.009	0.009	0.009	0.009	0.000	0.009	0.040	0.034	0.144	0.010	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.002	0.003	0.001	0.008	0.008
624500	0.009	0.000	0.009	0.009	0.009	0.009	0.009	0.041	0.047	0.123	0.015	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.010	0.031	0.018	0.006	0.006
624550	0.009	0.000	0.009	0.009	0.009	0.009	0.009	0.141	0.248	0.176	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.003	0.005	0.017	0.038	0.008	0.006
624600	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.161	0.119	0.039	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.007	0.017	0.017	0.022	0.008	0.008
624650	0.009	0.000	0.009	0.009	0.009	0.009	0.000	0.013	0.041	0.084	0.008	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.014	0.036	0.063	0.006	0.006	0.007
624700	0.009	0.009	0.009	0.009	0.009	0.009	0.000	0.056	0.107	0.216	0.004	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.019	0.013	0.027	0.004	0.004
624750	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.088	0.096	0.141	0.007	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.007	0.044	0.027	0.010	0.004	0.004
624800	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.063	0.050	0.030	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.012	0.036	0.082	0.059	0.005	0.004
624850	0.010	0.010	0.011	0.009	0.009	0.011	0.042	0.044	0.012	0.159	0.007	0.000	0.007	0.007	0.006	0.000	0.007	0.008	0.007	0.047	0.012	0.022	0.004	0.027
624900	0.005	0.013	0.034	0.018	0.007	0.072	0.056	0.061	0.077	0.023	0.056	0.006	0.003	0.002	0.005	0.004	0.001	0.004	0.003	0.016	0.010	0.018	0.011	0.019
624950	0.007	0.037	0.037	0.020	0.037	0.061	0.006	0.009	0.226	0.051	0.035	0.010	0.004	0.004	0.009	0.004	0.005	0.000	0.005	0.006	0.038	0.026	0.021	0.009
625000	0.019	0.029	0.019	0.005	0.008	0.010	0.003	0.342	0.460	0.196	0.096	0.009	0.009	0.008	0.009	0.009	0.009	0.000	0.011	0.017	0.014	0.002	0.006	0.006
625050	0.004	0.009	0.008	0.006	0.008	0.008	0.006	0.193	0.192	0.131	0.002	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.004	0.002	0.005	0.009	0.004	0.004
625100	0.006	0.006	0.008	0.008	0.006	0.006	0.003	0.076	0.186	0.159	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.000	0.003	0.008	0.010	0.007	0.004	0.004
625150	0.006	0.006	0.006	0.006	0.006	0.006	0.037	0.108	0.105	0.261	0.001	0.009	0.009	0.009	0.009	0.000	0.009	0.000	0.011	0.008	0.004	0.006	0.006	0.004
625200	0.008	0.008	0.006	0.006	0.006	0.006	0.015	0.081	0.470	0.303	0.011	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.004	0.005	0.010	0.007	0.005	0.006
625250	0.006	0.006	0.006	0.006	0.006	0.006	0.007	0.268	0.591	0.105	0.000	0.009	0.009	0.009	0.009	0.009	0.009	0.011	0.013	0.015	0.011	0.006	0.004	0.005
625300	0.006	0.006	0.006	0.006	0.006	0.000	0.003	0.221	0.205	0.164	0.010	0.009	0.009	0.009	0.009	0.009	0.009	0.002	0.003	0.006	0.002	0.005	0.006	0.004
625350	0.000	0.006	0.006	0.006	0.006	0.008	0.006	0.055	0.168	0.085	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.000	0.004	0.018	0.015	0.004	0.006
625400	0.006	0.006	0.006	0.008	0.006	0.006	0.006	0.067	0.104	0.100	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.011	0.017	0.017	0.010	0.000	0.004
625450	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.040	0.207	0.189	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.001	0.012	0.003	0.006	0.000	0.004
625500	0.001	0.006	0.006	0.006	0.006	0.006	0.006	0.123	0.275	0.221	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.000	0.031	0.038	0.022	0.005	0.004
625550	0.007	0.006	0.000	0.006	0.006	0.007	0.000	0.107	0.186	0.087	0.008	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.003	0.042	0.011	0.006	0.004	0.004
625600	0.006	0.006	0.006	0.007	0.006	0.006	0.006	0.044	0.137	0.099	0.005	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.002	0.021	0.046	0.010	0.004	0.004
625650	0.000	0.000	0.006	0.006	0.006	0.006	0.012	0.087	0.385	0.124	0.034	0.067	0.006	0.009	0.007	0.007	0.007	0.007	0.003	0.040	0.026	0.004	0.003	0.003
625700	0.006	0.000	0.007	0.006	0.007	0.007	0.024	0.029	0.125	0.029	0.025	0.009	0.003	0.021	0.014	0.005	0.001	0.022	0.036	0.029	0.002	0.009	0.004	0.007
625750	0.000	0.000	0.006	0.008	0.006	0.032	0.093	0.054	0.108	0.108	0.054	0.049	0.056	0.006	0.037	0.014	0.003	0.064	0.023	0.046	0.038	0.016	0.005	0.005
625800	0.003	0.008	0.001	0.013	0.001	0.070	0.598	0.470	0.111	0.089	0.091	0.071	0.092	0.089	0.091	0.057	0.061	0.104	0.103	0.080	0.064	0.072	0.076	0.078
625850	0.097	0.004	0.011	0.005	0.085	0.758	0.373	0.893	0.318	0.046	0.162	0.173	0.044	0.267	0.116	0.038	0.235	0.417	0.046	0.047	0.047	0.048	0.048	0.048
625900	0.010	0.003	0.274	1.184	0.518	1.361	0.576	0.221	0.003	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.012	0.021
625950	0.191	0.897	0.640	1.498	0.669	0.648	0.632	0.186	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.020	0.004	0.004
626000	0.497	0.024	0.828	0.599	0.737	0.071	0.066	0.094	0.004	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.006	0.012	0.003	0.004	0.019
626050	1.129	0.667	0.617	0.155	0.178	0.162	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.003	0.001	0.003
626100	0.658	0.503	0.288	0.041	0.101	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.005	0.000	0.003
626150	0.141	0.030	0.136	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.005	0.000	0.003
626200	0.168	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.005	0.000	0.002
626250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.004	0.000	0.002
626300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.004	0.000	0.001
626350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.004	0.000	0.001
626400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.003	0.000	0.001
626450	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.000	0.001
626500	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.001
626550	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.001
626600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.001
626650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.001
626700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000
626750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000
626800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000
626850	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
626900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
626950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
627000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Major Principal Strain, Tensile: Post-Settlement (sheet 6 of 6)

(%) EASTING (ft)	1352000	1351950	1351900	1351850	1351800	1351750	1351700	1351650	1351600	1351550	1351500	1351450	1351400	1351350	1351300	1351250	1351200	1351150	1351100
	NORTHING (ft)																		
623600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623650	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623800	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623850	0.002	0.061	0.060	0.123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623900	0.029	0.122	0.142	0.224	0.123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
623950	0.323	0.491	0.036	0.059	0.164	0.109	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624000	0.301	0.318	0.046	0.380	0.203	0.099	0.083	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624050	0.687	0.982	0.606	0.351	0.449	0.338	0.035	0.056	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624100	-0.002	0.441	0.511	0.518	0.317	0.467	0.455	0.009	0.029	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624150	0.017	0.024	0.453	0.326	0.583	0.471	0.579	0.546	0.037	0.001	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624200	0.006	0.022	0.000	0.371	0.221	0.677	0.558	0.654	0.613	0.645	0.025	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624250	0.006	0.004	0.002	0.018	0.294	0.085	0.752	0.658	0.739	0.657	0.034	0.042	0.026	0.000	0.000	0.000	0.000	0.000	0.000
624300	0.006	0.005	0.003	0.001	0.015	0.282	0.233	0.813	0.731	0.831	0.703	0.027	0.036	0.000	0.000	0.000	0.000	0.000	0.000
624350	0.006	0.007	0.005	0.002	0.000	0.011	0.289	0.386	0.687	0.800	0.656	0.373	0.126	0.081	0.000	0.000	0.000	0.000	0.000
624400	0.006	0.006	0.007	0.004	0.002	0.002	0.000	0.272	0.467	0.706	0.211	0.261	0.100	0.041	0.000	0.000	0.000	0.000	0.000
624450	0.006	0.008	0.008	0.006	0.004	0.001	0.000	0.001	0.330	0.801	0.532	0.243	0.011	0.000	0.000	0.000	0.000	0.000	0.000
624500	0.006	0.008	0.008	0.006	0.005	0.003	0.000	0.000	0.000	0.346	0.135	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624550	0.006	0.008	0.008	0.006	0.005	0.001	0.001	0.001	0.000	0.093	0.080	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624600	0.006	0.007	0.005	0.003	0.004	0.001	0.001	0.001	0.000	0.091	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624650	0.004	0.004	0.004	0.004	0.003	0.001	0.001	0.001	0.001	0.089	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624700	0.004	0.004	0.004	0.004	0.003	0.001	0.001	0.001	0.001	0.088	0.087	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624750	0.004	0.004	0.004	0.004	0.002	0.001	0.001	0.001	0.002	0.085	0.155	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624800	0.003	0.005	0.006	0.016	-0.001	0.007	0.000	0.006	0.009	0.067	0.116	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624850	0.001	0.026	0.005	0.022	0.000	0.016	0.001	0.018	0.005	0.076	0.251	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624900	0.006	0.016	0.010	0.014	0.003	0.002	0.002	0.004	0.034	0.081	0.077	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
624950	0.023	0.009	0.023	0.009	0.012	0.004	0.007	0.006	0.001	0.084	0.458	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625000	0.007	0.006	0.006	0.006	0.001	0.001	0.002	0.006	0.077	0.183	0.199	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625050	0.004	0.004	0.004	0.004	0.002	0.001	0.001	0.001	0.015	0.078	0.203	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625100	0.004	0.004	0.004	0.004	0.002	0.001	0.001	0.001	0.026	0.101	0.077	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625150	0.004	0.004	0.004	0.004	0.003	0.001	0.001	0.001	0.002	0.077	0.110	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000
625200	0.004	0.004	0.004	0.004	0.004	0.002	0.001	0.001	0.011	0.082	0.076	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625250	0.006	0.004	0.004	0.004	0.004	0.002	0.001	0.003	0.001	0.082	0.087	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625300	0.005	0.008	0.004	0.004	0.004	0.002	0.001	0.003	0.004	0.065	0.078	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625350	0.004	0.005	0.006	0.004	0.004	0.002	0.001	0.004	0.002	0.087	0.257	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625400	0.006	0.004	0.005	0.006	0.004	0.003	0.002	0.001	0.019	0.101	0.167	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625450	0.004	0.008	0.004	0.005	0.008	0.004	0.002	0.001	0.007	0.084	0.099	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625500	0.004	0.004	0.006	0.004	0.005	0.006	0.002	0.001	0.003	0.090	0.100	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000
625550	0.004	0.004	0.004	0.006	0.004	0.005	0.004	0.001	0.003	0.088	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625600	0.004	0.004	0.004	0.004	0.006	0.004	0.004	0.002	0.001	0.080	0.081	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625650	0.003	0.003	0.003	0.003	0.003	0.005	0.002	0.002	0.001	0.094	0.176	0.130	0.015	0.000	0.000	0.000	0.000	0.000	0.000
625700	0.002	0.004	0.002	0.002	0.001	0.003	0.002	0.000	-0.002	0.672	1.165	0.372	0.058	0.048	0.000	0.000	0.000	0.000	0.000
625750	0.007	0.030	0.012	0.016	0.005	0.007	0.007	0.065	0.957	0.784	0.687	0.593	0.108	0.071	0.000	0.000	0.000	0.000	0.000
625800	0.084	0.072	0.075	0.078	0.081	0.083	0.085	0.153	0.838	0.900	0.610	0.132	0.135	0.000	0.000	0.000	0.000	0.000	0.000
625850	0.156	0.074	0.120	0.050	0.050	0.051	0.187	0.561	0.298	0.560	0.030	0.038	0.017	0.000	0.000	0.000	0.000	0.000	0.000
625900	0.001	0.001	0.001	0.001	0.002	0.001	0.087	0.360	0.506	0.190	0.082	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000
625950	0.027	0.042	0.000	0.000	0.000	0.000	0.011	0.006	0.047	0.118	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626000	0.009	0.000	0.000	0.000	0.000	0.000	0.021	0.050	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626100	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626150	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626200	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626350	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626400	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626450	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626500	0.003	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626550	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626600	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626650	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626700	6.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626750	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626850	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626900	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
626950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
627200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Written by: STEVEN TAPP Date: 02/04/30 (YY MM DD) Reviewed by: ____ Date: __/__/__ (YY MM DD)

Client: OMNI Project: OHD FACILITY Project/Proposal No.: FW0400 Task No.: 03

MAJOR PRINCIPAL STRAIN

$$\epsilon_{P1} = \frac{\epsilon_{N-S} + \epsilon_{E-W}}{2} + \left[\left(\frac{\epsilon_{N-S} - \epsilon_{E-W}}{2}\right)^2 + \left(\frac{\gamma_{NS-EW}}{2}\right)^2\right]^{\frac{1}{2}}$$

FIRST CALCULATE ELEMENT LENGTHS (PRE- + POST-SETTLE) THAT WILL BE NEEDED USING CENTRAL DIFFERENCE APPROX.

$$L_{N-S\,(PRE\text{-}SETTLE)} = \frac{1}{2}\left\{\left[(50\,ft)^2 + (88.30\,ft - 88.96\,ft)^2\right]^{\frac{1}{2}} + \left[(50\,ft)^2 + (88.96\,ft - 89.62\,ft)^2\right]^{\frac{1}{2}}\right\}$$

$L_{N-S\,(PRE\text{-}SETTLE)} = 50.00436\ ft$

$$L_{N-S\,(POST\text{-}SETTLE)} = \frac{1}{2}\left\{\left[(50\,ft)^2 + (86.672\,ft - 87.350\,ft)^2\right]^{\frac{1}{2}} + \left[(50\,ft)^2 + (87.350\,ft - 88.028\,ft)^2\right]^{\frac{1}{2}}\right\}$$

$L_{N-S\,(POST\text{-}SETTLE)} = 50.00460\ ft$

$$L_{E-W\,(PRE\text{-}SETTLE)} = \frac{1}{2}\left\{\left[(50\,ft)^2 + (89.710\,ft - 88.960\,ft)^2\right]^{\frac{1}{2}} + \left[(50\,ft)^2 + (88.960\,ft - 88.210\,ft)^2\right]^{\frac{1}{2}}\right\}$$

$L_{E-W\,(PRE\text{-}SETTLE)} = 50.00562\ ft$

$$L_{E-W\,(POST\text{-}SETTLE)} = \frac{1}{2}\left\{\left[(50\,ft)^2 + (88.045\,ft - 87.350\,ft)^2\right]^{\frac{1}{2}} + \left[(50\,ft)^2 + (87.350\,ft - 86.655\,ft)^2\right]^{\frac{1}{2}}\right\}$$

$L_{E-W\,(POST\text{-}SETTLE)} = 50.00483\ ft$

$$L_{DIAG.\,(PRE\text{-}SETTLE)} = \frac{1}{2}\left\{\left[\left[(50')^2 + (50')^2\right]^{\frac{1}{2}\,2} + (88.960' - 88.870')^2\right]^{\frac{1}{2}} + \left[(50')^2 + (50')^2 + (89.050' - 88.960')^2\right]^{\frac{1}{2}}\right\}$$

(CANCELL)

$L_{DIAG.\,(PRE\text{-}SETTLE)} = 70.71074\ ft$

$$L_{DIAG.\,(POST\text{-}SETTLE)} = \frac{1}{2}\left\{\left[(50')^2 + (50')^2 + (87.350' - 87.333')^2\right]^{\frac{1}{2}} + \left[(50')^2 + (50')^2 + (87.366' - 87.350')^2\right]^{\frac{1}{2}}\right\}$$

$L_{DIAG.\,(POST\text{-}SETTLE)} = 70.71068\ ft$

Written by: STEVEN [illegible] Date: 02/04/30 Reviewed by: ______ Date: __/__/__

Client: OMNI Project: OHD FACILITY Project/Proposal No.: FW0400 Task No.: 03

SOLVE FOR NORMAL STRAINS

$$\epsilon_{N-S} = \left[L_{N-S(POST-SETTLE)} - L_{N-S(PRE-SETTLE)}\right] / L_{N-S(PRE-SETTLE)}$$

$$\epsilon_{N-S} = \left[(50.00460') - (50.00436')\right] / (50.00436')$$

$$\epsilon_{N-S} = 4.80 \times 10^{-6}$$

$$\epsilon_{E-W} = \left[L_{E-W(POST-SETTLE)} - L_{E-W(PRE-SETTLE)}\right] / L_{E-W(PRE-SETTLE)}$$

$$\epsilon_{E-W} = \left[(50.00483\ ft) - (50.00562\ ft)\right] / (50.00562\ ft)$$

$$\epsilon_{E-W} = {}^{-}1.58 \times 10^{-5}$$

$$\epsilon_{DIAG.} = \left[L_{DIAG(POST-SETTLE)} - L_{DIAG(PRE-SETTLE)}\right] / L_{DIAG(PRE-SETTLE)}$$

$$\epsilon_{DIAG.} = \left[(70.71068') - (70.71074')\right] / (70.71074')$$

$$\epsilon_{DIAG.} = {}^{-}8.49 \times 10^{-7}$$

SOLVE FOR SHEAR STRAIN

$$\gamma_{N-S,E-W} = \sin^{-1}\left\{\frac{\left[(1+\epsilon_{DIAG})L_{DIAG(PRE-SETTLE)}\right]^2 - \left[(1+\epsilon_{N-S})L_{N-S(PRE-SETTLE)}\right]^2 - \left[(1+\epsilon_{E-W})L_{E-W(PRE-SETTLE)}\right]^2}{2\left[(1+\epsilon_{N-S})L_{N-S(PRE-SETTLE)}\right]\left[(1+\epsilon_{E-W})L_{E-W(PRE-SETTLE)}\right]}\right\}$$

$$\gamma_{N-S,E-W} = \sin^{-1}\left\{\frac{\left[(1-8.49E^{-7})(70.71074\ ft)\right]^2 - \left[(1+4.80E^{-6})(50.00436\ ft)\right]^2 - \left[(1-1.58E^{-5})(50.00562\ ft)\right]^2}{2\left[(1+4.80E^{-6})(50.00436\ ft)\right]\left[(1-1.58E^{-5})(50.00562\ ft)\right]}\right\}$$

$$\gamma_{N-S,E-W} = \sin^{-1}(^{-}1.89 \times 10^{-4}) \approx -1.89 \times 10^{-4} \text{ RADIANS}$$

Written by: STEVEN DAPP Date: 02 / 04 / 30 Reviewed by: ______ Date: __ / __ / __

Client: OMNI Project: OHD FACILITY Project/Proposal No.: F40400 Task No.: 03

$$\epsilon_{P_1} = \frac{\epsilon_{N\text{-}S} + \epsilon_{E\text{-}W}}{2} + \left[\left(\frac{\epsilon_{N\text{-}S} - \epsilon_{E\text{-}W}}{2}\right)^2 + \left(\frac{\gamma_{NS\text{-}EW}}{2}\right)^2\right]^{\frac{1}{2}}$$

$$\epsilon_{P_1} = \frac{(4.80\times10^{-6}) + (-1.58\times10^{-5})}{2} + \left[\left(\frac{(4.80\times10^{-6}) - (-1.58\times10^{-5})}{2}\right)^2 + \left(\frac{(-1.89\times10^{-4})}{2}\right)^2\right]^{\frac{1}{2}}$$

$$\boxed{\epsilon_{P_1} = 8.93\times10^{-5} = 0.00893\% \text{ TENSION}}$$

$\epsilon_{P_1} = 0.00894\%$ TENSION ← SPREAD SHEET SOLN.

∴ O.K. ✓✓

STABILITY OF FINAL COVER SYSTEM

24 May 2002

1. INTRODUCTION

1.1 General

The proposed Oak Hammock Disposal (OHD) landfill will cover approximately 264 acres. Final side slopes will be 4 horizontal to 1 vertical (4H:1V). A final cover system will consist of a geomembrane, geocomposite drainage layer, and cap protective soil.

1.2 Purpose of the Analysis

The purpose of the analysis is to evaluate the veneer slope stability of the OHD landfill final cover system. A factor of safety of 1.50 is the established minimum criterion.

1.3 Method of Analysis

The factor of safety for the veneer stability of the final cover system was evaluated using the method proposed by Giroud et al. (1995) as follows:

For a shear surface above the geomembrane:

$$
\begin{aligned}
FS_A = & \frac{\gamma_t(t-t_w)+\gamma_b t_w}{\gamma_t(t-t_w)+\gamma_{sat} t_w}\frac{\tan\delta_A}{\tan\beta} \\
& + \frac{a_A/\sin\beta}{\gamma_t(t-t_w)+\gamma_{sat} t_w} \\
& + \frac{\gamma_t(t-t^*_w)+\gamma_b t^*_w}{\gamma_t(t-t_w)+\gamma_{sat} t_w}\frac{t}{h}\frac{\sin\phi}{\sin(2\beta)\cos(\beta+\phi)} \\
& + \frac{ct/h}{\gamma_t(t-t_w)+\gamma_{sat} t_w}\frac{\cos\phi}{\sin\beta\cos(\beta+\phi)} \\
& + \frac{T/h}{\gamma_t(t-t_w)+\gamma_{sat} t_w}
\end{aligned}
\qquad \text{(Equation 1)}
$$

in which:

a_A is the interface adhesion along a slip surface located above the geomembrane;

c is the soil cohesion above geomembrane;

FS_A is the factor of safety for slip surfaces above the geomembrane;

h is the slope height;

T is the tension within geosynthetic reinforcement;

t is the soil layer thickness;

t_w is the water flow thickness;

t^*_w is the water flow thickness in the toe area;

β is slope angle;

δ_A is the interface friction angle along a slip surface located above the geomembrane;

ϕ is the soil internal friction angle above the geomembrane;

γ_b is the soil buoyant unit weight;

γ_{sat} is the soil saturated unit weight; and

γ_t is the soil total unit weight;

For a slip surface below the geomembrane:

$$FS_B = \frac{\tan\delta_B}{\tan\beta} + \frac{a_B/\sin\beta}{\gamma_t(t-t_w)+\gamma_{sat}t_w} + \frac{\gamma_t(t-t^*_w)+\gamma_b t^*_w}{\gamma_t(t-t_w)+\gamma_{sat}t_w}\frac{t}{h}\frac{\sin\phi}{\sin(2\beta)\cos(\beta+\phi)} + \frac{ct/h}{\gamma_t(t-t_w)+\gamma_{sat}t_w}\frac{\cos\phi}{\sin\beta\cos(\beta+\phi)} + \frac{T/h}{\gamma_t(t-t_w)+\gamma_{sat}t_w} \quad \text{(Equation 2)}$$

in which:

a_B is the interface adhesion along a slip surface located below the geomembrane;

c is the soil cohesion above geomembrane;

FS_B is the factor of safety for slip surfaces below the geomembrane;

h is the slope height;

T is the tension within the geosynthetics;

t is the soil layer thickness;

t_w is the water flow thickness;

t^*_w is the water flow thickness in the toe area;

β is slope angle;

δ_A is the interface friction angle along a slip surface located above the geomembrane;

ϕ is the soil internal friction angle above the geomembrane;

γ_b is the soil buoyant unit weight;

γ_{sat} is the soil saturated unit weight; and

γ_t is the soil total unit weight;

2. INPUT PARAMETERS

2.1 Geometry

A typical cross section showing the final cover system is shown in Figure 1. The slope at the top of the proposed landfill is 5 percent. The final cover system on this top slope is not considered susceptible to veneer instability and is not further considered. It is planned that the landfill will reach the maximum height with a side slope inclination of 4H:1V. The components of the final cover system on the sideslope are shown in Figure 2. As shown, the components of the final cover system on the sideslope from bottom the top are: (i) MSW; (ii) a intermediate cover soil layer; (iii) a 40-mil textured geomembrane; (iv) a geocomposite drainage layer; (v) a cap protective soil layer; and (vi) a vegetative soil layer.

2.2 Phreatic Surface

The final cover system on the sideslope includes a geocomposite drainage layer designed to have sufficient capacity to convey the sub-surface water flow. According to analyses performed in the calculation package entitled "*Final Cover System Performance Evaluation*", the calculated maximum head of water in the geocomposite drainage layer is 0.123 inches, which is less than the thickness of the geocomposite drainage layer (i.e., 0.306 inches). Therefore, the phreatic surface within the geocomposite drainage layer has no influence on soil layers above the geomembrane.

2.3 Material Properties

For the cover soil layers, a typical unit weight of 120 lb/ft^3 and a typical peak drained friction angle of 35 degrees were used. For the geosynthetics, the weakest interface below the geomembrane for a final cover system is the textured geomembrane to sand interface. Based on the previous experiences [GeoSyntec, 1998], the value of δ can be estimated as follows:

$$\frac{\tan\delta}{\tan\phi} = 0.7\ to\ 0.8$$

in which:

δ = geomembrane/soil interface friction angle; and

ϕ =soil friction angle

therefore, using the average value:

$$\frac{\tan\delta}{\tan\phi} = 0.75$$

then,

$$\delta = \tan^{-1}(0.75 \tan 35°) = 27.71°$$

The weakest interface above the geomembrane for a final cover system is the textured geomembrane and geocomposite drainage layer interface. Based on the previous experiences [GeoSyntec, 1998], the value of interface friction angle for this interface varies between 17° and 29° with an average value of δ_A=23°.

4. ANALYSIS AND RESULTS

Using Equations 1 and 2, adapted from Giroud et al. [1995], the factor of safety for the final cover system veneer stability can be calculated using the parameters:

$a_A = 0$ (conservatively assumed)

$a_B = 0$ (conservatively assumed)

$c = 0$ (conservatively assumed)

$h = 98$ ft (maximum)

$T = 0$ (conservatively assumed)

$t = 2.5$ ft.

$t_w = 0$

$t^*_w = 0$

$\beta = \tan^{-1}(1/4) = 14°$

δ_A=23°

$\delta_B = 27.71°$

ϕ= 35°

γ_b = N/A

γ_{sat} = N/A

$\gamma_t = 120$ pcf

For the critical slip surface below the geomembrane:

$$FS = \frac{\tan(27.71)}{\tan(14)} + \frac{4}{98}\frac{\sin(35)}{\sin(2 \times 21.8)\cos(21.8 + 35)}$$

FS = 2.17 > 1.50

For the critical slip surface above the geomembrane:

$$FS = \frac{\tan(23)}{\tan(14)} + \frac{4}{98}\frac{\sin(35)}{\sin(2 \times 14)\cos(14 + 35)}$$

FS = 1.78 >1.50

5. SUMMARY AND CONCLUSION

An analysis was performed to evaluate the final cover system veneer stability for the proposed OHD landfill. The established minimum criterion for stability is a factor of safety of 1.50. The analysis has shown that the critical slip surfaces above and below the cover system geomembrane have calculated factors of safety of 2.17 and 1.78, respectively. The factors of safety for both of these critical slip surfaces were greater than the required 1.50.

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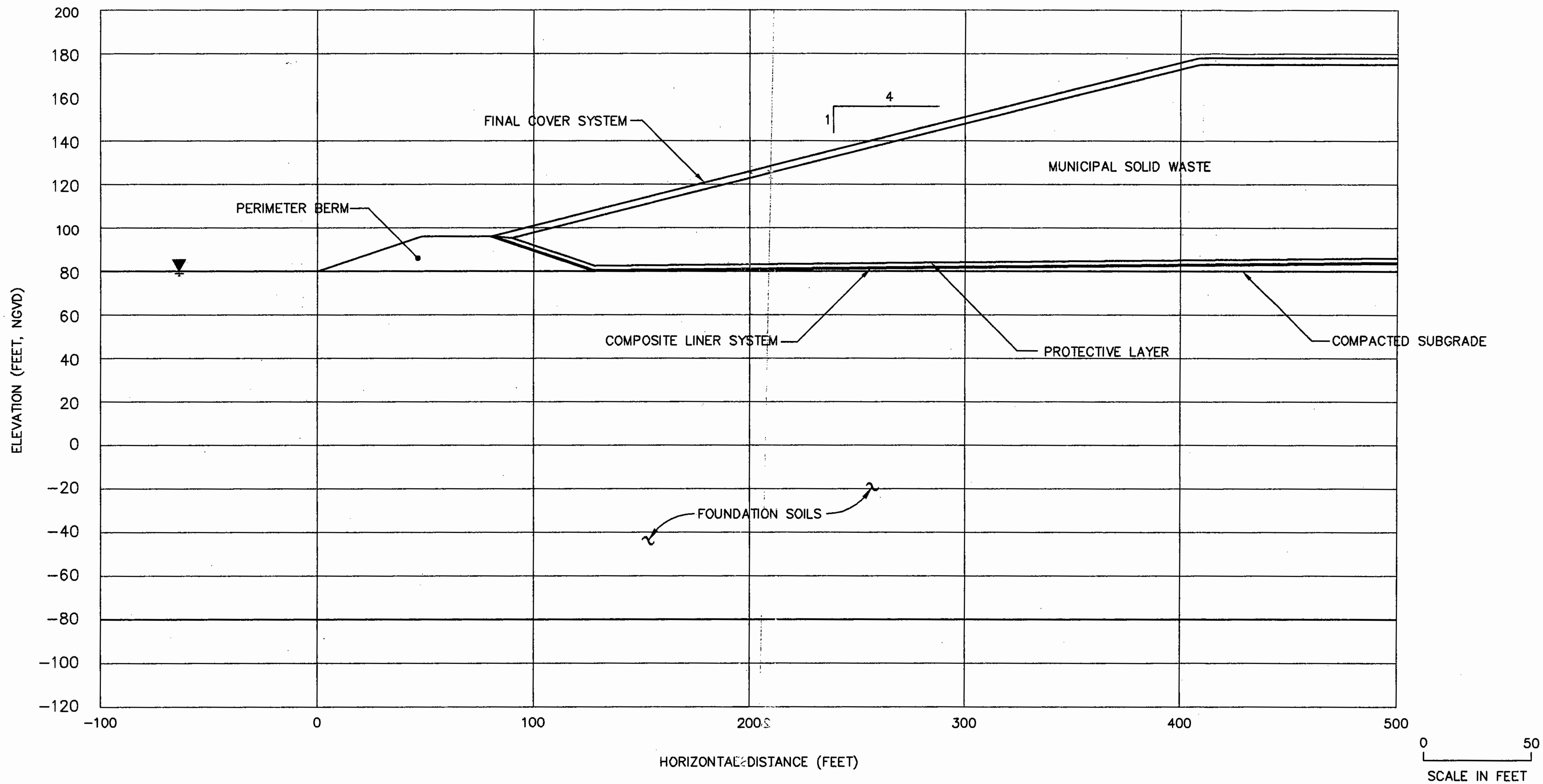

Project			
OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **FINAL CONFIGURATION GEOMETRY**			
Project Number	Date	File No.	Figure No.
FW0400	MARCH 02	0400FA035	1

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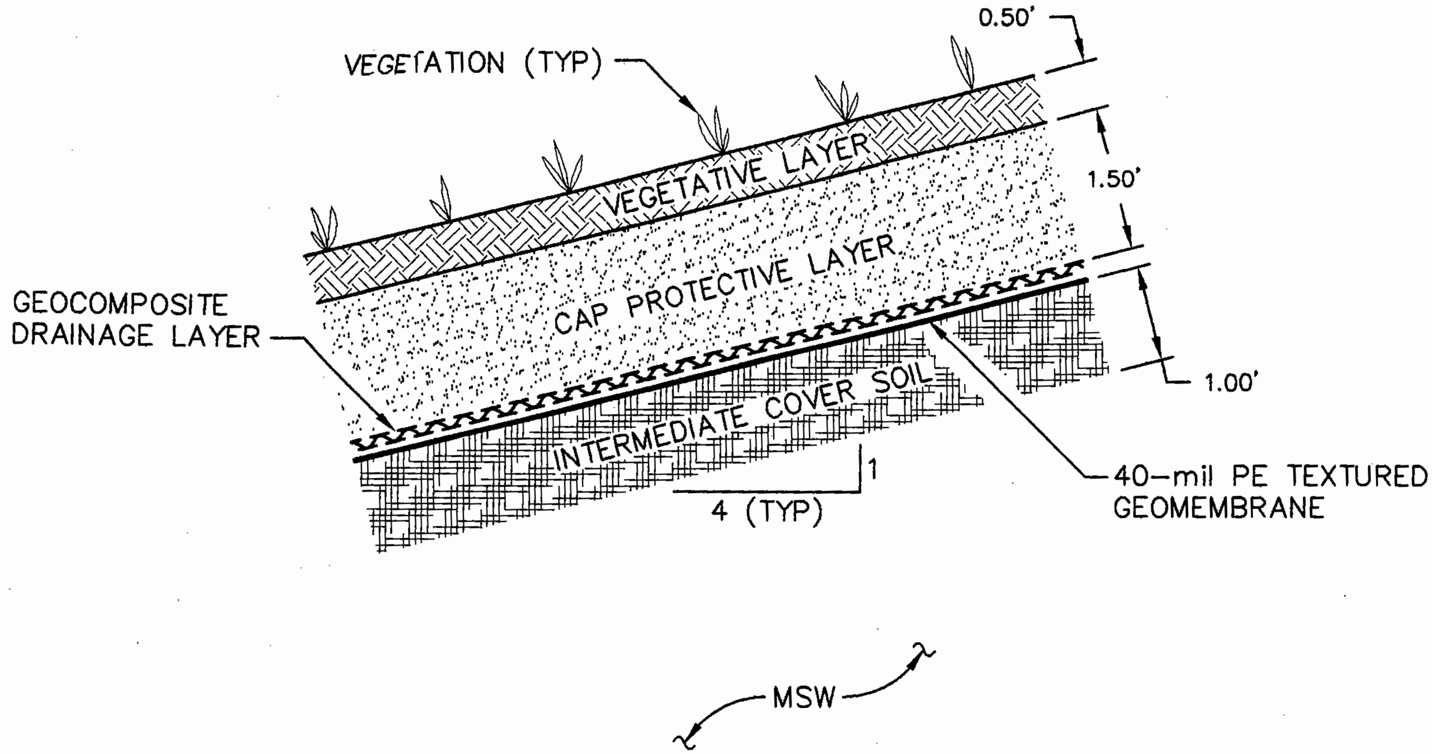

Project			
OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title			
FINAL COVER SYSTEM COMPONENTS			
Project Number	**Date**	**File No.**	**Figure No.**
FW0400	MARCH 02	0400FA029	**2**

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LEACHATE MANAGEMENT SYSTEM

24 May 2002

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1. INTRODUCTION

The purpose of this calculation package is to perform the engineering design and evaluate the performance of the leachate management system for the Oak Hammock Disposal (OHD) landfill. The leachate management system is made up of the primary and secondary leachate collection and removal systems, the leachate transmission pipeline, and the leachate storage containers. The primary leachate collection system is a component of the proposed primary liner system that consists of a geocomposite drainage layer on top of the primary geomembrane liner. This primary drainage layer is designed to collect the leachate that percolates vertically through the waste and convey it to a sump for removal from the cell. For each cell, the primary leachate collection system components include a primary geocomposite drainage layer, primary leachate collection pipes, and primary leachate collection sumps. According to Chapter 62-701.400(3)(c)1, FAC, the primary leachate collection system should limit the leachate head to no more than 1 foot above the primary geomembrane liner.

The secondary leachate collection system is a component of the proposed liner system that consists of a lateral drainage layer between the primary and secondary liners. This secondary lateral drainage layer is designed to collect any leachate that may leak through the primary liner system and convey it to a sump for removal. For each cell, the secondary leachate collection system components include a secondary geocomposite drainage layer, and a secondary leachate collection sump. According to Chapter 62-701.400(3)(c)2, FAC, the secondary drainage system should not allow the leachate head on the secondary geomembrane liner to exceed the thickness of the drainage layer.

2. DESCRIPTION OF RELEVANT SYSTEMS AND OPERATIONS

2.1 General Layout

The OHD landfill will be approximately 264 acres in plan area and will include 21 cells. The cell designations and area of each cell for the analysis of the primary and secondary liner systems is presented in Figure 1. While the landfill will actually be constructed in phases, this calculation package was prepared in consideration of the 21 cells with a maximum depth of waste of 95 feet.

The primary geocomposite drainage layer collects leachate resulting from the vertical percolation of rainfall through the waste. The leachate collected in each cell drains to the primary leachate collection pipes (perforated HDPE collector pipes surrounded by high-permeability gravel) placed at the lower edges of each cell. The primary leachate collection pipes and gravel convey the leachate to a common low point (primary leachate sump) where submersible pumps remove the leachate and transfer it via a leachate transmission pipeline to the leachate storage containers.

The secondary geocomposite drainage system collects leachate that may leak through the primary liner system. Leachate will be collected and conveyed to the secondary leachate sump. A double thickness of the geocomposite will be placed along the edges of the cells to increase the flow capacity in these areas. Submersible pumps will remove the leachate from the secondary sumps and transfer it to the leachate transmission pipeline.

Figure 2 shows the leachate collection system plan for the OHD landfill. This figure shows the leachate collection pipes in each cell with the corresponding sump for every cell. The leachate transmission pipeline and leachate storage container area are also shown.

2.2 Liner System

The OHD landfill liner system is composed of a double-composite liner as shown in Figure 3. The double-composite liner system consists of the following components, from top to bottom:

- 24-inch thick protective soil layer;
- primary geocomposite drainage layer consisting of a geonet with non-woven geotextile heat-bonded on both sides;
- primary 60-mil HDPE geomembrane liner;
- primary geosynthetic clay liner;
- secondary geocomposite drainage layer consisting of a geonet with non-woven geotextile heat-bonded on both sides;
- secondary 60-mil HDPE geomembrane liner;
- secondary geosynthetic clay liner; and
- compacted subgrade.

2.3 Cover System

The OHD landfill final cover system is also shown in Figure 3 and consists of the following components, from top to bottom:

- 6-inch thick vegetated layer;
- 18-inch thick protective soil layer;
- geocomposite drainage layer consisting of a geonet with non-woven geotextile heat-bonded on both sides (on side-slopes only);
- 40-mil PE geomembrane liner; and
- 12-inch thick intermediate soil cover

2.4 Initial and Intermediate Cover

An initial soil cover of 6 inches will be placed on top of all exposed waste at the end of each day's operation to control vectors, fires, blowing litter, odors, and scavenging. A 1-ft thick intermediate cover of clean soil will be placed on top of the waste following the completion of any intermediate lift of waste, which will not have additional waste placed within 30 to 60 days. The initial cover and intermediate cover will be graded to facilitate runoff and limit infiltration. The thickness and grade of the intermediate cover will be maintained until additional waste or the final cover is placed.

2.5 Landfill Development

The OHD landfill liner system will be constructed by cell and certain cells will be grouped in phases. Section 6.3 of this calculation package discusses the analyses performed to estimate leachate generation and leakage rates for various construction stages.

3. DESIGN REQUIREMENTS

Highlights of the leachate management system requirements specified in the regulations are listed below.

- the primary leachate collection system must be designed to limit the leachate head buildup on the primary geomembrane liner to no more than 1 foot during routine landfill operations after placement of initial cover (Chapter 62-701.400(3)(c)1, FAC);

- the primary leachate collection system must be designed with a bottom slope to maintain a leachate head less than the maximum allowable leachate head after the predicted settlements of the foundation (Chapter 62-701.400(4)(b), FAC);

- the secondary leachate collection system must have a minimum hydraulic conductivity of 10 cm/sec and must be designed to not allow the leachate head on the secondary geomembrane liner to exceed the thickness of the drainage layer (Chapter 62-701.400(3)(c)2, FAC);

- the transmissivity of geonets shall be tested with method ASTM D4716, or an equivalent method to demonstrate that the design transmissivity will be maintained for the design period of the facility using the actual boundary materials intended for the geonet at the maximum design normal load for the landfill and at the design load expected from one lift of waste (Chapter 62-701.400(3)(d)8, FAC);

4. HELP MODEL ANALYSES

4.1 Purpose

The Hydrogeologic Evaluation of Landfill Performance (HELP) model, Version 3.07 [Schroeder, et. al., EPA/600/R-94/168a and EPA/600/R-94/168b, 1994] was used to estimate leachate generation rates, leakage through geomembrane liners, and maximum head on geomembrane liners for the OHD landfill. The HELP model is a quasi-two dimensional water balance computer program used to evaluate the vertical movement of water through the waste and components of the liner system. The computer program, along with site-specific weather data and design information, was utilized to estimate runoff, evapotranspiration, drainage, leachate collection, and liner leakage for the OHD landfill during the initial startup, intermediate development, and post-closure stages.

The estimated leachate generation rates and other information obtained from the HELP Model were used to evaluate the performance of the primary and secondary leachate collection systems. The leachate generation rates were also used to design the leachate transmission and storage systems for the landfill.

4.2 Landfill Development Conditions Analyzed

To estimate leachate generation rates for different landfill development conditions, several design scenarios were analyzed for an area of 1 acre. Each scenario was analyzed for two surface slopes; a final cover top slope of 5 percent, and a final cover side slope of 25 percent. Figure 1 shows the cell sub-grade plan. The breakline shown on Figure 1 identifies the approximate location where the slope of the final cover changes from 5 percent to 25 percent.

The leachate generation rates, leakage through the geomembrane liners, and the maximum head on the geomembrane liners were estimated for the cases and scenarios described below:

- Case 1 Startup conditions (10 ft of waste)
- Case 2 Intermediate development conditions before construction of the final cover system (30 ft, 60 ft and 95 ft of waste)
- Case 3 Post-closure conditions (after construction of the final cover system, 95 ft of waste)

Case 1

This scenario considered the initial conditions of the landfill operation after the placement of a start-up lift and additional lifts of waste for a total of 10 ft of waste. Case 1 includes 6 inches of daily cover, no runoff, and no surface vegetation. The HELP model identified this scenario as the critical condition for peak lateral drainage of leachate in the primary drainage system. The limited waste thickness resulted in very little storage of precipitation, no runoff due to the fact that the waste height is below the perimeter berm, and limited evapotranspiration due to the lack of vegetation. This scenario represents the critical leachate condition for head build-up on the primary geomembrane liner because of the large amount of leachate flow that must be carried by the geocomposite drainage layer.

Case 2

This scenario considered the conditions presented after the initial 10-ft of waste is placed and before construction of the final cover. The intermediate conditions considered a 30 ft, 60 ft, and 95 ft height of waste. This report will refer to Case 2-A, Case 2-B and Case 2-C for the analyses with 30 ft, 60 ft and 95 ft of waste respectively. For this case, runoff from the intermediate cover surfaces was allowed and surface vegetation was assumed.

Case 3

This scenario considered the post-closure condition for the OHD landfill with 95 ft of waste and the final cover installed. This case represents the lowest generation potential for leachate, leakage and head in the primary and secondary leachate collection system. This is due to the fact that the final cover system over the waste minimizes the percolation of rainfall through the waste.

4.3 Geocomposite Properties

The geocomposite properties used for the calculation of heads, leachate and leakage for the OHD landfill are based on properties for commercially available geocomposites. It is not the objective of this section to identify specific geocomposites for use in the construction of the landfill. However, the performance of materials used should correspond to the minimum requirements used in design.

Geocomposites with high transmissivity values were identified for the primary drainage system. This was due to the need for this drainage layer to provide large drainage capacity under high stress loading. The secondary leachate collection system utilized geocomposites with transmissivity values lower than the primary leachate collection system since the HELP modeling indicated that lower transmissivities would handle the leachate flow without excessive head. Attachment 1 provides examples of commonly available materials having the properties meeting the requirements for the primary and secondary geocomposites and the final cover system geocomposite.

Attachment 1 also includes an example plot of transmissivity vs. time at different gradients for a primary geocomposite. This plot illustrates that at larger gradients the transmissivity values decrease for a specific stress.

4.4 Reduction Factors

4.4.1 General

This section discusses reduction factors used to predict the long-term performance of the geocomposites in the liner system and the final cover system. The procedures for the application of reduction factors for landfills are from Giroud, et. al. (2000).

The long-term performance of a lateral drainage geocomposite requires a larger initial transmissivity, θ_{LTIS}, obtained by increasing the required transmissivity, $\theta_{req'd}$, by a safety factor. Koerner (1998) gives the relationship in Equation 1.

$$FS = \frac{\theta_{LTIS}}{\theta_{req'd}} \qquad \text{Equation 1}$$

Where:

$$\theta_{LTIS} = \frac{\theta_{measured}}{\Pi(RF)} = \frac{\theta_{measured}}{RF_{in} * RF_{cr} * RF_{cc} * RF_{bc}} \qquad \text{Equation 2}$$

FS= the overall safety factor for drainage;
θ_{LTIS}= the long-term-in-soil hydraulic transmissivity of the drainage geocomposite;
$\theta_{req'd}$= the required transmissivity;
$\theta_{measured}$= the transmissivity measured in accordance with ASTM D4716;
RF_{in}= reduction factor for elastic deformation, or intrusion of the adjacent geotextiles into the drainage channel;
RF_{cr}= reduction factor for creep deformation of the drainage core and/or adjacent geotextile into the drainage channel;
RF_{cc}= reduction factor for chemical clogging and/or precipitation of chemicals in the drainage core space;
RF_{bc}= reduction factor for biological clogging in the drainage core space; and
$\Pi(RF)$= cumulative reduction factors.

Seating times of 100 or 300 hours are often recommended [Holtz et al. 1997], when testing geocomposites for transmissivity. During such seating times, a significant amount of creep can take place. As a result, RF_{cr} and RF_{in} are significantly less than it would be if the seating time were short. There are other reduction factors like RF_{IMCO}, RF_{IMIN}, RF_{CD}, RF_{PC} that did not apply to this analysis.

RF_{IMCO}= reduction factor for immediate compression (this can be eliminated if the hydraulic transmissivity is measured after a stress equal to, or greater than, the stress in the soil is applied to the specimen of transmissive material subjected to the hydraulic tansmissivity test). This reduction factor is eliminated in our design.

RF_{IMIN}= reduction factor for immediate intrusion (this can be eliminated if the hydraulic transmissivity test simulates the boundary conditions created by the presence of materials adjacent to the transmissive material). This reduction factor is eliminated in our design.

RF_{CD}= reduction factor for chemical degradation (due to the lack of relevant data, no guidance is provided for this reduction factor). This factor can be assumed to be 1.0 if the geocomposite will not degrade during the design life of the landfill and the geocomposite will not be exposed to harmful chemicals.

RF_{PC}= reduction factor for particulate clogging (due to the lack of relevant data, no guidance is provided for this reduction factor). This reduction factor can be assumed to be 1.0 if an adequate filter has been selected.

Guidance for the selection of reduction factors for geonets and geocomposites having a geonet transmissive core is provide by Koerner (1998). The reduction factor values given by Koerner (see table below) correspond to seating times in excess of 100 hrs and boundary conditions due to adjacent materials applicable to the properties for the geocomposites used in the OHD landfill.

Applications	Normal stress	Liquid	RF_{IN}	RF_{CR}	RF_{CC}	RF_{BC}
Landfill cover drainage layer, Low retaining wall drainage	Low	Water	1.0– 1.2	1.1-1.4	1.0-1.2	1.2-1.5
Primary drainage layer Secondary drainage layer Leachate pond leakage collection and detection layer	High	Leachate	1.0-1.2	1.4-2.0	1.5-2.0	1.5-2.0

4.4.2 Reduction Factors Applied

The reduction factors applied for the cases analyzed for the OHD landfill were obtained from the values presented by Koerner (1998). Additionally, creep reduction factors obtained for the primary geocomposite were considered for the initial phase of waste and prior to final closure as discussed in Attachment 2, which presents a technical note provided by the manufacturer. The creep reduction factors for these cases were 1.05 and 1.20 respectively.

The application of the reduction factors for the different cases for the OHD landfill considered the factors from Koerner and the creep reduction factors suggested by the manufacturer. These values assume that the landfill is not exposed to chemicals and that an adequate filter criteria has been selected for the geocomposites.

- Case 1. The lower reduction factors from Koerner were used in this analysis. The manufacturer reduction factor for creep (RF_{cr}= 1.05) was utilized for this case.
- Case 2. Average reduction factors from Koerner were used with a creep reduction factor taken from the manufacturer for prior final closure (RF_{cr}= 1.20)
- Case 3 The upper reduction factors were used for the primary and secondary drainage geocomposites. Average reduction factors were used for the drainage geocomposite in the final cover.

A summary of the reductions factors used for the cases studied in the primary and secondary drainage systems for the landfill are:

Case	RF_{in}	RF_{cr}	RF_{cc}	RF_{bc}	ΠRF
1 (initial condition)	1.0	1.05	1.5	1.5	2.36
2 (intermediate conditions)	1.1	1.20	1.75	1.75	4.04
3 (maximum depth of waste before cover system)	1.2	2.0	2.0	2.0	9.60
3 (maximum depth of waste with cover system)	1.1	1.25	1.1	1.35	2.04

4.5 Required Transmissivity Values

Typical measured transmissivity values for a candidate primary geocomposite drainage layer were provided by a geocomposite manufacturer and are included in Attachment 3. The given transmissivities were measured at a gradient of 0.02, or 2 percent, which is the initial slope of the liner system in the OHD landfill. The given transmissivities were also measured using a geocomposite sandwiched between sand and a geomembrane and after a load seating time of 100 hours.

Attachment 3 also provides typical measured transmissivity values for a candidate secondary geocomposite drainage layer provided by a geocomposite manufacturer. The tests were performed at a gradient of 0.1 and after a seating time of 100 hours. The boundary conditions for the test were: steel plate/ uniform sand / geocomposite / 60 mil HDPE geomembrane / steel plate. While the measured values of transmissivity were not at the same boundary conditions and gradients as expected in the OHD landfill, they are sufficiently similar to expect similar performance by the geocomposites.

The final cover system used transmissivity values for a candidate geocomposite drainage layer at a gradient of 0.2 for a normal stress of 1,000 psf. Although the final cover system has a side slope at a gradient of 0.25, normal stresses expected at the site are much less than 1,000 psf, therefore the values used for evaluation are considered conservative.

The transmissivity values used for design ($\theta_{req'd}$) resulted from equations 1 and 2 from Section 4.4.1 using the manufacturer's measured values, applying reduction factors as listed, and assuming a factor of safety of 2. The following tables summarize the calculated values for each candidate geocomposite. The thickness of the geocomposite under the various normal stresses is also listed for reference. It should be noted that normal stresses were calculated based on the depth vs density relationship for waste shown in Figure 4 [Kavazanjian, et. al., 2000].

Primary geocomposite drainage layer

Case	Depth of Waste ft	Reduction Factor	θ from Manufacturer m^2/sec	Thickness Geonet in	$\theta_{req'd}$ m^2/sec	k cm/sec
1	10	4.72	7.80E-03	0.297	$1.65e^{-3}$	21.88
2-A	30	8.08	7.60E-03	0.295	$9.41e^{-4}$	12.54
2-B	60	8.08	7.00E-03	0.289	$8.66e^{-4}$	11.79
2-C	95	8.08	6.20E-03	0.276	$7.67e^{-4}$	10.96
3	95	19.2	6.20E-03	0.276	$3.23e^{-4}$	4.61

Secondary geocomposite drainage layer

Case	Depth of Waste ft	Reduction Factor	θ from Manufacturer m²/sec	Thickness Geonet in	$\theta_{req'd}$ m^2/sec	k cm/sec
1	10	4.72	2.40E-03	0.181	$5.08e^{-4}$	11.05
2-A	30	8.08	2.00E-03	0.179	$2.48e^{-4}$	5.44
2-B	60	8.08	1.40E-03	0.173	$1.73e^{-4}$	3.94
2-C	95	8.08	1.10E-03	0.167	$1.36e^{-4}$	3.20
3	95	19.2	1.10E-03	0.167	$5.73e^{-5}$	1.35

Final cover geocomposite drainage layer

Case	Depth of Waste ft	Reduction Factor	θ from Manufacturer m²/sec	Thickness Geonet in	$\theta_{req'd}$ m^2/sec	k cm/sec
3	95	4.10	$4.5e^{-3}$	0.306	$1.1e^{-3}$	14.14

4.6 Input Data for HELP Model

The HELP model requires weather, soil, and basic design data as input and uses solution techniques that account for more than 10 above-surface and subsurface hydraulic processes including precipitation, runoff, and evapotranspiration. The simulation period used for analysis of the OHD landfill was 25 years. Sections 4.6.1 and 4.6.2 describe the weather data, soil and design parameters.

4.6.1 Weather Data Description

The weather data required in the HELP model are classified into four groups: evapotranspiration, precipitation, temperature, and solar radiation. The description for these options are described as follows:

4.6.1.1 Evapotranspiration

The evapotranspiration screen data requires the parameters: location, evaporative zone depth, maximum leaf area index, starting and ending dates of the growing season, normal average wind speed, and normal average quarterly relative humidity. The description of the values used for the OHD landfill are described below:

- Evaporative zone depth. This indicates the maximum depth at which water can be removed by evapotranspiration. The default values of evaporative zone depth provided by HELP are 10 inches for bare areas, 22 inches for fair vegetation, and 40 inches for excellent vegetation. The evaporative zone depth values used in the HELP model for each scenario analyzed are as follows:

Case	Evaporative zone depth in
1	12
2-A	22
2-B	22
2-C	22
3	24

It should be noted that the evaporative zone depth in Case 3 was limited to 24 inches since the depth of the cover system above the geomembrane cap is 24 inches.

- Maximum leaf area index. The leaf area index (LAI) is a ratio of the area of actively transpiring vegetation to the surface area of the land. The amount of water removed due to evapotranspiration increases with increasing LAI. The maximum LAI for bare ground is zero; for a poor stand of grass the LAI could approach 1.0; for a fair stand of grass 2.0; for a good stand of grass 3.5; and for an excellent stand of grass 5.0. The LAI for dense stands of trees and shrubbery would also approach 5.0. The LAI values used for each case can be listed as follows:

Case	LAI
1	0.0
2-A	1.0
2-B	2.0
2-C	3.5
3	5.0

- Dates starting and ending the growing season. Growing season start and end dates were based on the default values provided by the HELP model for Orlando, Florida. For this case the growing season start date is the 0^{th} day of the year and the growing season end date is the 367^{th} day.

- Normal average annual wind speed. Based on the default values provided by the HELP model for Orlando, Florida, the average wind speed of 8.6 miles per hour (mph) was used.

- Normal average quarterly relative humidity. The default normal average quarterly relative humidity values provided by the HELP model for Orlando, Florida are:

Quarter	Humidity %
First	72
Second	72
Third	80
Fourth	76

4.6.1.2 Precipitation

The HELP model provides default and synthetically generated precipitation data for specific cities in the United States. However, precipitation data for Orlando is not available in the HELP Model Version 3.07. Daily precipitation data files for a 30 year period were obtained from Dr. Schroeder (US Army Corps of Engineers, author of HELP model) for five locations close to the OHD landfill (Clermont, Avon Park, Fort Drum, Vera Beach and Titusville). Fort Drum's precipitation data was selected as the most representative of the landfill area. A summary of the annual rainfall for the available period of record is presented in Table 1. As shown in the table, the average annual rainfall over the 30-year period is 52.1 inches and the maximum yearly rainfall in the record is 77.9 inches.

4.6.1.3 Temperature

Normal mean monthly temperature data provided by the synthetic weather generator included in the HELP model was used to provide the temperature input data for the different cases. The following table provides the temperature data used in the HELP model analyses:

Month	Normal Mean Monthly Temperature (°F)
January	60.5
February	61.5
March	66.8
April	72.0
May	77.3
June	80.9
July	82.4
August	82.5
September	81.1
October	74.9
November	67.5
December	62.0

4.6.1.4 Solar Radiation Data

Solar radiation data for the Oak Hammock landfill was synthetically generated for the site using the HELP model. The default station latitude for Orlando was 27.8 degrees.

4.6.2 Soil and Design Data

Subsections 4.5.2.1 through 4.5.2.4 describe the parameters considered for the input data required for the soil and design data in the cases analyzed for the landfill.

4.6.2.1 Model Plan Area

Areas were assumed equal to 1 acre (43,560 ft^2) for the purpose of forming a unit quantity for each HELP analyses.

4.6.2.2 Runoff

This input parameter specifies the percentage of area that will allow drainage from the surface. The percentage of runoff for each case was assigned according to GeoSyntec's previous experience with similar projects:

Case	Runoff %
1	0
2-A	25
2-B	50
2-C	100
3	100

4.6.2.3 Moisture Storage

Default values for initial moisture content were calculated by the HELP model for approximately steady-state conditions and used for all soil layers.

4.6.2.4 Layer Data

Layer data was selected based on Geosyntec's experience and knowledge with local soils and site conditions, additional guidance was provided by the HELP model. The HELP model provides default parameter values based on the soil classification according to the Unified Soil Classification System (USCS) or the United States Department of Agriculture (USDA) textural classification system.

The HELP model recognizes four general types of layers: i) vertical percolation layer; ii) lateral drainage layer designed to convey drainage laterally to a collection and removal system; iii) a soil barrier layer designed to restrict vertical leakage or percolation through which a saturated vertical flow is allowed; and iv) geomembrane liners.

Attachment 4 shows the input properties of every layer type used for the cases analyzed for the OHD landfill. Other information required to describe the types of layer for every case are presented in the following.

4.6.3 Miscellaneous Input

Geomembrane Liner

- Pinhole density: This is the number of assumed defects with a diameter hole equal to or smaller than the geomembrane thickness. For this analysis a conservative hole diameter of 1 mm is used by the HELP model. The number of pinholes selected for analysis was 2 per acre based on a good manufacturer's quality control program prior to shipping the geomembrane. It should be noted that technical specifications require spark testing of all rolls at the plant prior to shipment. Any rolls found to have defects will be rejected and not used in the project.

- Installation defects: This is the assumed number of defects in a given area with a hole diameter larger than the geomembrane thickness. For this analysis a hole size of 1 cm^2 is used by the HELP model. Installation defects are the result of seaming faults and punctures during installation. The number of defects selected for analysis was 2 per acre, based on a good CQA program being implemented in the field.

Liner System and Final Cover Drainage Path Lengths

The length of drainage path for the liner system drainage layers were calculated for two separate surface grades: 5 percent, and 25 percent slope. The longest drainage path along the liner system in each cell is shown on Figure 1. Table 2 summarizes the values used in this analysis. The approximate surface lengths for the final cover are summarized in Table 3. Figure 5 shows the configuration of the final cover. Below are the average values used for design.

Surface slope	5 %	25 %
Average liner system drainage path	630	135
Average final cover slope length	765	236

Surface soil texture

The soil texture used for the surface of Case 1 and Case 2 (2-A, 2-B) used the properties of the waste. Case 2-C used the properties of the intermediate cover, and Case 3 used the vegetated soil layer properties of the cover system.

Surface vegetation

The surface vegetation of each case used the following values.

Case	Surface Vegetation Number	Description
1	1	Bare ground
2-A	2	Poor grass
2-B	3	Fair grass
2-C	4	Good grass
3	5	Excellent grass

5. LEACHATE GENERATION, HEAD, AND LEAKAGE

5.1 Parametric Study Using HELP Model

A parametric study for all the cases was performed with different area percentages of runoff for the surface and different slopes in the subgrade in order to study the head over the primary geomembrane (primary leachate collection system). Parametric studies showed that the heads over the primary geomembrane were very sensitive to the slopes of the subgrade. Attachment 5 includes the results of this study for the landfill primary liner.

The scenario that represented the most realistic conditions for each case was then selected to compute the results for leachate leakage and heads for the primary and secondary leachate collection system. The results demonstrated that the leachate heads on the primary geomembrane liner would be kept below 12 inches for all the cases studied for the OHD landfill and, in fact, should not exceed 3 inches for the worst case scenario. Attachment 6 summarizes these results with the conditions considered for each case.

5.2 Leachate Generation, Head, and Leakage Estimates

Attachment 6 presents a summary of the results from the HELP model for leachate generation, leakage, and heads for Cases 1 through 3 for an area of one acre in the landfill. Output files from the HELP Model for each case are included in Attachment 7. The computations for this analysis assumed an initial minimum liner system of 2 percent (Case

1), a slope of 1.5 percent for the intermediate stages of construction with 30 ft and 60 ft of waste, and a minimum liner system slope of 1 percent for the intermediate (Case 2-C) and final stage of construction (Case 3) with 95 ft of waste. The results for leachate, leakage, and head calculations are presented in Attachment 6 and include the following:

Leachate

- The volume of peak daily lateral drainage from the primary and secondary geocomposites on a per acre basis.
- The volume of average annual total lateral drainage for the primary and secondary geocomposites on a per acre basis.

Leakage

- The volume of peak daily leakage to the subgrade, which was interpreted as the leakage through the secondary geocomposite clay liner on a per acre basis.
- The volume of average annual total leakage to the subgrade on a per acre basis.

Heads

- Peak daily maximum heads, peak daily average heads, and average annual heads on top of the primary geomembrane showing all heads to be less than 12 inches.
- Peak daily maximum heads, peak daily average heads, and average annual heads on top of the secondary geomembrane showing all heads to be less than the thickness of the secondary drainage layer.

5.3 Leachate Volume for the Critical Scenario During the Operation of the Landfill

The maximum leachate quantities and generation rates for the OHD landfill were estimated to size the leachate handling components required for the landfill to include pumps, pipes, and leachate storage containers.

Leachate generation rates were estimated by combining the leachate generation rates for different levels of waste deposition based on the construction sequence shown in the permit drawings. A total of 49 scenarios were evaluated to obtain the critical scenario, which would generate maximum amounts of leachate during the operation of the landfill.

The total peak and average leachate generation rate was calculated for both the primary and secondary drainage layers for all 49 scenarios. The critical scenario with the largest amount of leachate generation had the following conditions:

- Cell 1 with 95 ft of waste (Case 2-C) and an approximate area of 12 acres.
- Cell 1 with 60 ft of waste (Case 2-B) and an approximate area of 6 acres.
- Cell 2 with 95 ft of waste (Case 2-C) and an approximate area of 8.3 acres.
- Cell 2 with 60 ft of waste (Case 2-B) and an approximate area of 4.2 acres.
- Cell 4 with 30 ft of waste (Case 2-A) and an approximate area of 5.5 acres.
- Cell 4 with 10 ft of waste (Case 1) and an approximate area of 5.5 acres.
- Cell 3 with 30 ft of waste (Case 2-A) and an approximate area of 5.5 acres.
- Cell 3 with 10 ft of waste (Case 1) and an approximate area of 5.5 acres.
- Cell 5 with 10 ft of waste (Case 1) and an approximate area of 11.2 acres.

Attachment 8 contains a summary of the analysis of the 49 scenarios and includes plots that summarize the totals for peak and average leachate in the primary and secondary drainage layers. The results of the analysis of the critical scenario are summarized as follows:

Peak Leachate in primary	883,800 gal/day	615 gpm
Average Leachate in primary	41,700 gal/day	29 gpm
Peak Leachate in secondary	0.18 gal/day	0.000125 gpm
Average Leachate in secondary	0.0048 gal/day	0.0 gpm

5.4 Leakage Volume for the Critical Scenario During the Operation of the Landfill

The total peak leakage to subgrade was calculated for the critical scenario identified in section 5.3 for an area of 63.6 acres. The calculations for peak leakage resulted in 0.01 gal/day for this scenario. Attachment 9 presents this calculation.

6. VERIFICATION OF HEADS

The heads on the liner system were verified using Giroud's method (2001) since the HELP model uses McEnroe's equation. It has been demonstrated that the maximum head on the liner, as calculated by McEnroe's equation, is valid only when the head lies within the thickness of the geocomposite [Ellithy and Zhao, 2001]. Giroud's method was developed to evaluate drainage systems composed of two layers with the lower layer being a geocomposite.

The results of the head analysis in the HELP model showed heads on top of the primary geomembrane larger than the thickness of the primary geocomposite drainage layer for some cases.

6.1 McEnroe's Equation for Head

HELP V3.07 uses McEnroe's equations to calculate maximum saturated depth over landfill liners. These equations are mathematically sensitive under certain ranges of drainage layer slope and hydraulic conductivity and may produce incorrect results. An alternative solution based on simplifying assumptions and numerical methods presented by Giroud, et. al. (2001) was therefore used to verify the heads calculated by the HELP model.

6.2 Giroud, et al. Solution for Head

Giroud, et. al. (2001) present a method for calculating the maximum liquid thickness and the maximum head in drainage systems composed of two layers, with the lower layer being a geocomposite.

The solution for maximum liquid thickness and maximum head presented in the above paper are functions of the rate of liquid supply, the hydraulic conductivities of the two layers, the length of the drainage system, and the slope.

The application of the above method for the OHD landfill considered values for rate of liquid supply, q_h, obtained from the average annual total lateral drainage obtained from HELP in the primary geocomposite for each case. The length of the drainage layer, L, was obtained from the average liner system drainage paths for the cells under 5 and 25 percent of surface slope. Attachment 10 includes a spreadsheet with the calculation of heads using Giroud's method for each case. The results showed heads lower than 0.05 inches for all the cases with values similar to the average annual total heads obtained from the HELP model.

7. LEACHATE STORAGE CAPACITY

The design criteria for leachate storage capacity at the OHD landfill had the objective of choosing the leachate production rate for a critical 7-day period during the operational life of the landfill. In order to obtain the leachate production rate for the critical 7-day period during the landfill operation, the leachate generation during the greatest annual rainfall was considered. From the HELP model it was observed that Fort Drum's precipitation data in year 20 had the largest annual precipitation with 77.9 inches. The leachate generation for this wettest year was obtained from the HELP model for each Case for year 20. It should be noted that modeling in the HELP model was performed for 25 years.

The calculation of the required storage volume was not based on the peak leachate generation for the critical scenario discussed in Section 5.3 since this analysis represents the maximum rate of leachate generation for one day out of the 25 years of simulation.

The HELP analyses results for the leachate production in year 20 are shown in Table 4 for the cases applied in the critical scenario for an area of 1 acre. The computation of the annual leachate production in year 20 for the critical scenario is shown in Table 5. From this analysis an average daily leachate production rate was calculated. This average daily rate was used to calculate a 7-day generation rate of 885,336 gallons.

The leachate storage containers for the OHD landfill will be designed with a capacity to store 1 million gallons in order to meet the requirement for 7 days of storage during the historically wettest year at the landfill.

8. LEACHATE COLLECTION SYSTEM PIPE DESIGN

8.1 Peak Leachate Flow

An analysis was performed to evaluate the performance of the proposed leachate collection system pipes placed within the cells and sumps for the OHD landfill. The collector pipes proposed for the cells and sumps are perforated HDPE pipes of 6 in. and 8 in. diameter, respectively, with a standard dimension ratio (SDR) of 11.

The selected design flow rate for the leachate collection pipes in each cell was the peak daily leachate flow generated by the HELP model when 10 feet of waste was placed. Table 6 presents the peak daily leachate flows calculated for each cell for both the primary and secondary drainage layers. From these results, the weighted average peak leachate generation was calculated as 224 gpm (Table 6). A weighted average peak daily leachate flow is considered appropriate since the peak daily flow occurs only once in the 25-year modeling period and the cells have different values. 248

8.2 Pipe Flow Capacity

The pipe flow capacity is calculated using Manning's equation as follows:

$$Q_p = \frac{1.486 R_h^{0.66} i_p^{0.5} A_p}{n} \quad \text{Equation 3}$$

Where:

Q_p= pipe flow capacity, cfs;
R_h= $B_i/4$, hydraulic radius where B_i= pipe inner diameter;
i_p= hydraulic gradient (i.e., slope of the pipe);
A_p= cross-sectional area of the pipe, ft^2; and
n= Manning's roughness coefficient (Attachment 11).

For a pipe with a circular cross section that is flowing full, Manning's equation assumes steady uniform turbulent conditions.

8. 2.1 Leachate Collector Pipes in Cells

The peak quantity of leachate generated in the average cell is estimated at 247.7 gpm (Table 6). Due to the configuration of the cell, two sides of each cell have leachate collection pipes with a maximum percent of flow that a pipe is likely to receive of 70 percent of the total cell flow. Therefore, the design flow of the pipes within the cells is 173.4 gpm.

A 6 in HDPE pipe (SDR 11) at slopes ranging from 0.5 to 2.0 percent results in the following input data:

B_i	5.349 in
R_h	1.34 in
i_p	0.5% to 2%
A_p	22.47 in^2
n	0.009

Equation 3 yields the following flow capacities:

Pipe Slope %	Flow gpm
2.0	384.32
1.0	271.75
0.5	192.16

From the above results it can be concluded that the 6 in leachate collection pipes with a minimum slope of 0.5 percent can handle the expected leachate flows in the cells.

8.2.2 Leachate Sump Pipes

The flow rate used for design of the leachate sump pipes is 247.7 gpm. The proposed bottom slope for the sump pipes is 1 percent. Using a pipe size of 8 in. diameter with an SDR of 11, the flow capacity of this pipe is calculated at 548 gpm which is greater than the design flow rate.

B_i	6.963 in
R_h	1.7 in
i_p	1.0 %
A_p	38.08 in^2
n	0.009
Flow	548 gpm

8.3 Pipe Perforation Sizing

The maximum allowable perforation diameter in the leachate collection pipes and leachate sump pipes that will prevent gravel from passing through, may be determined as follows [USEPA, 1983]:

$$d_{h\max} = \frac{d_{85}}{F} \qquad \text{Equation 4}$$

Where:

d_{hmax}= maximum perforation diameter to provide particle retention (inches);
d_{85}= particle size of the pipe bedding material for which 85 percent by weight of the particles are finer (inches); and
F= factor varying from 1.2 to 2.0.

The OHD landfill will use No. 57 stone for the leachate collection pipes and No. 4 stone for the leachate sump pipes. The pipe perforation sizing proposed is 1/2 in for the leachate collection pipes and 5/8 in for the leachate sump pipes. Assuming a factor, F, of 1.5 and using the particle size of the pipe bedding material for 85 percent of finer particles [ASTM D 448, Attachment 11] results in the following:

Pipes in cells	Pipes in sumps
Stone No. 57	Stone No. 4
F= 1.5	F= 1.5
d_{85}= 3/4 in	d_{85}= 1 in
d_{hmax}= 1/2 in = 1/2 in	d_{hmax}=2/3 in > 5/8 in

8.4 Pipe Structural Stability

Calculations are performed to evaluate the ability of the pipes in cells to withstand the applied load. Figure 6 shows the cover system plan with the location of the leachate collection pipes in each cell. This figure also shows waste height in relation to the pipe locations. Figures 7 and 8 show a cross section of the primary and secondary pipes in the sumps.

The potential failure mechanisms that are checked in this analysis are: (i) wall crushing; (ii) wall buckling; (iii) excessive ring deflection; and (iv) excessive bending strain. Stresses applied on the pipes are considered for two conditions: (i) initial condition and (ii) the post-closure condition.

8.4.1 Calculation of Applied Stresses

Initial Condition

The initial condition considers the pipes with 1 ft of cover material and the stresses due to traffic applied by a 35 ton truck with a wheel load of 20,000 lb. Therefore, the total stress on the pipe can be calculated as described by ASCE [1979] as follows:

$$\sigma_{ic} = \gamma_p D_p + C_s \frac{PF_{ic}}{L_{ic} D_{od}} \qquad \text{Equation 5}$$

Where:

- γ_p= average unit weight of the overburden materials, pcf;
- D_p= thickness of the overburden materials, ft;
- D_{od}= pipe outer diameter, ft;
- C_s= load coefficient from Attachment 11 [ASCE, 1979];
- P= concentrated load, lb;
- F_{ic}= impact factor accounting for dynamic loads [ASCE, 1979];
- L_{ic}= effective length of pipe equal to 3 if the pipe is longer than 3 ft or equal to the actual pipe length if the pipe is shorter than 3 ft (ASCE, 1979); and
- σ_{ic}= stress on the pipe, psf.

The table below shows a summary of the parameters used and the applied stresses calculated for the initial condition for both 6 in and 8 in pipe:

Data	Pipe 6 in	Pipe 8 in
γ_p	120 pcf	120 pcf
D_p	1 ft	1 ft
D_{od}	6.625	8.625
Cs	0.324	0.383
P	20,000 lb	20,000 lb
F_{ic}	1.3	1.3
L_{ic}	3	3
σ_{ic}	543.85 psf	504.85 psf

Post-Closure Condition

During the post-closure condition, the stress applied to the pipes in cells and sumps is due to the overburden materials above the pipe. The stress is calculated with Equation 6.

$$\sigma_p = \gamma_p D_p \qquad \text{Equation 6}$$

For the leachate collection pipes, overburden depth was assumed to be 95 ft of waste with a density of 90 pcf plus 3 ft of soil cover with a density of 120 pcf. This is a conservative assumption since not all the length of all the pipes in the cells are under 95 ft of waste and the waste density is greater than is expected.

For the leachate sump pipes the overburden was assumed to be 16 ft of general fill with an assumed density of 120 pcf. The following table summarizes the parameters used and the applied stresses calculated for the post-closure condition:

Data	Pipe 6 in	Pipe 8 in
γ_p	90 pcf (waste), 120 pcf (cover soil)	120 pcf
D_p	95 ft of waste and 3 ft of cover soil	16 ft (fill)
σ_p	8910 psf = 61.9 psi	1920 psf= 13.33 psi

From the above calculations, the applied stresses calculated for the post-closure condition are the most critical. Therefore post closure stresses were used as the maximum stress against which the remaining structural design calculations were compared.

8.4.2 Wall Crushing

Wall crushing occurs when the stress in the pipe wall due to external pressures exceeds the compressive strength of the pipe material. The maximum applied stress which may be withstood by the pipe can be calculated by Equation 7:

$$\sigma_{crush} = \frac{2\sigma_y}{(SDR - 1)} \qquad \text{Equation 7}$$

Where σ_y is the compressive strength of the pipe material, based on PE 3408 pipe. σ_{crush} is the maximum applied stress that can be withstood by the pipe. The parameters used and the results calculated by Equation 7 are:

Data	Pipe 6 in	Pipe 8 in
σ_y	1600 psi	1600 psi
SDR	11	11
σ_{crush}	320 psi	320 psi

Based on these calculations, the compressive strength of both the 6 in and 8 in pipe is greater than the applied stress calculated for the post-closure condition in Section 8.4.1.

8.4.3 Wall Buckling

Wall buckling occurs when the external vertical pressure exceeds the critical buckling pressure of the pipe/bedding aggregate system. The maximum applied stress that may be withstood by the pipe can be calculated by Equation 8:

$$\sigma_{buckle} = 1.2\left[\frac{E'E}{SDR^3}\right]^{1/2} \quad \text{Equation 8}$$

Where E is the modulus of elasticity of the pipe material, E' is the modulus of soil reaction for the pipe bedding material, SDR is the standard dimension ratio of the pipe, and σ_{buckle} is the maximum applied stress that can be withstood by the pipe.

Since HDPE exhibits a tensile creep characteristic, the value of E is dependent upon the applied tensile stress and the time of application as shown in Attachment 11 [Plastic Pipe Institute, 1993]. Using the overburden stress, the tensile stress intensity can be estimated using the following equation:

$$S_A = \frac{(SDR-1)\sigma_{vo}}{2} \quad \text{Equation 9}$$

Where SDR is the pipe standard dimension ratio, σ_{vo} is the maximum stress due to overburden, and S_A is the estimated tensile stress.

The value of E' depends on the bedding material and the applied stress level. The table for modulus of soil reaction (E') for Pipe Bedding Material by Selig (Attachment 11) was used to select a value of E' based on the fill material and the applied stress from the soil overburden.

The following table presents the parameters used and the results calculated by Equations 8 and 9:

Data	Pipe 6 in	Pipe 8 in
SDR	11	11
σ_{vo}	59.4 psi	12.22 psi
S_A	297 psi	61.1 psi
E	25,000 psi	35,000 psi
E'	4,800 psi	2,550 psi
σ_{buckle}	360.1 psi	310.74 psi

Based on these results, both the 6 in and 8 in pipes are capable of resisting the applied stresses induced by the post-closure condition.

8.4.4 Ring Deflection

Excessive ring deflection is a horizontal over-deflection of the pipe causing a reversal of curvature in the pipe wall. This can occur if large external vertical pressures are applied to the pipe/bedding system. Excessive ring deflection can also lead to a substantial loss in flow capacity. Ring deflection is calculated using the Modified Iowa Equation:

$$\Delta X = \frac{D_L K W_c}{\frac{EI}{r^3} + (0.061E')} \qquad \text{Equation 10}$$

Where:

- D_L= deflection lag factor typically with range values from 1 to 1.5;
- K= bedding constant with values from 0.083 to 0.11 [Wilson-Fahmy and Koerner, 1994, Attachment 11];
- W_c= Martson prism load per unit length (overburden stress times the pipe outside diameter);
- E= modulus of elasticity of the pipe material;
- E'= modulus of soil reaction for the bedding material;
- I= moment of inertia of the pipe wall;
- r= mean radius of the pipe $((D_{od}-t)/2)$; and
- ΔX= horizontal deflection. The ring deflection is calculated from the horizontal deflection divided by the pipe outside diameter.

The allowable ring deflection for HDPE pipe is 3.0 percent [Koerner, 1998]. The table below shows the parameters used and the results obtained by for this calculation.

Data	Pipe 6 in	Pipe 8 in
D_L	1.25	1.25
K	0.083	0.083
W_c	393.53 lb/in	105.4 lb/in
E	25,000 psi	35,000 psi
I	0.018 in^3	0.0402 in^3
r	3.0115 in	3.9205 in
E'	4,800 psi	2,550 psi
ΔX	0.13	0.06
Ring Deflection	1.9 %	0.7 %

Based on these calculations the calculated ring deflection for both pipes under the post-closure scenario are below the 3 percent limit [Koerner, 1998].

8.4.5 Bending Strain

When a pipe deflects under load, bending strains are induced in the pipe wall. Bending strain occurs in the pipe wall as external pressures are applied to the pipe/bedding aggregate system. Bending strain is calculated using the following equation [Mosher, 1990]:

$$\varepsilon_b = f_d \frac{t\Delta_y}{D^2} \qquad \text{Equation 11}$$

Where:

ε_b= bending strain, percent;
f_d= deformation shape factor;
t= minimum wall thickness, in;
Δ_y= vertical deflection, in; and
D= inside pipe diameter, in.

The following are recommendations for allowable bending strain from the literature and manufacturers:

- An allowable bending strain of 5 percent is recommended in Wilson-Fahmy and Koerner [1994] based on ASHTO guidelines for long-term use of smooth polyethylene pipes.
- An allowable bending strain of 4.2 percent is recommended as conservative in Chevron [1994]. It is noted that strains up to 8 percent are reported in literature as acceptable for a design period of 50 years.

The following table presents the parameters used and the results of the bending strain calculations:

Data	Pipe 6 in	Pipe 8 in
f_d	6	6
t	0.602 in	0.784 in
Δ_y	0.13	0.06
D	5.349 in	6.963
ε_b	1.6 %	0.6 %

Based on these parameters, the calculated strains are less than published allowable values.

9. LEACHATE TRANSMISSION SYSTEM

The leachate transmission system will consist of leachate sump pumps, (2 pumps for the primary geocomposite and 1 pump for the secondary geocomposite), individual riser pipes from the pumps to a header pipe from the manhole to the leachate transmission pipeline, and a leachate transmission pipe line to the existing storage tank area.

9.1 Selection of Sump Pumps and Leachate Transmission Piping

Leachate sump pumps are required to pump the collected leachate from the leachate collection sumps to the leachate storage area. In order to simplify the operation of the leachate handling system the sump pumps were designed to be able to pump directly from the leachate collection sumps to the leachate storage area without the need for an intermediate booster pump. Figure 9 presents a mechanical flow diagram for the leachate handling system from the sump pumps to the leachate transmission line. This configuration necessitated the following pump design criteria be met:

- overcome the elevation head from the bottom of the leachate sumps to the top of the steel tank in the leachate storage area (sump bottoms 77 ft NGVD, top of tank 108 ft NGVD);
- overcome the friction head in all pipelines between sump pumps and the leachate storage area; and
- have a combined pumping capacity per cell equal to or greater than 350 gpm. This value is equal to the largest single cell peak leachate generation calculated for the critical scenario (Table 6).

At this site, the length and diameter of the leachate transmission pipeline are the controlling factors with regard to friction head losses. This is due to the length of the pipeline from the leachate collection sumps to the leachate storage area. To simplify operation, the landfill was designed with an interim leachate storage facility located just south of the first two phases of construction as indicated in Figure 10. This has the added benefit that during the initial phases of construction when leachate generation is expected to be the highest the pumping distance for the leachate sump pumps will be significantly shorter. As the landfill enters the later phases of construction the leachate storage area will be moved to the final location on the south-east side of the landfill. The new location will place the leachate storage area closest to the active landfilling areas where the majority of the leachate is being generated. Areas in the earlier phases of construction should be closed at this point and leachate generation from those cells is expected to be minimal.

Pipeline and pump sizing is an iterative process of head loss estimation, pump selection and then refining head loss estimates and either confirmation or reselection of the pumps.

Attachment 12 contains a worksheet used to calculate head loss in the pipeline based on the projected flow rates. The pump performance curve for the selected sump pump is also provided in Attachment 12. Based on the available data for pump selection and calculations performed to estimate head loss in HDPE pipe at the design flow rates it was determined that 7.5 HP sump pumps would be installed in each leachate sump. Based on the performance curves for this pump and the head losses calculated for the system pipe each pump will be capable of pumping approximately 200 gpm under full flow conditions.

Based on these considerations the design flow rate used for the leachate transmission line was selected at 800 gpm. This value is higher than the average peak daily leachate generation rate of 615 gpm, calculated for the entire landfill by the HELP model. However, from an operational standpoint it was decided that during landfill construction, because of the sectioning provided by the individual cells, the ability to operate up to four leachate sump pumps simultaneously may be necessary to ensure that adequate leachate pumping capacity was available. Therefore, the higher design flow rate of 800 gpm was selected.

Final pipe sizing for the of the leachate handling system includes a 3 inch HDPE or flex hose riser pipe from the sump pump to the main header pipe. The header pipe will be 4 inch HDPE from the leachate sumps to the leachate transmission line. The leachate transmission line will be 8 inch HDPE. Using this equipment and material configuration, under full flow conditions the pipeline will generate 90 feet of head loss.

9.2 Structural Characteristics of Leachate Transmission Piping

The leachate transmission pipeline was also evaluated to determine the appropriate wall thickness to resist pressures generated by pumping. Normal pumping pressures are expected to be on the order of 90 ft of head (39 psi). However, the maximum pressure that may be generated is the maximum deadhead pressure generated by a sump pump pumping against a closed valve. Review of the pump curves for a 7.5 HP pump indicates that the maximum pressure that can be generated is on the order of 130 ft of head (56 psi).

The pressure rating of HDPE pipe is dependant on the SDR rating of the pipe and the temperature of the pipe. The maximum pressure rating of the pipe was calculated using Plexcalc, Version 2.0 software provided by the pipe manufacturer (Chevron, 1999). Calculations were performed using the following parameters:

Hydrostatic Design Basis:	1600 psi (PE 3408)
Environmental Factor	0.5
Temperature Factor	0.63 (120 degrees F) 1.0 (73 Degrees F)
SDR	11

Temperature factors were used for both 73 degrees F and 120 degrees F. 73 degrees F is applicable to pipe that is buried or protected from exposure to sunlight. 120 degrees F was used for those portions of the pipe exposed to sunlight. Because HDPE pipe is black, temperatures can exceed 100 degrees F during the day even when filled with water. Therefore, a temperature factor equal to 120 degrees F was used. Based on this evaluation an HDPE pipe with an SDR of 11 is capable of withstanding a hydrostatic pressure of 100 psi at 120 degrees F and 160 psi at 73 degrees F. Since both of these values are greater than the deadhead pressure of the sump pumps, an SDR rating of 11 is considered appropriate for this site.

The pipelines were also evaluated for the effects of water hammer. Water hammer can be caused by the starting and stopping of pumps, rapid opening and closing of valves, or rapid shutting of air release valves. Water hammer creates pressure waves that travel through out the pipeline until they are attenuated. HDPE pipe is able to attenuate water hammer pressure waves faster than other pipes due to its inherent flexibility. Water hammer pressures in HDPE pipe are very dependant on the temperature of the pipe. Higher temperatures result in lower water hammer pressures than lower temperatures because HDPE is more flexible at higher temperatures. For this reason water hammer was evaluated for pipe temperatures of both 73 degrees F and 120 degrees F. The Plexco design manual allows the sum of hydrostatic and water hammer pressures to exceed the maximum allowable hydrostatic pressure by 2 to 1 for piping systems with very few fittings and 1.5 to 1 for systems with significant amounts of fittings. For purposes of this evaluation, a factor of 2 was used, based on the simplicity of the piping system and the long distances between fittings.

Water hammer calculations were performed using Plexcalc, Version 2.0. Attachment 12 contains the computer printouts from Plexcalc. The following values for pipe modulus were used for this evaluation:

	73 degrees F	120 degrees F
Pipe Modulus, E (psi)	11,0000	65,000

Water hammer calculations yielded the following results:

		73 degrees F					120 degrees F				
Pipe Diameter (in)	Flow Rate (gpm)	Hydrostatic Pressure (psi)	Water Hammer Pressure (psi)	Total Pressure (psi)	Allowable Hydrostatic Pressure (psi)	Allowable Water Hammer Pressure (psi)	Hydrostatic Pressure (psi)	Water Hammer Pressure (psi)	Total Pressure (psi)	Allowable Hydrostatic Pressure (psi)	Allowable Water Hammer Pressure (psi)
3	200	39	133	172	160	320	39	103	142	101	202
4	400	39	161	200	160	320	39	125	164	101	202
8	800	39	88	127	160	320	39	68	107	101	202

Based on the results of this evaluation water hammer is not expected to present a problem with the leachate transmission pipeline. In addition, the control system for the automatic valves at the leachate storage area will utilize slow closing valve actuators to reduce the potential for water hammer due to valve actuation.

Strength factors previously analyzed such as wall crushing, wall buckling, ring deflection and bending strain were not re-evaluated for the leachate transmission pipeline. These factors were already evaluated for the leachate collection and leachate sump pipes and found to be acceptable. Those pipes will be under greater stress than the leachate transmission pipeline.

9.3 Performance of Leachate Collection System Sump

The storage capacity of the leachate collection sump is approximately 3638 gallons for the secondary side and 5866 gallons for the primary side (Attachment 12). This is based on the volume of the sump areas and assumed a porosity of the gravel of 0.4. This sump volume should be adequate to minimize the number of on-off cycles of the pumps.

Calculations for pump cycle time are based on a maximum rate of leachate generation of 502,000 gal/day (348.7 gpm).

The on-off cycle times for the maximum design flow with 2 pumps at 200 gpm is shown in the following table.

Sump volume in primary= 5866 gallons

Case	No. of Pumps	Total Pumping Rate gpm	Inflow Rate gpm	Time to fill Sump minutes	Time to Empty sump minutes	Total Cycle Time minutes	Cycles per Day
Maximum Leachate Generation	2	400	349	17	115	132	11

Single phase motors in EPM Pumps are rated for 100 cycles per day and three phase motors are rated for 300 cycles per day, therefore, from the cycle times reported in the above table, the sump volume is adequate.

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TABLES

Table 1. Average Annual Rainfall, Fort Drum Florida

Year	Annual Rainfall in
1	56.33
2	51.93
3	57.14
4	55.57
5	52.54
7	56.16
6	49.59
8	59.95
9	48.49
10	53.89
11	61.69
12	54.37
14	55.4
15	56.09
13	54.64
16	43.81
17	49.48
19	45.18
18	46.36
20	77.9
21	42.59
22	44.91
23	51.55
24	66.53
25	38.5
26	56.53
27	49.53
28	49.76
29	36.67
30	40.65
Average Annual Rainfall over the 30-year=	**52.12**

Table 2. Drainage paths along liner system

Cell	Drainage Path Under 5% surface slope	Drainage Path Under 25% surface slope	Total Drainage Path
1	500	190	690
2	450	210	660
3	640	250	890
4	640	240	880
5	850	20	870
7	810	0	810
6	460	240	700
8	640	0	640
9	670	0	670
10	560	200	760
11	450	240	690
12	530	230	760
14	420	190	610
15	420	180	600
13	990	0	990
16	750	0	750
17	1020	0	1020
19	630	170	800
18	790	0	790
20	530	200	730
21	460	260	720

Table 3. Slope lengths on final cover

Cell	Drainage Path 5% surface slope	Drainage Path 25% surface slope	Total Drainage Path
1	710.60	320.16	1030.76
2	480.82	308.52	789.34
3	500.78	246.00	746.78
4	500.78	226.53	727.31
5	550.71	236.00	786.71
7	600.91	215.64	816.55
6	750.82	226.53	977.35
8	640.96	215.64	856.60
9	910.60	205.92	1116.52
10	1050.69	267.76	1318.45
11	550.06	398.53	948.59
12	1050.69	267.76	1318.45
14	990.73	206.15	1196.88
15	990.73	205.68	1196.41
13	1050.69	185.30	1235.99
16	760.95	175.60	936.55
17	931.81	175.60	1107.41
19	760.95	185.30	946.25
18	760.95	175.60	936.55
20	760.95	330.34	1091.29
21	760.95	175.60	936.55

Table 4. Annual leachate production for year 20 in critical scenario (1 acre)

Case	Area (acres)	Jan (in/mon)	Feb (in/mon)	Mar (in/mon)	Apr (in/mon)	May (in/mon)	June (in/mon)	July (in/mon)	Aug (in/mon)	Septh (in/mon)	Oct (in/mon)	Nov (in/mon)	Dec (in/mon)
2-C	12.025	0.553	0.218	0.125	0.090	0.401	1.691	1.474	3.604	2.244	4.098	3.614	3.442
2-B	6.013	0.104	0.067	0.055	0.044	0.040	0.822	1.854	4.360	2.843	4.331	3.605	3.280
2-C	8.293	0.553	0.218	0.125	0.090	0.401	1.691	1.474	3.604	2.244	4.098	3.614	3.442
2-B	4.146	0.104	0.067	0.055	0.044	0.040	0.822	1.854	4.360	2.843	4.331	3.605	3.280
2-A	5.490	0.219	0.204	0.142	0.378	0.481	2.026	4.016	6.215	3.715	4.856	3.504	0.800
1	5.490	1.375	0.207	0.116	1.148	1.199	5.036	13.541	5.163	4.004	1.875	0.241	0.125
2-A	5.490	0.219	0.204	0.142	0.378	0.481	2.026	4.016	6.215	3.715	4.856	3.504	0.800
1	5.490	1.375	0.207	0.116	1.148	1.199	5.036	13.541	5.163	4.004	1.875	0.241	0.125
1	11.150	1.375	0.207	0.116	1.148	1.199	5.036	13.541	5.163	4.004	1.875	0.241	0.125

Table 5. Total annual leachate production for year 20 in critical scenario

Case	Area (acres)	Jan (gal/mon)	Feb (gal/mon)	Mar (gal/mon)	Apr (gal/mon)	May (gal/mon)	June (gal/mon)	July (gal/mon)	Aug (gal/mon)	Septh (gal/mon)	Oct (gal/mon)	Nov (gal/mon)	Dec (gal/mon)	Sum (gal/year)
2-C	12.025	1.8E+05	7.1E+04	4.1E+04	3.0E+04	1.3E+05	5.5E+05	4.8E+05	1.2E+06	7.3E+05	1.3E+06	1.2E+06	1.1E+06	7.0E+06
2-B	6.013	1.7E+04	1.1E+04	9.0E+03	7.2E+03	6.5E+03	1.3E+05	3.0E+05	7.1E+05	4.6E+05	7.1E+05	5.9E+05	5.4E+05	3.5E+06
2-C	8.293	1.2E+05	4.9E+04	2.8E+04	2.0E+04	9.0E+04	3.8E+05	3.3E+05	8.1E+05	5.1E+05	9.2E+05	8.1E+05	7.7E+05	4.9E+06
2-B	4.146	1.2E+04	7.5E+03	6.2E+03	5.0E+03	4.5E+03	9.3E+04	2.1E+05	4.9E+05	3.2E+05	4.9E+05	4.1E+05	3.7E+05	2.4E+06
2-A	5.490	3.3E+04	3.0E+04	2.1E+04	5.6E+04	7.2E+04	3.0E+05	6.0E+05	9.3E+05	5.5E+05	7.2E+05	5.2E+05	1.2E+05	4.0E+06
1	5.490	2.1E+05	3.1E+04	1.7E+04	1.7E+05	1.8E+05	7.5E+05	2.0E+06	7.7E+05	6.0E+05	2.8E+05	3.6E+04	1.9E+04	5.1E+06
2-A	5.490	3.3E+04	3.0E+04	2.1E+04	5.6E+04	7.2E+04	3.0E+05	6.0E+05	9.3E+05	5.5E+05	7.2E+05	5.2E+05	1.2E+05	4.0E+06
1	5.490	2.1E+05	3.1E+04	1.7E+04	1.7E+05	1.8E+05	7.5E+05	2.0E+06	7.7E+05	6.0E+05	2.8E+05	3.6E+04	1.9E+04	5.1E+06
1	11.150	4.2E+05	6.3E+04	3.5E+04	3.5E+05	3.6E+05	1.5E+06	4.1E+06	1.6E+06	1.2E+06	5.7E+05	7.3E+04	3.8E+04	1.0E+07
ANNUAL LEACHATE PRODUCTION FOR YEAR 20														**4.6E+07**
AVERAGE DAILY LEACHATE PRODUCTION FOR YEAR 20														**126476.6**
AVERAGE 7-DAY LEACHATE PRODUCTION FOR YEAR 20														**885336.2**

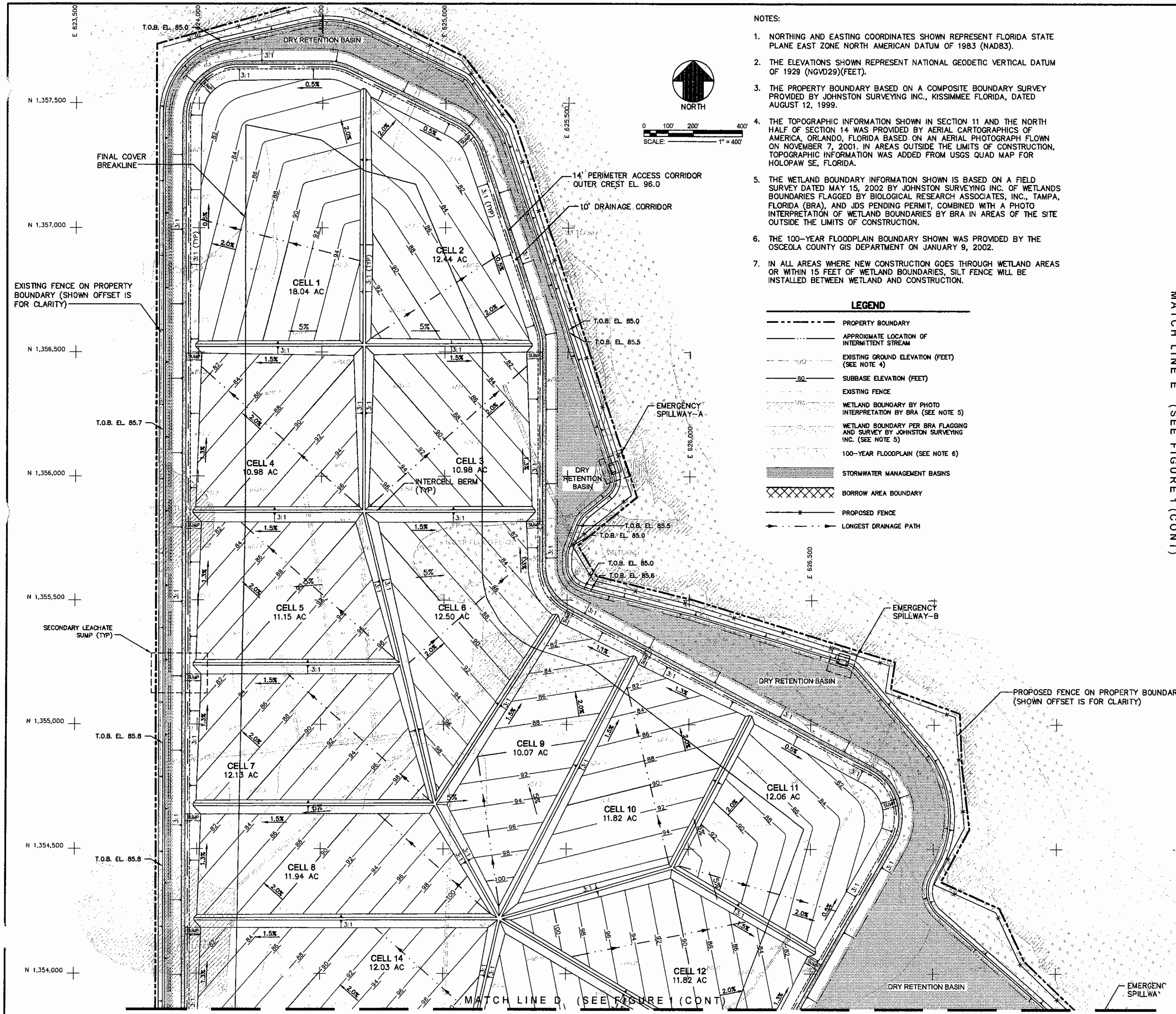
Table 6. Maximum Occurrence of Leachate Per Cell For Scenarios

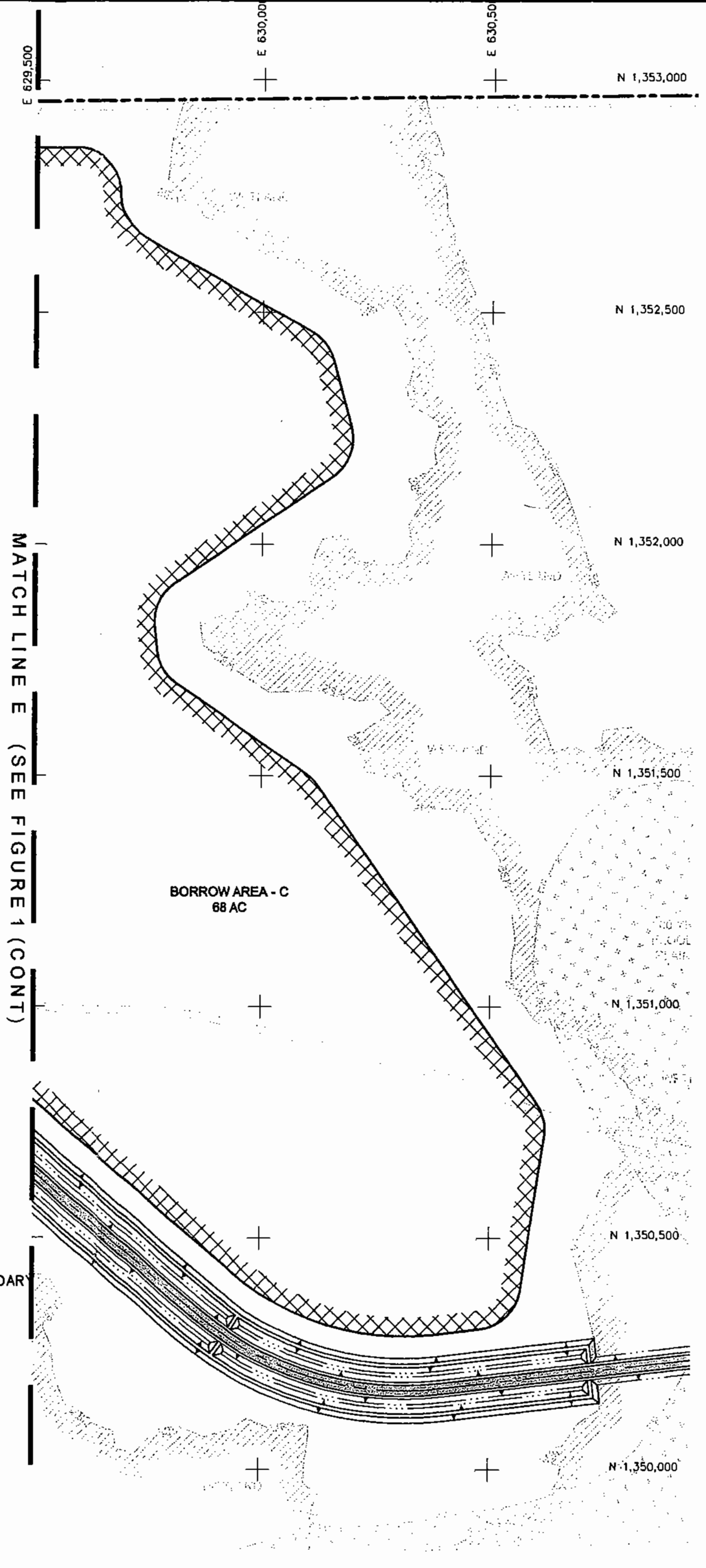
Cell	Area (acres)	Primary Liner				Secondary Liner			
		Peak leachate (gal/day)	Peak leachate (gpm)	Average leachate (gal/day)	Average leachate (gpm)	Peak leachate (gal/day)	Peak leachate (gpm)	Average leachate (gal/day)	Average leachate (gpm)
1	18.04	502093.13	348.68	16426.87	11.41	0.12483	0.00009	0.00185	0.00000
2	12.44	346232.73	240.44	11327.62	7.87	0.08608	0.00006	0.00127	0.00000
3	10.98	305597.70	212.22	9998.17	6.94	0.07598	0.00005	0.00113	0.00000
4	10.98	305597.70	212.22	9998.17	6.94	0.07598	0.00005	0.00113	0.00000
5	11.15	310329.18	215.51	10152.97	7.05	0.07715	0.00005	0.00114	0.00000
6	12.5	347902.67	241.60	11382.26	7.90	0.08649	0.00006	0.00128	0.00000
7	12.13	337604.75	234.45	11045.34	7.67	0.08393	0.00006	0.00124	0.00000
8	11.94	332316.63	230.78	10872.33	7.55	0.08262	0.00006	0.00122	0.00000
9	10.07	280270.39	194.63	9169.55	6.37	0.06968	0.00005	0.00103	0.00000
10	11.82	328976.76	228.46	10763.06	7.47	0.08179	0.00006	0.00121	0.00000
11	11.06	335656.49	233.09	10981.60	7.63	0.08345	0.00006	0.00124	0.00000
12	11.82	328976.76	228.46	10763.06	7.47	0.08179	0.00006	0.00121	0.00000
13	15.16	421936.35	293.01	13804.40	9.59	0.10490	0.00007	0.00155	0.00000
14	12.03	334821.53	232.51	10954.28	7.61	0.08324	0.00006	0.00123	0.00000
15	12.04	335099.85	232.71	10963.39	7.61	0.08331	0.00006	0.00123	0.00000
16	12.07	335934.81	233.29	10990.71	7.63	0.08352	0.00006	0.00124	0.00000
17	12.93	359870.52	249.91	11773.81	8.18	0.08947	0.00006	0.00132	0.00000
18	12.08	336213.14	233.48	10999.81	7.64	0.08359	0.00006	0.00124	0.00000
19	12.08	336213.14	233.48	10999.81	7.64	0.08359	0.00006	0.00124	0.00000
20	13.60	378518.10	262.86	12383.90	8.60	0.09410	0.00007	0.00139	0.00000
21	15.91	442810.51	307.51	14487.34	10.06	0.11009	0.00008	0.00163	0.00000

Average Weighted Peak Leachate in Primary Geocomposite= 247.7 gpm
Average Weighted Peak Leachate in Secondary Geocomposite= 0.000062 gpm

FIGURES

LEACHATE MANAGEMENT SYSTEM





NOTES:

1. NORTHING AND EASTING COORDINATES SHOWN REPRESENT FLORIDA STATE PLANE EAST ZONE NORTH AMERICAN DATUM OF 1983 (NAD83).
2. THE ELEVATIONS SHOWN REPRESENT NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29)(FEET).
3. THE PROPERTY BOUNDARY BASED ON A COMPOSITE BOUNDARY SURVEY PROVIDED BY JOHNSTON SURVEYING INC., KISSIMMEE FLORIDA, DATED AUGUST 12, 1999.
4. THE TOPOGRAPHIC INFORMATION SHOWN IN SECTION 11 AND THE NORTH HALF OF SECTION 14 WAS PROVIDED BY AERIAL CARTOGRAPHICS OF AMERICA, ORLANDO, FLORIDA BASED ON AN AERIAL PHOTOGRAPH FLOWN ON NOVEMBER 7, 2001. IN AREAS OUTSIDE THE LIMITS OF CONSTRUCTION, TOPOGRAPHIC INFORMATION WAS ADDED FROM USGS QUAD MAP FOR HOLOPAW SE, FLORIDA.
5. THE WETLAND BOUNDARY INFORMATION SHOWN IS BASED ON A FIELD SURVEY DATED MAY 15, 2002 BY JOHNSTON SURVEYING INC. OF WETLANDS BOUNDARIES FLAGGED BY BIOLOGICAL RESEARCH ASSOCIATES, INC., TAMPA, FLORIDA (BRA), AND JDS PENDING PERMIT, COMBINED WITH A PHOTO INTERPRETATION OF WETLAND BOUNDARIES BY BRA IN AREAS OF THE SITE OUTSIDE THE LIMITS OF CONSTRUCTION.
6. THE 100-YEAR FLOODPLAIN BOUNDARY SHOWN WAS PROVIDED BY THE OSCEOLA COUNTY GIS DEPARTMENT ON JANUARY 9, 2002.
7. IN ALL AREAS WHERE NEW CONSTRUCTION GOES THROUGH WETLAND AREAS OR WITHIN 15 FEET OF WETLAND BOUNDARIES, SILT FENCE WILL BE INSTALLED BETWEEN WETLAND AND CONSTRUCTION.

LEGEND

- PROPERTY BOUNDARY
- APPROXIMATE LOCATION OF INTERMITTENT STREAM
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- SUBBASE ELEVATION (FEET)
- EXISTING FENCE
- WETLAND BOUNDARY BY PHOTO INTERPRETATION BY BRA (SEE NOTE 5)
- WETLAND BOUNDARY PER BRA FLAGGING AND SURVEY BY JOHNSTON SURVEYING INC. (SEE NOTE 5)
- 100-YEAR FLOODPLAIN (SEE NOTE 6)
- STORMWATER MANAGEMENT BASINS
- BORROW AREA BOUNDARY
- PROPOSED FENCE
- LONGEST DRAINAGE PATH

Project			
OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **BASE GRADING PLAN I**			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA011	1

Consultant / Engineer

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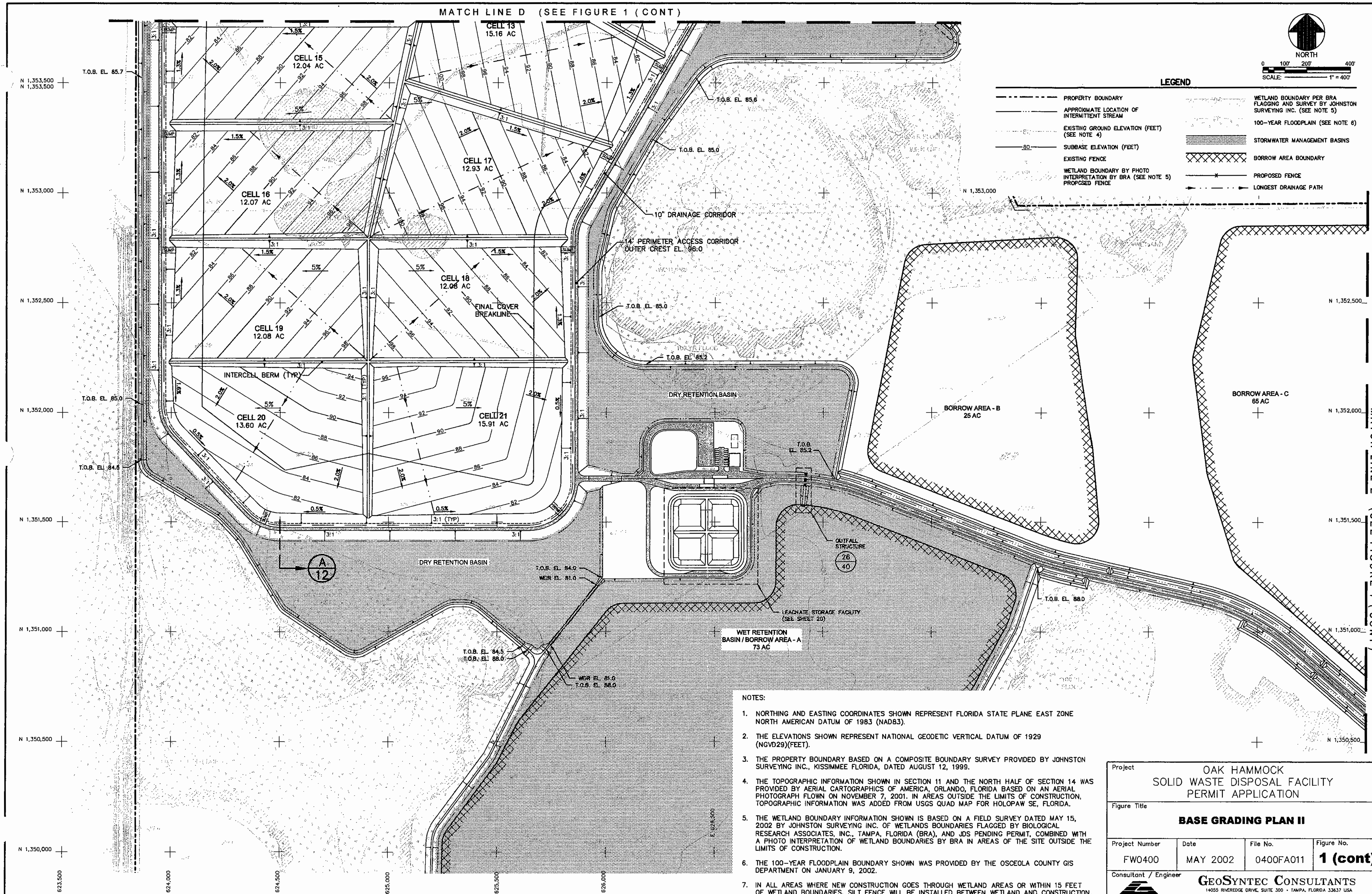

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5. THE WETLAND BOUNDARY INFORMATION SHOWN IS BASED ON A FIELD SURVEY DATED MAY 15, 2002 BY JOHNSTON SURVEYING INC. OF WETLANDS BOUNDARIES FLAGGED BY BIOLOGICAL RESEARCH ASSOCIATES, INC., TAMPA, FLORIDA (BRA), AND JDS PENDING PERMIT, COMBINED WITH A PHOTO INTERPRETATION OF WETLAND BOUNDARIES BY BRA IN AREAS OF THE SITE OUTSIDE THE LIMITS OF CONSTRUCTION.
6. THE 100-YEAR FLOODPLAIN BOUNDARY SHOWN WAS PROVIDED BY THE OSCEOLA COUNTY GIS DEPARTMENT ON JANUARY 9, 2002.
7. IN ALL AREAS WHERE NEW CONSTRUCTION GOES THROUGH WETLAND AREAS OR WITHIN 15 FEET OF WETLAND BOUNDARIES, SILT FENCE WILL BE INSTALLED BETWEEN WETLAND AND CONSTRUCTION.

Project			
OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **BASE GRADING PLAN II**			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA011	**1 (cont)**

Consultant / Engineer

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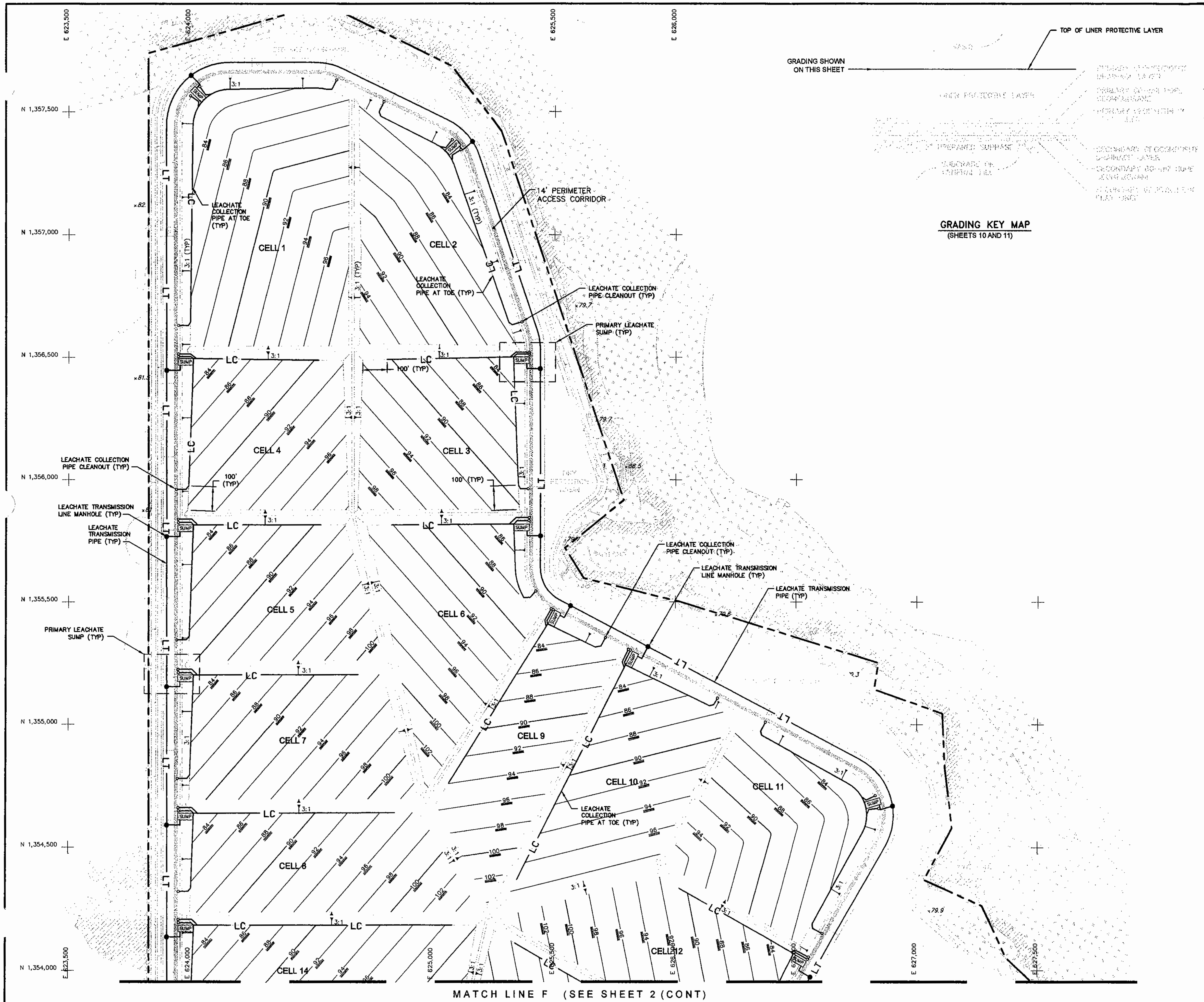

NORTH

0 100' 200' 400'

SCALE: 1" = 400'

LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- TOP OF LINER PROTECTIVE LAYER ELEVATION (FEET)
- LEACHATE COLLECTION PIPE
- LEACHATE TRANSMISSION PIPE AND MANHOLE
- LEACHATE COLLECTION PIPE CLEANOUT
- WETLAND BOUNDARY BY PHOTO INTERPRETATION BY BRA (SEE NOTE 5)
- WETLAND BOUNDARY PER BRA FLAGGING AND SURVEY BY JOHNSTON SURVEYING INC. (SEE NOTE 5)
- 100-YEAR FLOODPLAIN (SEE NOTE 6)

NOTES:

1. NORTHING AND EASTING COORDINATES SHOWN REPRESENT FLORIDA STATE PLANE EAST ZONE NORTH AMERICAN DATUM OF 1983 (NAD83).
2. THE ELEVATIONS SHOWN REPRESENT NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29)(FEET).
3. THE PROPERTY BOUNDARY BASED ON A COMPOSITE BOUNDARY SURVEY PROVIDED BY JOHNSTON SURVEYING INC., KISSIMMEE FLORIDA, DATED AUGUST 12, 1999.
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6. THE 100-YEAR FLOODPLAIN BOUNDARY SHOWN WAS PROVIDED BY THE OSCEOLA COUNTY GIS DEPARTMENT ON JANUARY 9, 2002.

Project	OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION		
Figure Title	**LEACHATE COLLECTION SYSTEM PLAN I**		
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA012	2

Consultant / Engineer
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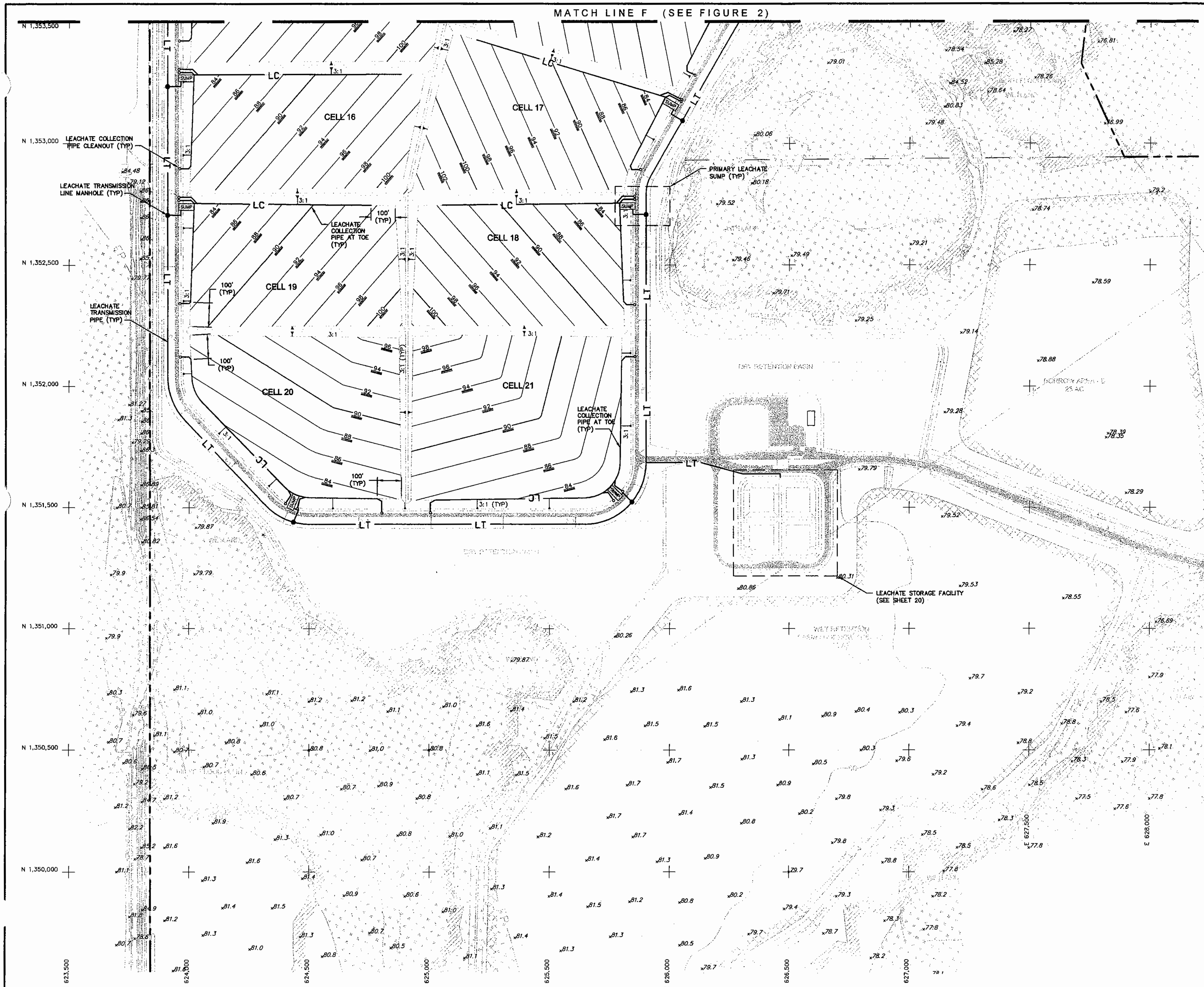

LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- TOP OF LINER PROTECTIVE LAYER ELEVATION (FEET)
- LEACHATE COLLECTION PIPE
- LEACHATE TRANSMISSION PIPE AND MANHOLE
- LEACHATE COLLECTION PIPE CLEANOUT
- WETLAND BOUNDARY BY PHOTO INTERPRETATION BY BRA (SEE NOTE 5)
- WETLAND BOUNDARY PER BRA FLAGGING AND SURVEY BY JOHNSTON SURVEYING INC. (SEE NOTE 5)
- 100-YEAR FLOODPLAIN (SEE NOTE 6)

NOTES:

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6. THE 100-YEAR FLOODPLAIN BOUNDARY SHOWN WAS PROVIDED BY THE OSCEOLA COUNTY GIS DEPARTMENT ON JANUARY 9, 2002.

Project			
OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **LEACHATE COLLECTION SYSTEM PLAN II**			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA012	**2 (cont)**

Consultant / Engineer
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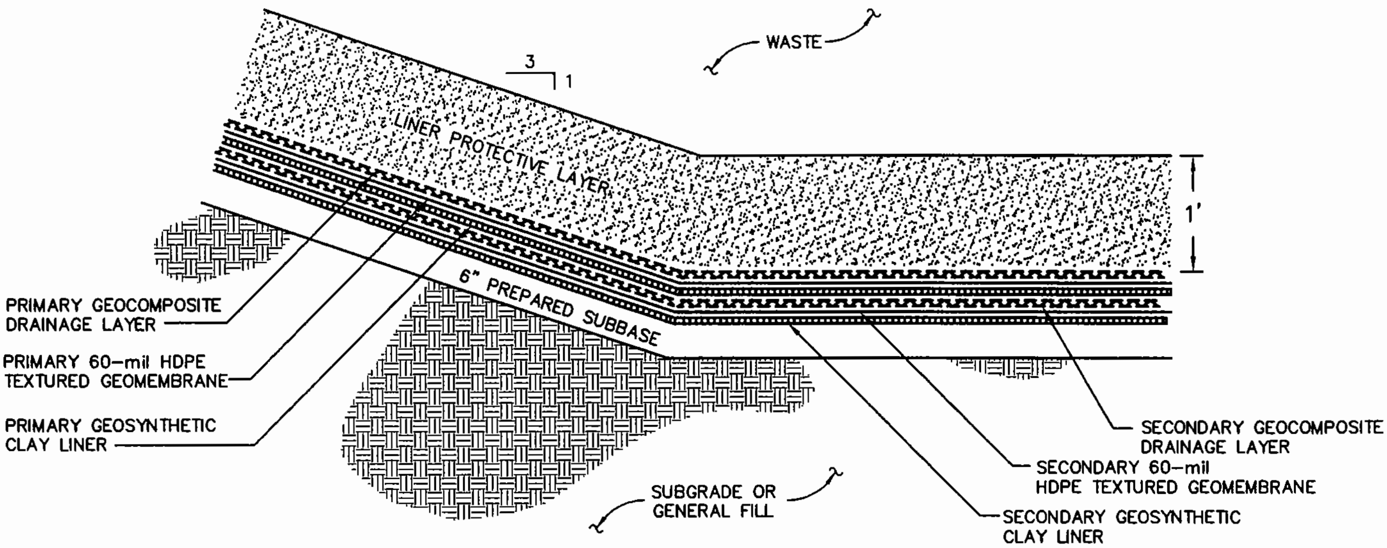
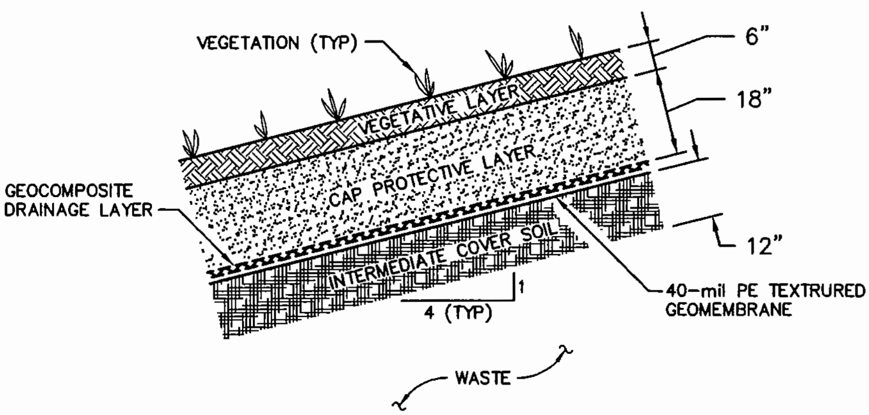


DETAIL (TYPICAL)
LINER SYSTEM AT BASE
NOT TO SCALE



DETAIL (TYPICAL)
FINAL COVER SYSTEM ON SIDESLOPE
NOT TO SCALE

Project: OAK HAMMOCK SOILD WASTE DISPOSAL FACILITY PERMIT APPLICATION

Figure Title: **LINER AND FINAL COVER SYSTEM DETAILS**

Project Number	Date	File No.	Figure No.
FW0400	MARCH 02	0400FA013	3

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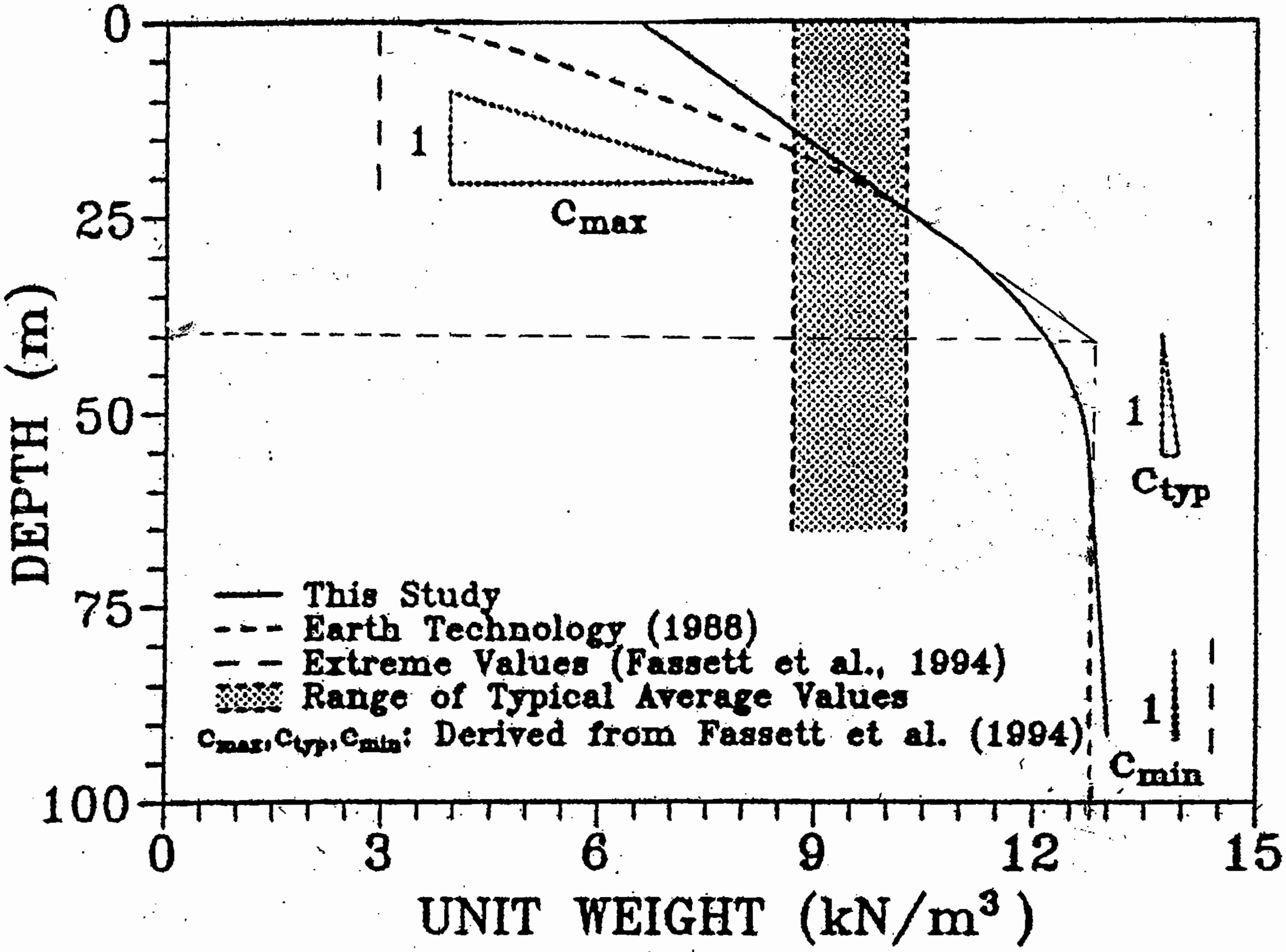

Project: OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: Depth vs. Density Relationship for Waste [Kavazanjian et. al., 2000]			
Project Number: FW0400	Date: MARCH 02	File No.	Figure No.: 4

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MATCH LINE B (SEE FIGURE 5 (CONT)

NORTH

0 100' 200' 400'

SCALE: 1" = 400'

LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- 80 — TOP OF FINAL COVER SYSTEM ELEVATION (FEET)
- WETLAND BOUNADRY(SEE NOTE 5)
- 100 YEAR FLOODPLAIN (SEE NOTE 6)

NOTES:

1. NORTHING AND EASTING COORDINATES SHOWN REPRESENT FLORIDA STATE PLANE EAST ZONE NORTH AMERICAN DATUM OF 1983 (NAD83).
2. THE ELEVATIONS SHOWN REPRESENT NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29)(FEET).
3. THE PROPERTY BOUNDARY BASED ON A COMPOSITE BOUNDARY SURVEY PROVIDED BY JOHNSTON SURVEYING INC., KISSIMMEE FLORIDA, DATED AUGUST 12, 1999.
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6. THE 100-YEAR FLOODPLAIN BOUNDARY SHOWN WAS PROVIDED BY THE OSCEOLA COUNTY GIS DEPARTMENT ON JANUARY 9, 2002.

Project			
OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **FINAL COVER SYSTEM GRADING PLAN I**			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA014	5

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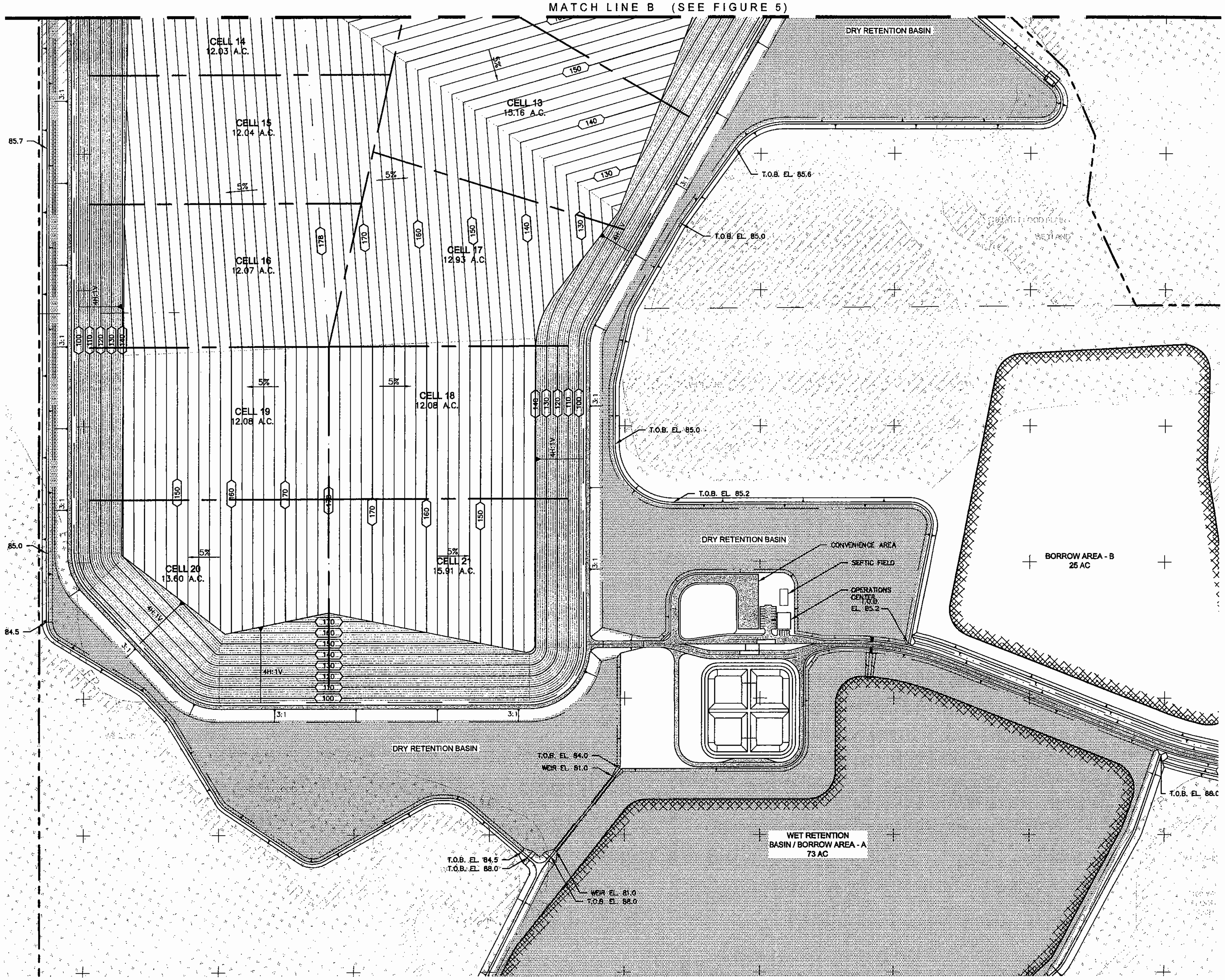

NORTH

SCALE: 1" = 400'

LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- 80 TOP OF FINAL COVER SYSTEM ELEVATION (FEET)
- WETLAND BOUNADRY(SEE NOTE 5)
- 100 YEAR FLOODPLAIN (SEE NOTE 6)

NOTES:

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Project			
OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **FINAL COVER SYSTEM GRADING PLAN II**			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA014	**5 (cont)**

Consultant / Engineer

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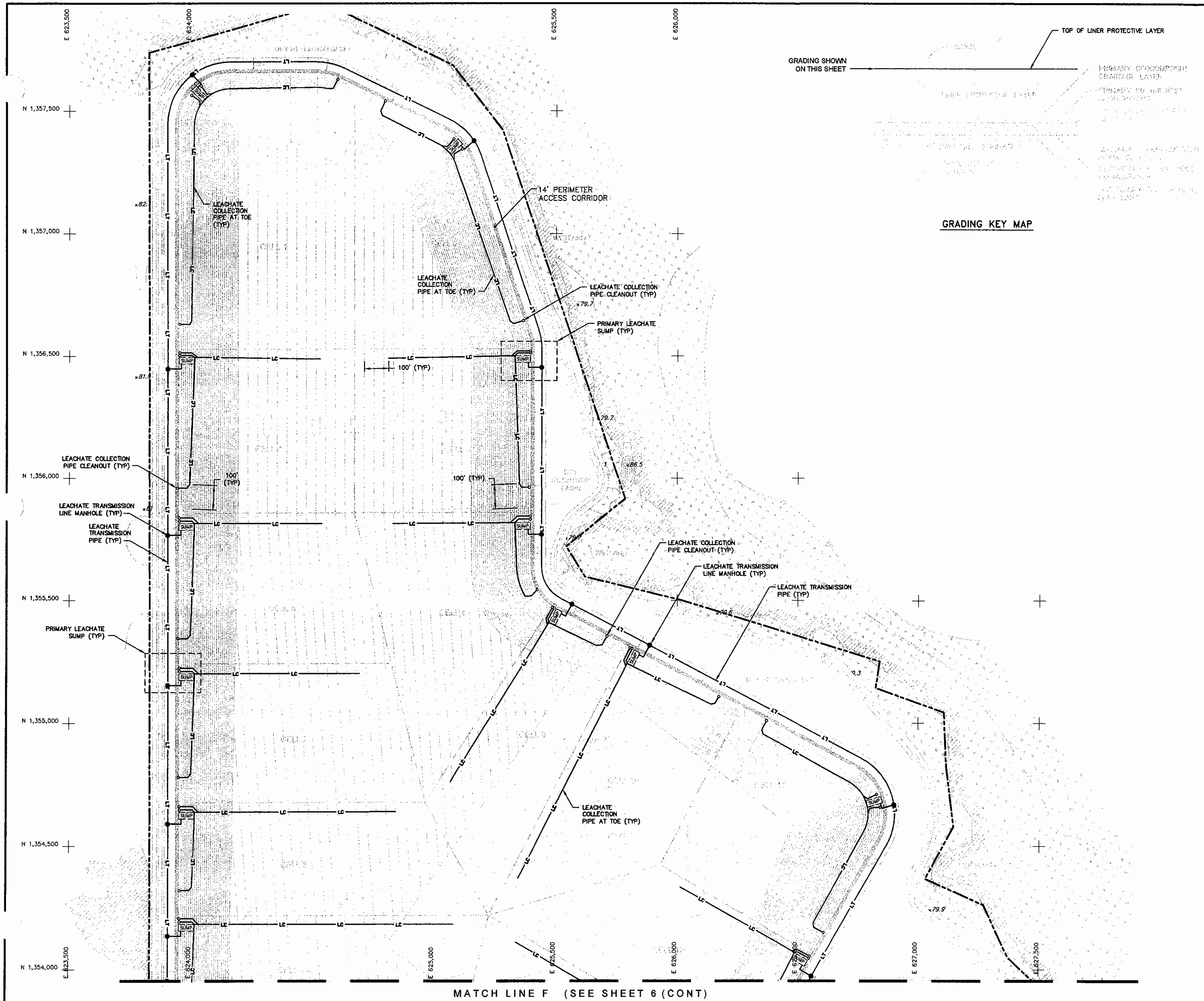

NORTH

0 100' 200' 400'

SCALE: 1" = 400'

LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- 170 TOP OF FINAL COVER ELEVATION (FEET)
- LC LEACHATE COLLECTION PIPE
- LT LEACHATE TRANSMISSION PIPE AND MANHOLE
- LC LEACHATE COLLECTION PIPE CLEANOUT
- WETLAND BOUNDARY BY PHOTO INTERPRETATION BY BRA (SEE NOTE 5)
- WETLAND BOUNDARY PER BRA FLAGGING AND SURVEY BY JOHNSTON SURVEYING INC. (SEE NOTE 5)
- 100-YEAR FLOODPLAIN (SEE NOTE 6)

NOTES:

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Project			
OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **FINAL COVER WITH LEACHATE PIPES**			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA027	6

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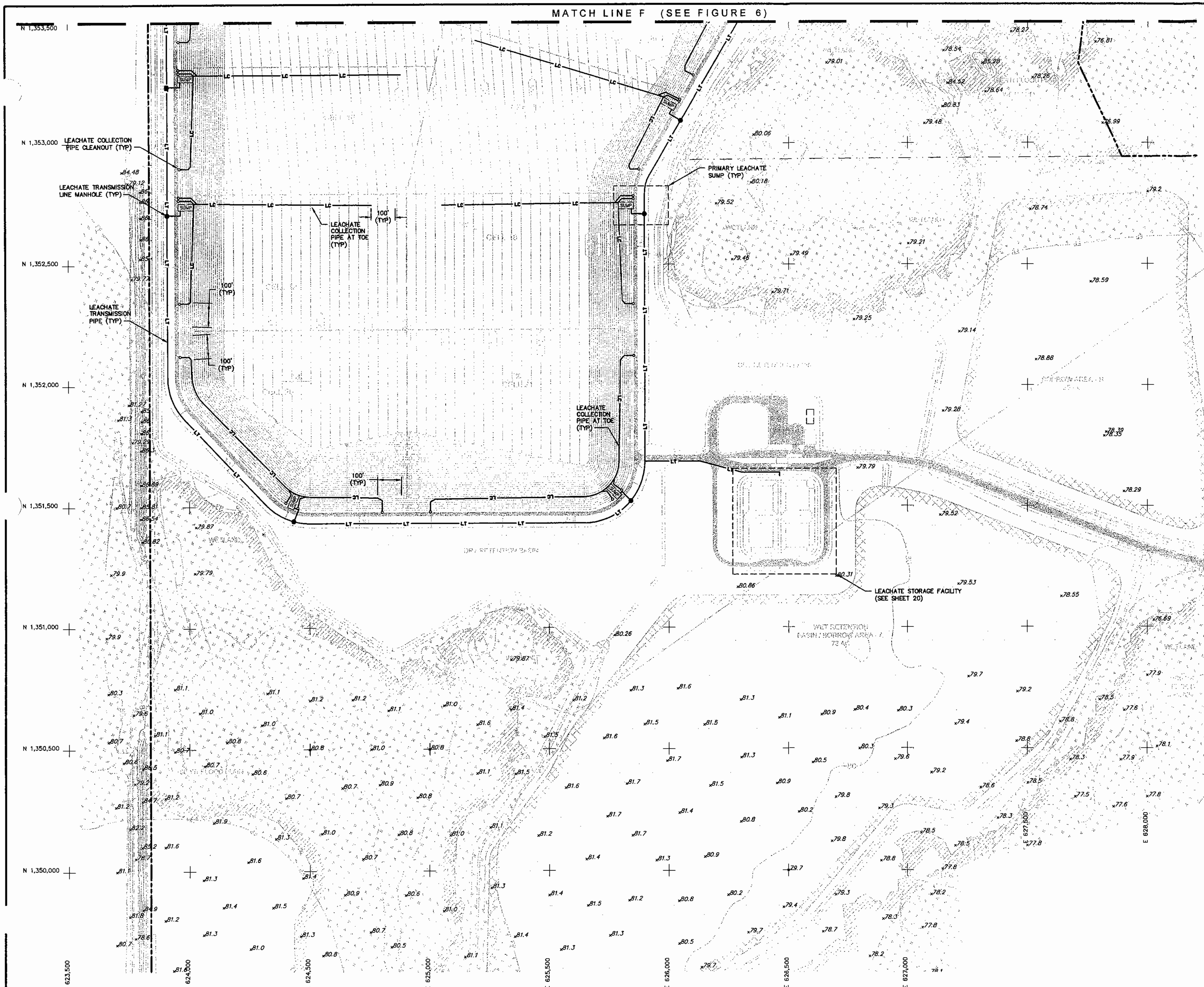

LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- TOP OF FINAL COVER ELEVATION (FEET)
- LEACHATE COLLECTION PIPE
- LEACHATE TRANSMISSION PIPE AND MANHOLE
- LEACHATE COLLECTION PIPE CLEANOUT
- WETLAND BOUNDARY BY PHOTO INTERPRETATION BY BRA (SEE NOTE 5)
- WETLAND BOUNDARY PER BRA FLAGGING AND SURVEY BY JOHNSTON SURVEYING INC. (SEE NOTE 5)
- 100-YEAR FLOODPLAIN (SEE NOTE 6)

NOTES:

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Project: OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION

Figure Title: **FINAL COVER WITH LEACHATE PIPES**

Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA027	6 (cont)

Consultant / Engineer
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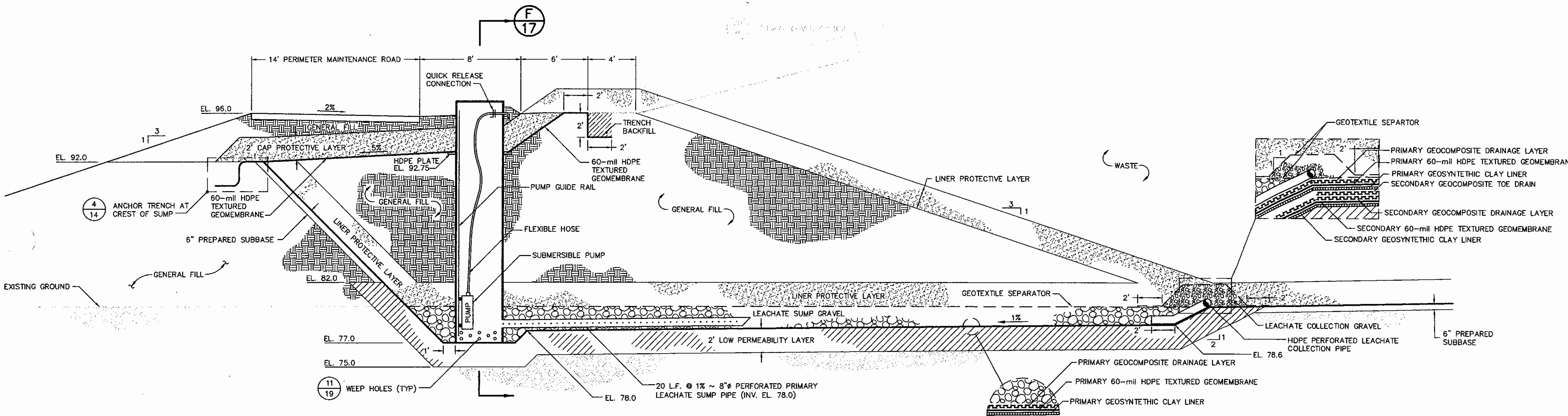

H/16 SECTION (TYPICAL)
PRIMARY LEACHATE SUMP
SCALE: 1" = 4'
XREF: 0400X0022.DWG

0 8
SCALE IN FEET

Project: OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **CROSS SECTION FOR LEACHATE PRIMARY COLLECTION PIPE IN SUMP**			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA028	**7**

Consultant / Engineer
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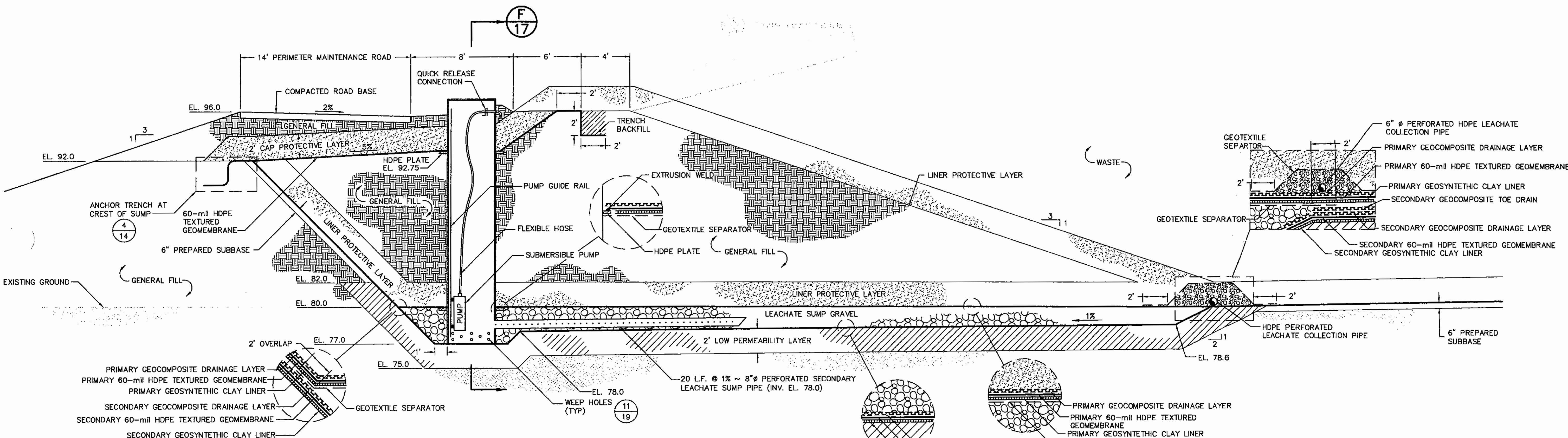


G
16

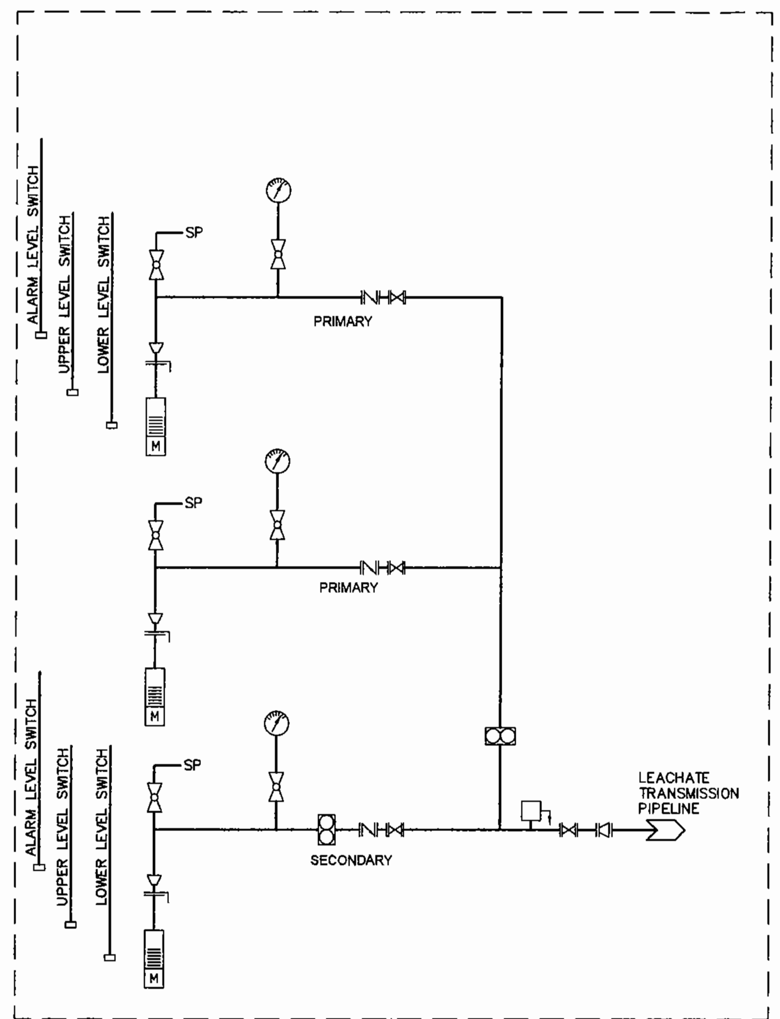
SECTION (TYPICAL)
SECONDARY LEACHATE SUMP

SCALE: 1" = 4'

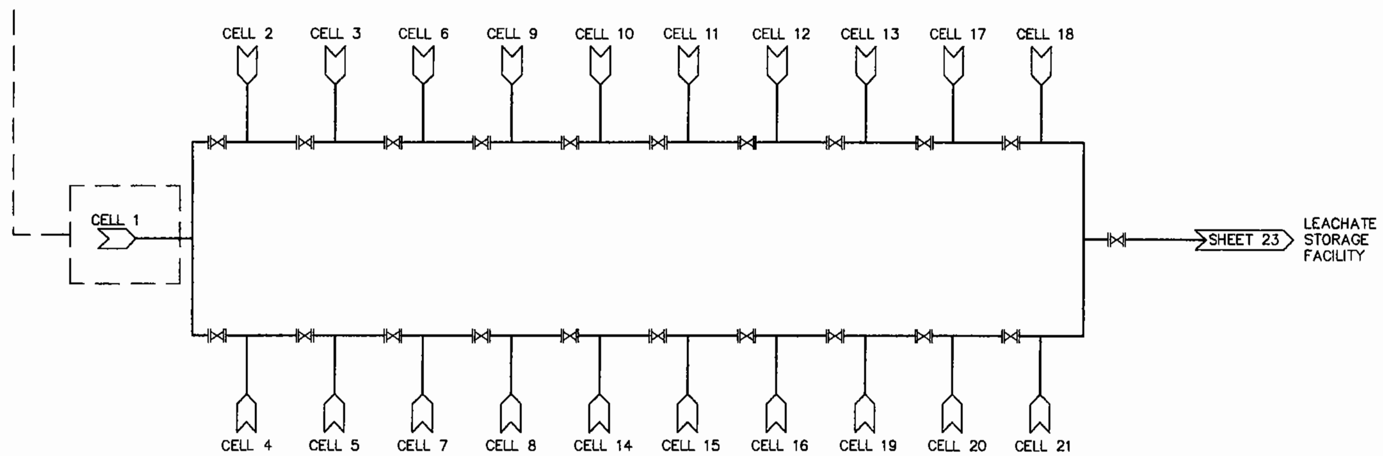
XREF: 0400X0023.DWG

0 8
SCALE IN FEET

Project	OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION		
Figure Title	**CROSS SECTION FOR LEACHATE SECONDARY COLLECTION PIPE IN SUMP**		
Project Number: FW0400	Date: MAY 2002	File No.: 0400FA028	Figure No.: **8**
Consultant / Engineer	GEOSYNTEC CONSULTANTS 14055 RIVEREDGE DRIVE, SUITE 300 · TAMPA, FLORIDA 33637 USA TEL: (813) 558-0990 · FAX: (813) 558-9726		



PUMP CONFIGURATION
(TYPICAL)



LEACHATE TRANSMISSION PIPELINE
SCALE: NTS

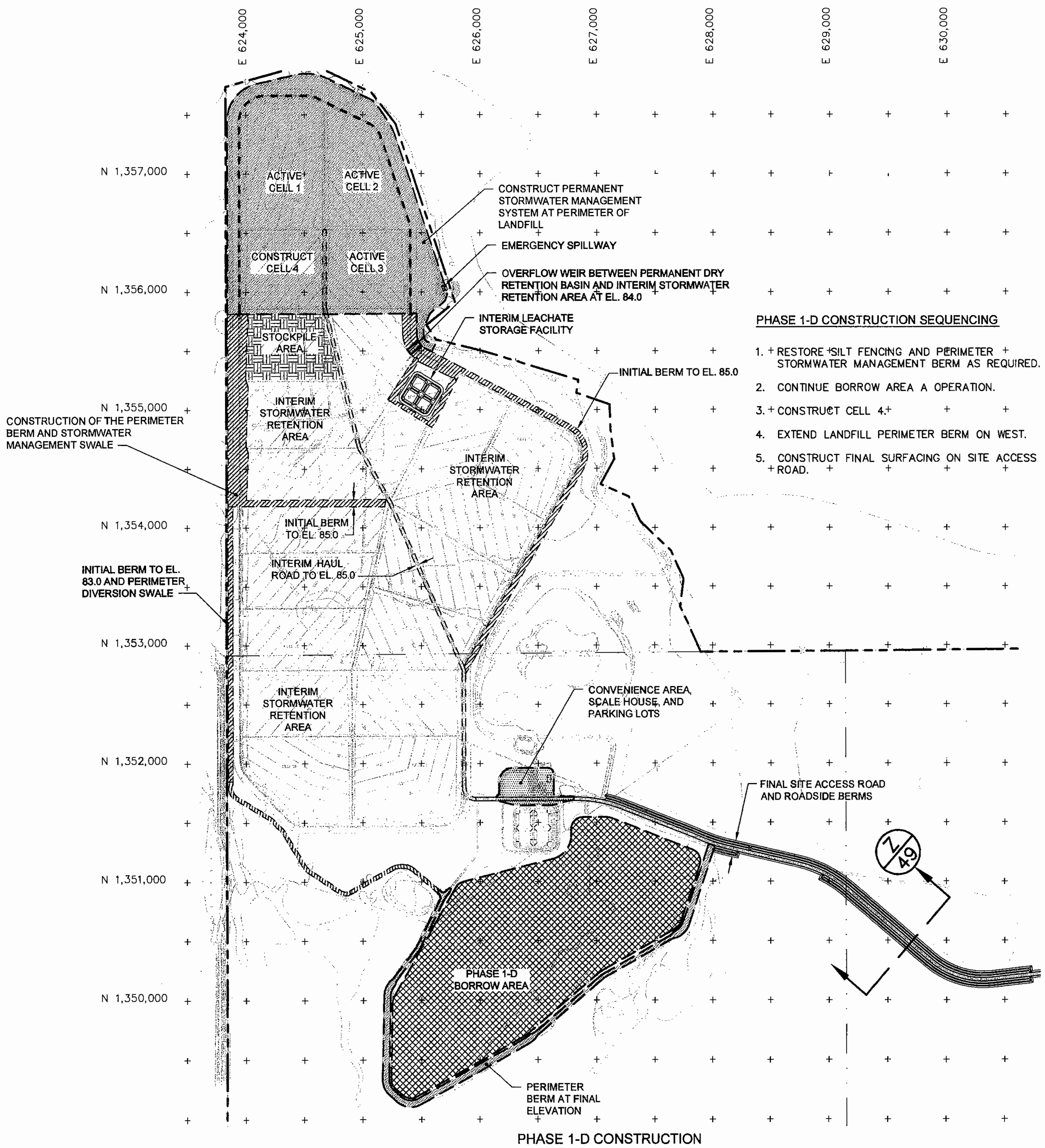
LEGEND

- FLANGED CONNECTION
- CONCENTRIC REDUCER
- ATMOSPHERE VENT
- GATE VALVE
- BALL VALVE
- CHECK VALVE
- AIR ELIMINATOR
- CAMLOCK CONNECTION
- QUICK RELEASE CONNECTION
- FLOW CONTINUATION
- FLOW METER
- PRESSURE GUAGE
- HORIZONTAL CENTRIFUGAL PUMP (PC)
- SUBMERSIBLE CENTRIFUGAL PUMP, MOTOR DRIVEN (PS)
- STORAGE TANK (T)
- MOTOR OR PISTON ACTUATOR M = MOTOR, P = PISTON
- SAMPLE POINT

OPERATIONAL NOTES:

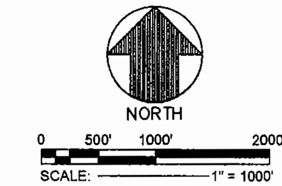
1. PUMP OPERATION IS CONTROLLED BY ELECTRICAL LEVEL SWITCHES MOUNTED IN THE SUMPS.
2. THE PRIMARY LEACHATE SUMP WILL BE EQUIPPED WITH THREE LEVEL SWITCHES. THE LOWER LEVEL SWITCH WILL ACTIVATE ONE PUMP. IF THE INFLOW TO THE PUMP EXCEEDS THE PUMP CAPACITY AND THE LEACHATE LEVEL CONTINUES TO RISE, THEN THE UPPER LEVEL SWITCH WILL ACTIVATE A SECOND PUMP. PUMPS IN THE PRIMARY LEACHATE SUMPS WILL BE SET TO ALTERNATE SO THAT BOTH PUMPS WILL RUN PERIODICALLY. IF THE LEVEL OF LEACHATE IN THE PRIMARY LEACHATE SUMP EXCEEDS THE UPPER LEVEL, THE ALARM LEVEL SWITCH WILL ACTIVATE AN ALARM THAT WILL SIGNAL POTENTIAL PUMPING PROBLEMS WITHIN THE SUMPS.
3. THE SECONDARY LEACHATE SUMP WILL BE EQUIPPED WITH ONE LEVEL SWITCH THAT WILL ACTIVATE THE SECONDARY LEACHATE SUMP PUMP IN THE EVENT SUFFICIENT LEACHATE ACCUMULATES IN THE SECONDARY SUMP. THE SECONDARY LEACHATE SUMP WILL BE HYDRAULICALLY CONNECTED TO THE PRIMARY SUMPS TO PROVIDE BACKUP PUMPING CAPACITY IN THE EVENT INFLOW TO THE PRIMARY SUMP EXCEEDS THE PUMPING CAPACITY OF THE PRIMARY PUMPS OR IN THE EVENT OF A PRIMARY SUMP PUMP FAILURE.
4. FLOW TOTALIZERS WILL RECORD THE AMOUNT OF LEACHATE PUMPED FROM EACH SUMP.
5. THE MAIN CONTROL SYSTEM WILL MONITOR THE NUMBER OF PUMPS OPERATING AT ANY ONE TIME. THE CONTROL SYSTEM WILL ONLY ALLOW 4 PUMPS TO RUN AT A TIME. THIS IS DONE TO LIMIT THE AMOUNT OF WATER PUMPED THROUGH THE TRANSMISSION PIPELINE TO 800 GPM.

Project: OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **LEACHATE COLLECTION SYSTEM SCHEMATIC DIAGRAM**			
Project Number FW0400	Date MAY 2002	File No. 0400FA036	Figure No. **9**
Consultant / Engineer	GEOSYNTEC CONSULTANTS 14055 RIVEREDGE DRIVE, SUITE 300 · TAMPA, FLORIDA 33637 USA TEL: (813) 558-0990 · FAX: (813) 558-9726		



PHASE 1-D CONSTRUCTION

SCALE: 1" = 1000'



PHASE 1-D CONSTRUCTION SEQUENCING

1. RESTORE SILT FENCING AND PERIMETER STORMWATER MANAGEMENT BERM AS REQUIRED.
2. CONTINUE BORROW AREA A OPERATION.
3. CONSTRUCT CELL 4.
4. EXTEND LANDFILL PERIMETER BERM ON WEST.
5. CONSTRUCT FINAL SURFACING ON SITE ACCESS ROAD.

LEGEND

- AREA OF INITIAL CONSTRUCTION (i.e., PARTIAL CONSTRUCTION OF A PERMANENT FEATURE)
- AREA OF PERMANENT CONSTRUCTION
- BORROW AREA
- INITIAL SUBGRADE CONSTRUCTION
- INTERIM ROADWAY (UNPAVED)
- PERMANENT ROADWAY (PAVED)
- STORMWATER BERM

NOTES:

1. NORTHING AND EASTING COORDINATES SHOWN REPRESENT FLORIDA STATE PLANE EAST ZONE NORTH AMERICAN DATUM OF 1983 (NAD83).
2. THE ELEVATIONS SHOWN REPRESENT NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29)(FEET).
3. THE PROPERTY BOUNDARY BASED ON A COMPOSITE BOUNDARY SURVEY PROVIDED BY JOHNSTON SURVEYING INC., KISSIMMEE FLORIDA, DATED AUGUST 12, 1999.
4. THE TOPOGRAPHIC INFORMATION SHOWN IN SECTION 11 AND THE NORTH HALF OF SECTION 14 WAS PROVIDED BY AERIAL CARTOGRAPHICS OF AMERICA, ORLANDO, FLORIDA BASED ON AN AERIAL PHOTOGRAPH FLOWN ON NOVEMBER 7, 2001. IN AREAS OUTSIDE THE LIMITS OF CONSTRUCTION, TOPOGRAPHIC INFORMATION WAS ADDED FROM USGS QUAD MAP FOR HOLOPAW SE, FLORIDA.
5. THE WETLAND BOUNDARY INFORMATION SHOWN IS BASED ON A FIELD SURVEY DATED MAY 15, 2002 BY JOHNSTON SURVEYING INC. OF WETLANDS BOUNDARIES FLAGGED BY BIOLOGICAL RESEARCH ASSOCIATES, INC., TAMPA, FLORIDA (BRA), AND JDS PENDING PERMIT, COMBINED WITH A PHOTO INTERPRETATION OF WETLAND BOUNDARIES BY BRA IN AREAS OF THE SITE OUTSIDE THE LIMITS OF CONSTRUCTION.
6. THE 100-YEAR FLOODPLAIN BOUNDARY SHOWN WAS PROVIDED BY THE OSCEOLA COUNTY GIS DEPARTMENT ON JANUARY 9, 2002.
7. PHASE I REPRESENTS LANDFILL DEVELOPMENT IN THE FIRST 5 YEARS OF OPERATION.

Project	OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION		
Figure Title	**INTERIM LEACHATE STORAGE TANKS**		
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA037	**10**

Consultant / Engineer

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TEL: (813) 558-0990 · FAX: (813) 558-9726

Attachment 1

Examples of Geocomposites

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TENAX® Corp.
4800 East Monument Street
Baltimore, MD 21205
1-800-356-8495

TENDRAIN 770-2

DOUBLE-SIDED GEOCOMPOSITE

The drainage geocomposite is comprised of a tri-planar geonet structure consisting of thick supporting ribs with diagonally placed top and bottom ribs and with a thermally bonded, non-woven geotextile on both sides. The product is capable of providing high Transmissivity in a soil environment under high normal loads and will have properties conforming with the values and test methods listed below:

PROPERTIES	TEST METHOD	UNIT	VALUE	QUALIFIER
GEONET CORE				
Tensile Strength - MD	ASTM D4595	lb/ft (kN/m)	1000 (14.6)	c, Note 1, 4
Compressive Behavior (% Retained thickness)				
@50,000 psf (short term)	ASTM D1621	%	50	a, Note 2, 4
@25,000 psf (10,000 hours)		%	65	a, Note 4
Density	ASTM D1505	g/cm^3	0.94	c, Note 4
Melt Flow Index	ASTM D1238	g/10 min.	1.0	d, note 4
Carbon Black Content	ASTM D4218	%	2.0	a, Note 4
Thickness	ASTM D5199	mils (mm)	300 (7.6)	c, Note 3, 4
GEOTEXTILE				
Apparent Opening Size (AOS)	ASTM D4751	US Sieve (mm)	70 (0.21)	b, Note 4
Weight	ASTM D3776	oz/yd^2 (g/m^2)	6 (203)	b, Note 4
Water Flow Rate	ASTM D4491	$gal/min/ft^2$ (lpm/m^2)	110 (4483)	b, Note 4
Permeability	ASTM D4491	cm/sec	0.2	b, Note 4
Permittivity	ASTM D4491	sec^{-1}	1.3	b, Note 4
Puncture Strength	ASTM D4833	lbs (N)	90 (400)	b, Note 4
Trapezoid Tear	ASTM D4533	lbs (N)	65 (290)	b, Note 4
Grab Tensile Strength	ASTM D4632	lbs (N)	160 (712)	b, Note 4
Grab Elongation	ASTM D4632	%	50	b, Note 4
Mullen Burst	ASTM D3786	psi (kPa)	325 (2241)	b, Note 4
UV Resistance @500 Hours	ASTM D4355	%	70	b, Note 4
GEOCOMPOSITE				
Roll Width		ft (m)	6.7 (2.0)	a, Note 5
Roll Length		ft (m)	200 (61)	a, Note 5
Ply Adhesion	ASTM F904 (modified)	lb/in (N/m)	1.0 (175)	c, Note 6

HYDRAULIC BEHAVIOR OF GEOCOMPOSITE

Transmissivity - MD, ASTM D 4716-99 (m^2/sec) — c, Notes 7

Gradient/Load:	15,000 psf (720 kPa)	25,000 psf (1200 kPa)
0.1	$1.8x10^{-3}$	$1.0x10^{-3}$

Qualifiers: a = Typical Value b = Minimum Average Roll Value (MARV)
c = Minimum Value d = Maximum Value

NOTES:

1. Tensile properties tested by manufacturer every 50,000 square feet of product per ASTM D4595 with a specimen width of 8.0 in. and cross-head speed of 0.4 in/min
2. Short term compressive behavior tested by manufacturer every 50,000 square feet of product per ASTM D1621 with a 4 in.x 4 in. specimen and a constant rate of strain of 0.04 in./min.
3. Thickness measured by manufacturer every 50,000 square feet of product per ASTM D5199 with a 2.22 in. diameter presser foot and 2.9 psi pressure.
4. Geotextile and geonet properties listed are prior to lamination. Geotextile is tested at the industry standard frequency.
5. Roll dimensions are measured at the time of manufacture.
6. Ply Adhesion is tested by the manufacturer every 100,000 sf of production per modified ASTM F904, with a 2 inch wide (5 longitudinal ribs) by 10 inch long strip. The geotextile bonded to either side of the geonet is pulled apart at a peeling rate of 12 in/min., for at least 4 inches of peeling distance. The reported value for each laminated side is the average of the "peak" values from 5 tested samples. The 5 samples are cut evenly distributed along the roll width with a 1 foot margin from both edges of the roll.
7. Geocomposite transmissivity measured by manufacturer every 200,000 square feet of product as per ASTM D4716-99 with testing boundary conditions as follows: steel plate / uniform sand / geocomposite / 60 mil HDPE geomembrane / steel plate, and seating period of 100 hours.

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TENAX® Corp.
4800 East Monument Street
Baltimore, MD 21205
1-800-356-8495

TENDRAIN 7100-2

UBLE-SIDED GEOCOMPOSITE

The drainage geocomposite is comprised of a tri-planar geonet structure consisting of thick supporting ribs with diagonally placed top and bottom ribs and with a thermally bonded, non-woven geotextile on both sides. The product is capable of providing high Transmissivity in a soil environment under high normal loads and will have properties conforming with the values and test methods listed below:

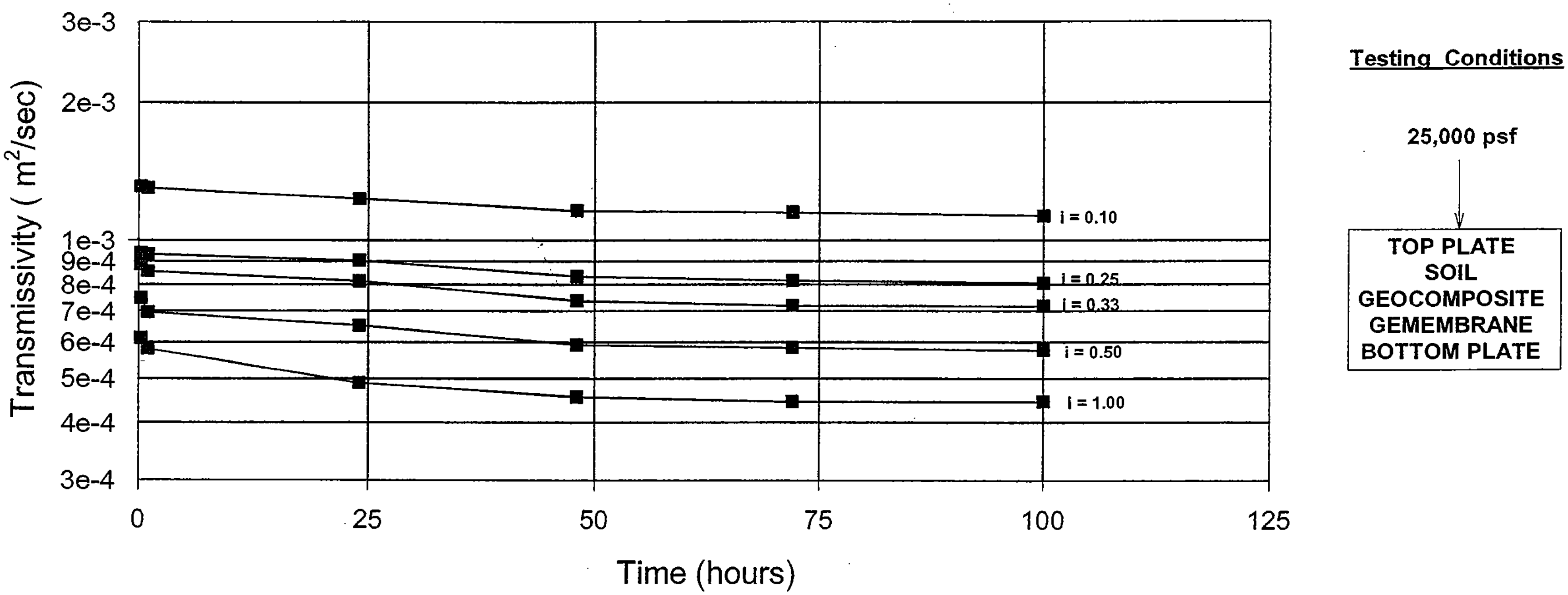
PROPERTIES	TEST METHOD	UNIT	VALUE	QUALIFIER
GEONET CORE				
Tensile Strength - MD	ASTM D4595	lb/ft (kN/m)	1000 (14.6)	c, Note 1, 4
Compressive Behavior (% Retained thickness)				
@50,000 psf (short term)	ASTM D1621	%	50	c, Note 2, 4
@25,000 psf (10,000 hours)		%	65	Note 4
Density	ASTM D1505	g/cm^3	0.94	c, Note 4
Melt Flow Index	ASTM D1238	g/10 min.	1.0	d, note 4
Carbon Black Content	ASTM D4218	%	2.0	a, Note 4
Thickness	ASTM D5199	mils (mm)	300 (7.6)	c, Note 3, 4
GEOTEXTILE				
Apparent Opening Size (AOS)	ASTM D4751	US Sieve (mm)	80 (0.18)	b, Note 4
Weight	ASTM D3776	oz/yd^2 (g/m^2)	8 (271)	b, Note 4
Water Flow Rate	ASTM D4491	$gal/min/ft^2$ (lpm/m^2)	100 (4075)	b, Note 4
Permeability	ASTM D4491	cm/sec	0.2	b, Note 4
Permittivity	ASTM D4491	sec^{-1}	1.26	b, Note 4
Puncture Strength	ASTM D4833	lbs (N)	130 (580)	b, Note 4
Trapezoid Tear	ASTM D4533	lbs (N)	80 (356)	b, Note 4
Grab Tensile Strength	ASTM D4632	lbs (N)	203 (900)	b, Note 4
Grab Elongation	ASTM D4632	%	50	b, Note 4
Mullen Burst	ASTM D3786	psi (kPa)	400 (2750)	b, Note 4
Resistance @500 Hours	ASTM D4355	%	70	b, Note 4
GEOCOMPOSITE				
Roll Width		ft (m)	6.7 (2.0)	a, Note 5
Roll Length		ft (m)	200 (61)	a, Note 5
Ply Adhesion	ASTM F904 (modified)	lb/in (N/m)	1.0 (175)	c, Note 6
HYDRAULIC BEHAVIOR OF GEOCOMPOSITE				
Transmissivity - MD, ASTM D 4716 (m^2/sec)				c, Notes 7
Gradient/Load:	15,000 psf (720 kPa)		25,000 psf (1200 kPa)	
0.1	$1.8x10^{-3}$		$1.0x10^{-3}$	

Qualifiers: a = Typical Value b = Minimum Average Roll Value (MARV)
c = Minimum Value d = Maximum Value

NOTES:

1. Tensile properties tested by manufacturer every 50,000 square feet of product per ASTM D4595 with a specimen width of 8.0 in. and cross-head speed of 0.4 in/min
2. Short term compressive behavior tested by manufacturer every 50,000 square feet of product per ASTM D1621 with a 4 in.x 4 in. specimen and a constant rate of strain of 0.04 in./min.
3. Thickness measured by manufacturer every 50,000 square feet of product per ASTM D5199 with a 2.22 in. diameter presser foot and 2.9 psi pressure.
4. Geotextile and geonet properties listed are prior to lamination. Geotextile is tested at the industry standard frequency.
5. Roll dimensions are measured at the time of manufacture.
6. Ply Adhesion is tested by the manufacturer every 100,000 sf of production per modified ASTM F904, with a 2 inch wide (5 longitudinal ribs) by 10 inch long strip. The geotextile bonded to either side of the geonet is pulled apart at a peeling rate of 12 in/min., for at least 4 inches of peeling distance. The reported value for each laminated side is the average of the "peak" values from 5 tested samples. The 5 samples are cut evenly distributed along the roll width with a 1 foot margin from both edges of the roll.
7. Geocomposite transmissivity measured by manufacturer every 200,000 square feet of product as per ASTM D4716 with testing boundary conditions as follows: steel plate / uniform sand / geocomposite / 60 mil HDPE geomembrane / steel plate, and seating period of 100 hours.

In-Soil Long Term Transmissivity Test*
ASTM D4716-99
Tendrain 770-2



*Geotechnics Results

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GSE

GSE FabriNet

HDPE Geonet/Geotextile Composite (HS)

GSE FabriNet geocomposites typically consist of GSE HyperNet with nonwoven polypropylene geotextile fabric heat-bonded to one or both sides. The geotextile serves as a filter to prevent the geonet from clogging while the geonet provides a path for fluids (liquids and gases). Geocomposites may also be used as a cushion to protect a geomembrane from unduly rough substrates. GSE FabriNet is designed specifically for use in situations where high normal loads are expected, such as in landfill cell designs.

Product Specifications

TESTED PROPERTY	TEST METHOD	MINIMUM AVERAGE VALUES(d)		
Geocomposite		6 oz/yd²	8 oz/yd²	10 oz/yd²
Transmissivity(a), m²/sec	ASTM D 4716-00	1×10^{-4}	1×10^{-4}	9×10^{-5}
Ply Adhesion, lb/in	GRI GC-7	0.5	0.5	0.5
Roll Width, ft (m)		14 (4.3)	14 (4.3)	14 (4.3)
Roll Length, ft (m)		230 (70.1)	200 (60.9)	190 (58.0)
Geonet core(b)				
Transmissivity,(a) m²/sec	ASTM D 4716-00	2×10^{-3}	2×10^{-3}	2×10^{-3}
Thickness, mil (mm)	ASTM D 5199	200 (5)	200 (5)	200 (5)
Density, g/cm³	ASTM D 1505	0.94	0.94	0.94
Tensile Strength (MD), lb/in (N/mm)	ASTM D 5035	45 (7.9)	45 (7.9)	45 (7.9)
Carbon Black Content, %	ASTM D 1603	2.0	2.0	2.0
Geotextile (prior to lamination)(b,c)				
Thickness, mil (mm)	ASTM D 5199	80 (2.0)	90 (2.2)	105 (2.6)
Grab Tensile, lb (N)	ASTM D 4632	170 (755)	220 (975)	260 (1155)
Puncture Strength, lb (N)	ASTM D 4833	110 (485)	135 (600)	180 (800)
AOS, US sieve (mm)	ASTM D 4751	70 (0.212)	80 (0.180)	100 (0.150)
Flow Rate, gpm/ft² (lpm/m²)	ASTM D 4491	110 (4480)	110 (4480)	85 (3460)
UV Resistance, % retained	ASTM D 4355 (after 500 hours)	70	70	70

NOTES:

(a) Gradient of 0.1, normal load of 10,000 psf, water at 70° F between steel plates for 15 minutes.

(b) Component properties prior to lamination.

(c) Several geotextiles are available and may be supplied as determined by GSE.

(d) These are MARV values that are based on the cumulative results of specimens tested and determined by GSE.

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Represented by:

A Gundle/SLT Environmental, Inc. Company
www.gseworld.com

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GSE

GSE HyperNet

HDPE Geonet

GSE HyperNet products are geosynthetic drainage materials composed of two bonded, overlapping HDPE strands commonly referred to as geonet. HyperNet transmits fluids (liquids and gases) in the plane of the net by creating open channels that allow flow. HyperNet is a premium grade geonet with excellent chemical resistance, mechanical properties and life expectancy.

GSE HyperNet HF

HDPE High Flow Geonet

GSE HyperNet HF products are manufactured in the same manner as standard GSE HyperNet but are designed specifically for use in situations where high flow and high loads are expected such as in landfill cell designs.

GSE HyperNet CP

HDPE Capping Geonet

GSE HyperNet CP products are manufactured in the same manner as standard GSE HyperNet but are designed specifically for use in situations where lower normal loads are expected such as in landfill cap designs.

Product Specifications

TESTED PROPERTY	TEST METHOD	MINIMUM AVERAGE VALUES[e]		
		HyperNet	HyperNet HF	HyperNet CP
Transmissivity, m^2/sec	ASTM D 4716-00	2×10^{-3} [a]	3×10^{-3} [b]	1×10^{-3} [c]
Thickness, mil (mm)	ASTM D 5199	200 (5)	250 (6.3)	200 (5)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94
Tensile Strength (MD), lb/in (N/mm)	ASTM D 5035	45 (7.9)	55 (9.6)	32 (5.6)
Carbon Black Content, %	ASTM D 1603, modified	2.0	2.0	2.0
Roll Width, ft (m)		14 (4.3)	14 (4.3)	14 (4.3)
Roll Length[d] ft (m)		300 (90)	250 (76)	300 (90)

NOTES:

(a) Gradient of 0.1, normal load of 10,000 psf, water at 70°F between steel plates for 15 minutes.
(b) Gradient of 0.1, normal load of 10,000 psf, water at 70°F between steel plates for 15 minutes.
(c) Gradient of 1.0, normal load of 4,000 psf, water at 70°F between steel plates for 15 minutes.
(d) Please check with GSE for other available roll lengths.
(e) These are MARV values that are based on the cumulative results of specimens tested and determined by GSE.

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DS017 R10/15/01

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The Geocomposite with a Structure

TENAX

TENFLOW

Drainage Geocomposite

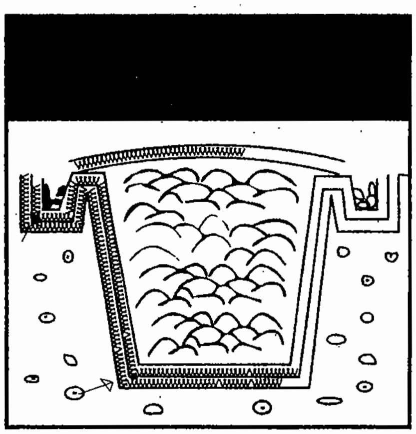
- High in-soil transmissivity after 100 hour seating period
- High retained thickness after 10,000 hours compressive creep

Properties	Test Method	Unit	Data	Notes
GEONET CORE				
Tensile Strength- MD	ASTM D4595	lb/ft(kN/m)	500 (7.3)	c
Compressive Creep Behavior Retained thickness @ 2,000psf after 10,000 hours		%	90	a
Resin Density	ASTM D1505	g/cm	0.94	c
Resin Melt Index	ASTM D1238	g/10 min	1.0	b
Carbon Black Content	ASTM D4218	%	2	c
Thickness	ASTM D5199	mils (mm)	315 (8.0)	c

GEOCOMPOSITE

Technical Characteristics	Test Method	Unit	Data	Notes
Roll Width		ft (m)	6.7 (2.0)	a
Roll Length		ft (m)	200 (61)	a
Ply Adhesion	ASTM F904	lb/in (N/m)	0.75 (131)	c
HYDRAULIC BEHAVIOR OF GEOCOMPOSITE IN SOIL				
Transmissivity - MD	ASTM D4716 (modified)	m^2/sec		c
Gradient		Load 1,000 psf		
i=0.10		5.5 x 10[illegible]		
i=0.20		4.5 x 10[illegible]		
i=0.33		4.0 x 10[illegible]		
i=0.50		3.5 x 10[illegible]		

Notes:
a) Typical Value b) Maximum Value c) Minimum Value



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Attachment 2

Technical Note Relating to Creep Factors

Technical Note

Determining Creep Reduction Factor for Tri-Planar Geonets

In this technical note, the Creep Reduction Factor, RF_{cr} is determined to account for the creep that takes place in a tri-planar geonet between the seating period of 100 hours and two time periods. The first case is to represent the initial phase of waste placement, and the second case is to represent the stage of the landfill prior to final closure where waste thickness reaches its maximum height. The reduction factor for creep is then applied to the transmissivity value determined from performance test with a 100-hour seating to account for the creep deformation.

The attached Figure shows the results of 10,000-hour compressive creep tests on tri-planar geonets under normal loads of 2,000psf and 25,000psf respectively. The creep curve under 2,000psf load is used to determine the creep reduction fact for the first case (initial phase of waste placement), and the creep curve under 25,000psf is used for the second case (landfill prior to final closure). The following Equation[1] is used to determine the Creep Reduction Factor, RF_{cr}

$$RF_{cr} = \left[\frac{(t_{CO} / t_{virgin}) - (1 - n_{virgin})}{(t_{CR} / t_{virgin}) - (1 - n_{virgin})} \right]^3$$

Where:

T_{CO} = thickness after load application for 100 hours

t_{virgin} = initial thickness under 2.9 psi (ASTM D5199)

t_{CR}= thickness at the time period of interest

n_{virgin} = initial porosity

---

[1] Giroud, J.P., Zhao, A., and Richardson, G., 2000, "Effect of Thickness Reduction on Geosynthetic Hydraulic Transmissivity", Special Issue on Liquid Collection Systems, *Geosynthetics International*, Vol.7, Nos. 4-6, pp. 433-452.

Case 1: Using the compressive creep curve under 2000psf load (Initial Phase of Waste Placement):

t_{CO} = t_{100h} = 7.62*0.975 = 7.43 mm

t_{vingin} = 7.62 mm (300 mils)

t_{CR} (use 4,000 hours) = t_{4000h} = 7.62*0.965 = 7.35 mm

n_{virgin} = 0.75 (calculated)

Substituting these values in the above Equation:

RC_{CR} = **1.05**

Case 2: Using the compressive creep curve under 25,000psf load (Landfill Prior to Final Closure):

t_{CO} = t_{100h} = 7.62*0.7 = 5.32 mm

t_{vingin} = 7.62 mm (300 mils)

t_{CR} (use 17,000 hours) = t_{17000h} = 7.62*0.675 = 5.14 mm

n_{virgin} = 0.75 (calculated)

Substituting these values in the above Equation:

RC_{CR} = **1.20** (for landfill prior to final closure)

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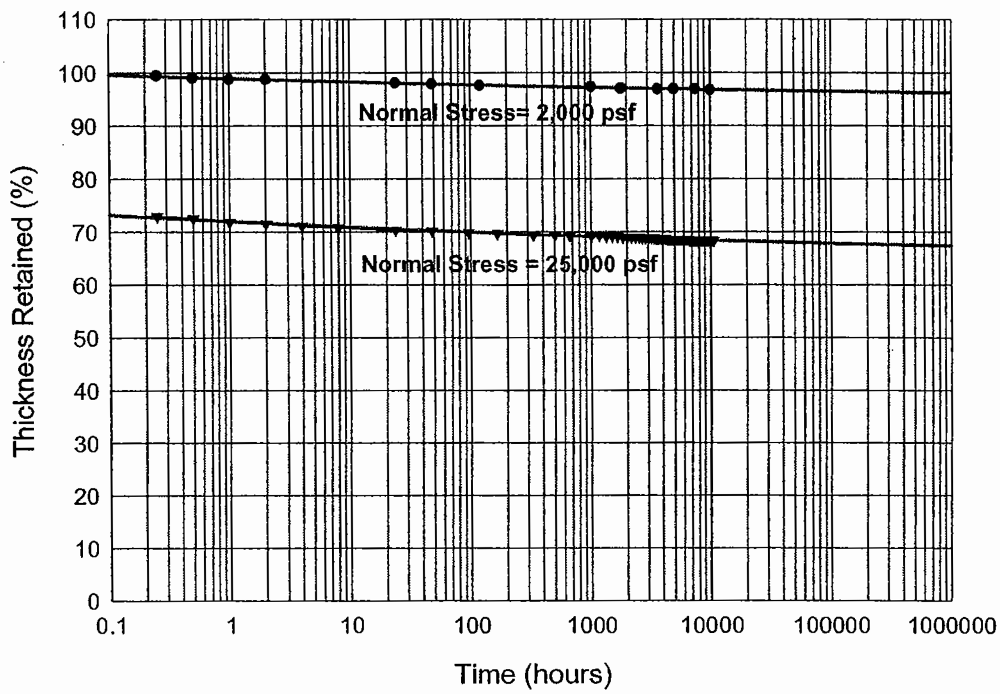
Compressive Creep Data on Tendrain



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Attachment 3

Transmissivity Properties of Geocomposites

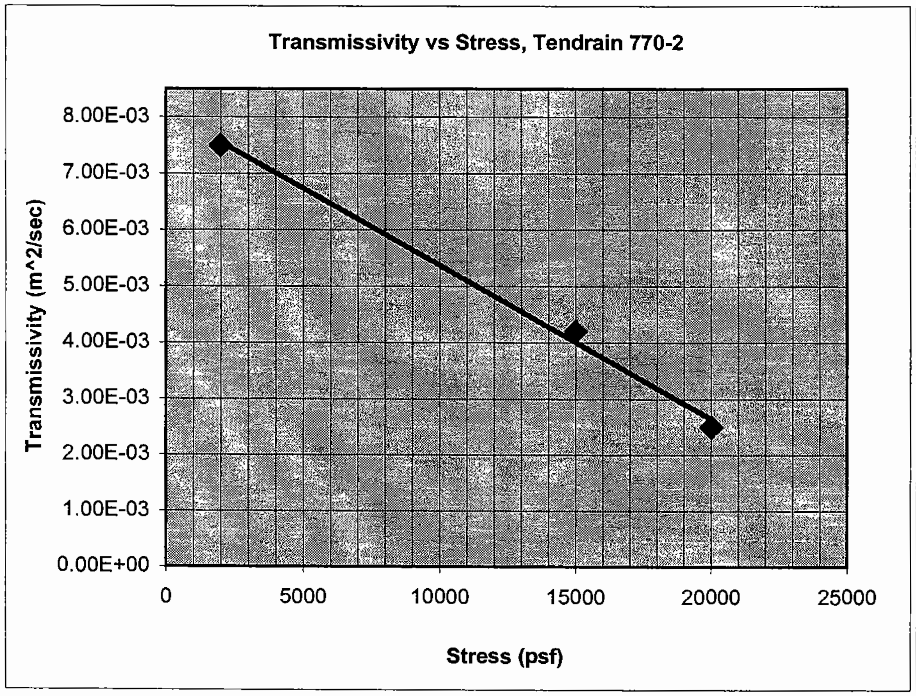
PROPERTIES OF CANDIDATE PRIMARY GEOCOMPOSITE

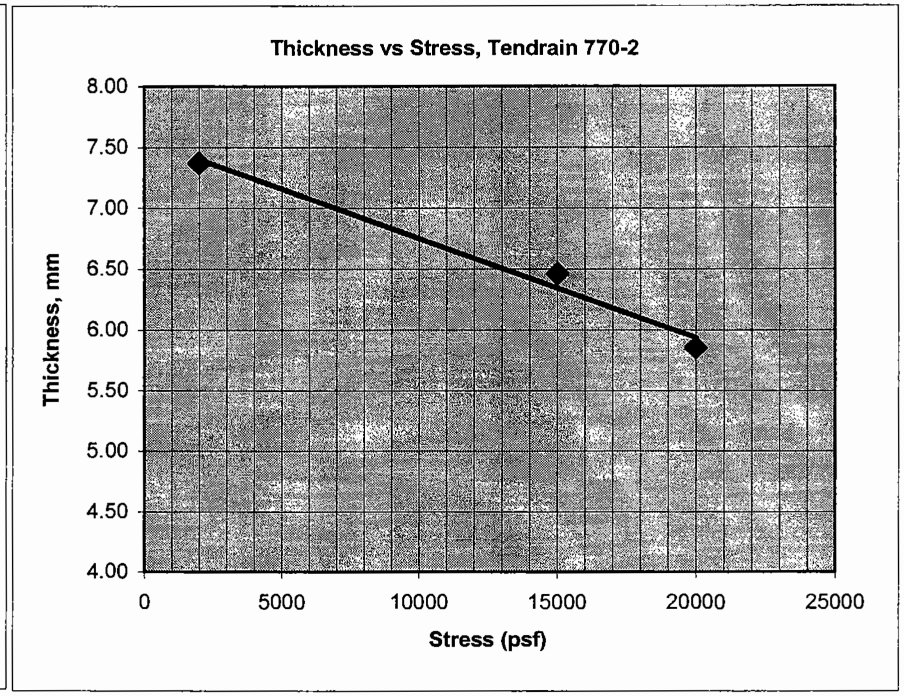
TRI-PLANAR GEOCOMPOSITE

i= 0.02

Tendrain 770-2, 100 hours, Manufacturer data

Stress	θ	Thickness geonet	
psf	m^2/sec	%	mm
0		100	7.6
2000	7.50E-03	97	7.37
15000	4.20E-03	85	6.46
20000	2.50E-03	77	5.85





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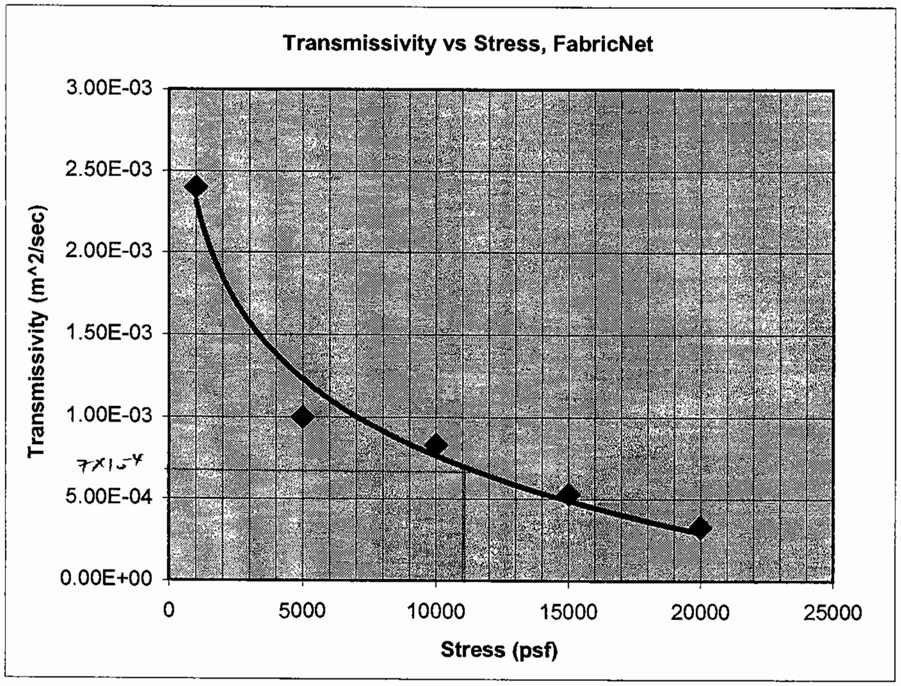
PROPERTIES OF CANDIDATE SECONDARY GEOCOMPOSITE

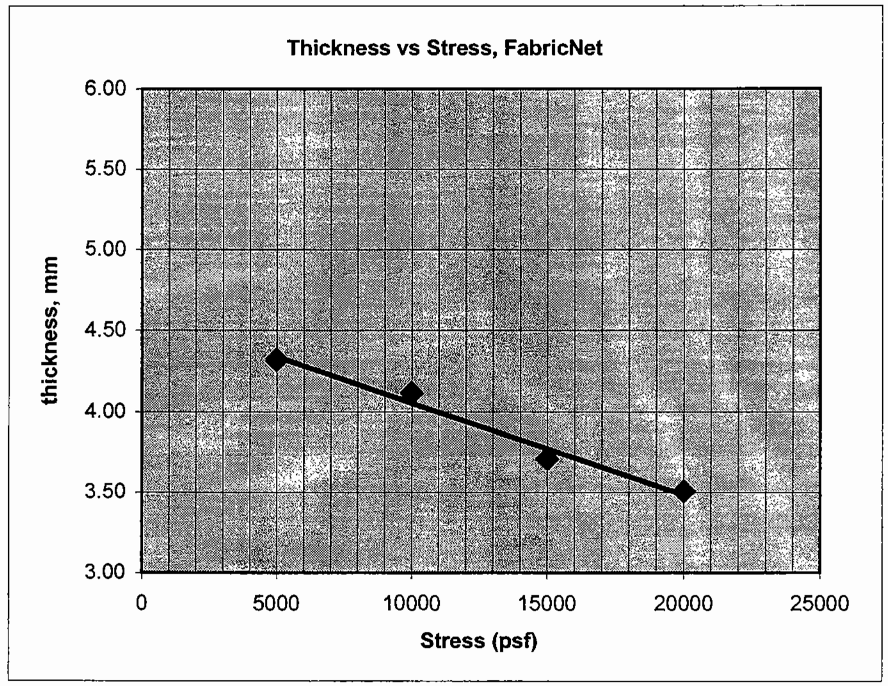
BI-PLANAR GEOCOMPOSITE

i= 0.1

Fabri Net, 100 hours, Manufacturer data

Stress	θ	Thickness geonet	
psf	m^2/sec	%	mm
0		100	5.08
1000	2.40E-03		
5000	1.00E-03	85	4.32
10000	8.30E-04	81	4.11
15000	5.30E-04	73	3.71
20000	3.30E-04	69	3.51





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PROPERTIES OF CANDIDATE FINAL COVER GEOCOMPOSITE

Thickness of geonet=	8	mm

Note: The reduction thickness at a normal pressure of 1000 psf is assumed to be 97%

TENFLOW, Data from Manufacturer

Transmiss m^2/sec	gradient	%reduction thickness
5.50E-03	0.10	97.00
4.50E-03	0.20	97.00
4.00E-03	0.33	97.00
3.50E-03	0.50	97.00

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Attachment 4

Summary of Help Model Input Data

INPUT DATA, CASE 1
LINER SYSTEM WITH 10 FT OF WASTE

WEATHER DATA AND SOIL LAYERS PROPERTIES

A. Evapotranspiration data

Data	Value	Units
Nearby city	Orlando	
State	Florida	
Latitude	27.8	
Evaporative zone depth	12	in
bare	10	
fair	22	
excellent	40	
Maximum leaf area index	0	
bare ground	0	
poor stand of grass	1	
fair stand of grass	2	
good stand of grass	3.5	
excellent stand of grass	5	
Growing season start day	0	
Growing season end day	367	
Average wind speed	8.6	mph
First quarter relative humidity	72	%
Second quarter relative humidity	72	%
Third quarter relative humidity	80	%
Fourth quarter relative humidity	76	%

B. Precipitation

Data	Value
Nearby city	Fort Drum
State	Florida
Years for data generation	30

C. Temperature

Data	Value
Nearby city	Orlando
State	Florida
Years for data generation	25

Normal mean monthly temperature (°F)

January	60.5	July	82.4
February	61.5	August	82.5
March	66.8	September	81.1
April	72	October	74.9
May	77.3	November	67.5
June	80.9	December	62

D. Solar Radiation

Data	Value
Nearby city	Orlando
State	Florida
Years for data generation	25

E. Geomembrane and Area

Placement of geomembrane	good
Pinhole (# of defects/area)	2
Defect density per acre	2
Area assumed in program (acre)	1
Total area (cell 1)	18.04

Runoff curve number

Soil texture	18	waste type
Vegetation	1	bare ground

Variables

Area of runoff	vary	%
Bottom slope	vary	%

	5%	25%
Liner path (average)=	630	135
Surface slope length (average)=	765	236

F. Properties of soil layers

Layer	Type	Description	Thickness in	Texture number	Porosity vol/vol	Field cap. vol/vol	Wilting point vol/vol	k cm/sec	Length Drain ft	Liner slope %
1	1	Vertical percolation	120	18	0.168	0.073	0.019	0.001		
2	1	Vertical percolation	24	1	0.417	0.045	0.018	0.010		
3	2	Lateral drainage	0.297		0.86	0.01	0.005	21.89	630 / 135	vary
4	4	Geomembrane liner	0.060	35				2E-13		
5	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
6	2	Lateral drainage	0.181		0.850	0.010	0.005	11.05	630 / 135	vary
7	4	Geomembrane liner	0.060	35				2E-13		
8	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
9	1	Vertical percolation	120.000	5	0.457	0.131	0.058	0.001		

INPUT DATA, CASE 2-A
LINER SYSTEM WITH 30 FT OF WASTE

WEATHER DATA AND SOIL LAYERS PROPERTIES

A. Evapotranspiration data

Data	Value	Units
Nearby city	Orlando	
State	Florida	
Latitude	27.8	
Evaporative zone depth	22	in
bare	10	
fair	22	
excellent	40	
Maximum leaf area index	1	
bare ground	0	
poor stand of grass	1	
fair stand of grass	2	
good stand of grass	3.5	
excellent stand of grass	5	
Growing season start day	0	
Growing season end day	367	
Average wind speed	8.6	mph
First quarter relative humidity	72	%
Second quarter relative humidity	72	%
Third quarter relative humidity	80	%
Fourth quarter relative humidity	76	%

B. Precipitation

Data	Value
Nearby city	Fort Drum
State	Florida
Years for data generation	30

C. Temperature

Data	Value
Nearby city	Orlando
State	Florida
Years for data generation	25

Normal mean monthly temperature (°F)

January	60.5	July	82.4
February	61.5	August	82.5
March	66.8	September	81.1
April	72	October	74.9
May	77.3	November	67.5
June	80.9	December	62

D. Solar Radiation

Data	Value
Nearby city	Orlando
State	Florida
Years for data generation	25

E. Geomembrane and Area

Placement of geomembrane	good
Pinhole (# of defects/area)	2
Defect density per acre	2
Area assumed in program (acre)	1
Total area (cell 1)	18.04

Runoff curve number

Soil texture	18	waste type
Vegetation	2	poor grass

Variables

Area of runoff	vary	%
Bottom slope	vary	%

	5%	25%
Liner path (average)=	630	135
Surface slope length (average)=	765	236

F. Properties of soil layers

Layer	Type	Description	Thickness in	Texture number	Porosity vol/vol	Field cap. vol/vol	Wilting point vol/vol	k cm/sec	Length Drain ft	Liner slope %
1	1	Vertical percolation	360	18	0.168	0.073	0.019	0.001		
2	1	Vertical percolation	24	1	0.417	0.045	0.018	0.010		
3	2	Lateral drainage	0.295		0.85	0.01	0.005	12.54	630 / 135	vary
4	4	Geomembrane liner	0.060	35				2E-13		
5	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
6	2	Lateral drainage	0.179		0.850	0.010	0.005	5.44	630 / 135	vary
7	4	Geomembrane liner	0.060	35				2E-13		
8	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
9	1	Vertical percolation	120.000	5	0.457	0.131	0.058	0.001		

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INPUT DATA, CASE 2-B
LINER SYSTEM WITH 60 FT OF WASTE

WEATHER DATA AND SOIL LAYERS PROPERTIES

A. Evapotranspiration data

Data	Value	Units
Nearby city	Orlando	
State	Florida	
Latitude	27.8	
Evaporative zone depth	22	in
bare	10	
fair	22	
excellent	40	
Maximum leaf area index	2	
bare ground	0	
poor stand of grass	1	
fair stand of grass	2	
good stand of grass	3.5	
excellent stand of grass	5	
Growing season start day	0	
Growing season end day	367	
Average wind speed	8.6	mph
First quarter relative humidity	72	%
Second quarter relative humidity	72	%
Third quarter relative humidity	80	%
Fourth quarter relative humidity	76	%

B. Precipitation

Data	Value
Nearby city	Fort Drum
State	Florida
Years for data generation	30

C. Temperature

Data	Value
Nearby city	Orlando
State	Florida
Years for data generation	25

Normal mean monthly temperature (°F)

January	60.5	July	82.4
February	61.5	August	82.5
March	66.8	September	81.1
April	72	October	74.9
May	77.3	November	67.5
June	80.9	December	62

D. Solar Radiation

Data	Value
Nearby city	Orlando
State	Florida
Years for data generation	25

E. Geomembrane and Area

Placement of geomembrane	good
Pinhole (# of defects/area)	2
Defect density per acre	2
Area assumed in program (acre)	1
Total area (cell 1)	18.04

Runoff curve number

Soil texture	18	waste type
Vegetation	3	fair grass

Variables

Area of runoff	vary	%
Bottom slope	vary	%

	5%	25%
Liner path (average)=	630	135
Surface slope length (average)=	765	236

F. Properties of soil layers

Layer	Type	Description	Thickness in	Texture number	Porosity vol/vol	Field cap. vol/vol	Wilting point vol/vol	k cm/sec	Length Drain ft	Slope %
1	1	Vertical percolation	720	18	0.168	0.073	0.019	0.001		
2	1	Vertical percolation	24	1	0.417	0.045	0.018	0.010		
3	2	Lateral drainage	0.289		0.85	0.01	0.005	11.79	630 / 135	vary
4	4	Geomembrane liner	0.060	35				2E-13		
5	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
6	2	Lateral drainage	0.173		0.850	0.010	0.005	3.938	630 / 135	vary
7	4	Geomembrane liner	0.060	35				2E-13		
8	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
9	1	Vertical percolation	120.000	5	0.457	0.131	0.058	0.001		

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PARAMETRIC STUDY, CASE 2-C
LINER SYSTEM WITH 95 FT OF WASTE

WEATHER DATA AND SOIL LAYERS PROPERTIES

A. Evapotranspiration data

Data	Value	Units
Nearby city	Orlando	
State	Florida	
Latitude	27.8	
Evaporative zone depth	22	in
bare	10	
fair	22	
excellent	40	
Maximum leaf area index	3.5	
bare ground	0	
poor stand of grass	1	
fair stand of grass	2	
good stand of grass	3.5	
excellent stand of grass	5	
Growing season start day	0	
Growing season end day	367	
Average wind speed	8.6	mph
First quarter relative humidity	72	%
Second quarter relative humidity	72	%
Third quarter relative humidity	80	%
Fourth quarter relative humidity	76	%

B. Precipitation

Data	Value
Nearby city	Fort Drum
State	Florida
Years for data generation	30

C. Temperature

Data	Value
Nearby city	Orlando
State	Florida
Years for data generation	25

Normal mean monthly temperature (°F)

January	60.5	July	82.4
February	61.5	August	82.5
March	66.8	September	81.1
April	72	October	74.9
May	77.3	November	67.5
June	80.9	December	62

D. Solar Radiation

Data	Value
Nearby city	Orlando
State	Florida
Years for data generation	25

E. Geomembrane and Area

Placement of geomembrane	good
Pinhole (# of defects/area)	2
Defect density per acre	2
Area assumed in program (acre)	1
Total area (cell 1)	18.04

Runoff curve number

Soil texture	18	waste type
Vegetation	4	good grass

Variables

Area of runoff	vary	%
Bottom slope	vary	%

	5%	25%
Liner path (average)=	630	135
Surface slope length (average)=	765	236

F. Properties of soil layers

Layer	Type	Description	Thickness in	Texture number	Porosity vol/vol	Field cap. vol/vol	Wilting point vol/vol	k cm/sec	Length Drain ft	Slope %
1	1	Vertical percolation	12	1	0.417	0.045	0.018	0.01		
2	1	Vertical percolation	1140	18	0.168	0.073	0.019	0.001		
3	1	Vertical percolation	24	1	0.417	0.045	0.018	0.010		
4	2	Lateral drainage	0.276		0.85	0.01	0.005	10.96	630 / 135	vary
5	4	Geomembrane liner	0.060	35				2E-13		
6	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
7	2	Lateral drainage	0.167		0.850	0.010	0.005	3.20	630 / 135	vary
8	4	Geomembrane liner	0.060	35				2E-13		
9	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
10	1	Vertical percolation	120.000	5	0.457	0.131	0.058	0.001		

INPUT DATA, CASE 3
LINER SYSTEM WITH 95 FT OF WASTE AND COVER SYSTEM

WEATHER DATA AND SOIL LAYERS PROPERTIES

A. Evapotranspiration data

Data	Value	Units
Nearby city	Orlando	
State	Florida	
Latitude	27.8	
Evaporative zone depth	24	in
bare	10	
fair	22	
excellent	40	
Maximum leaf area index	5	
bare ground	0	
poor stand of grass	1	
fair stand of grass	2	
good stand of grass	3.5	
excellent stand of grass	5	
Growing season start day	0	
Growing season end day	367	
Average wind speed	8.6	mph
First quarter relative humidity	72	%
Second quarter relative humidity	72	%
Third quarter relative humidity	80	%
Fourth quarter relative humidity	76	%

B. Precipitation

Data	Value
Nearby city	Fort Drum
State	Florida
Years for data generatior	25

C. Temperature

Data	Value
Nearby city	Orlando
State	Florida
Years for data generatior	25

Normal mean monthly temperature (ºF)

January	60.5	July	82.4
February	61.5	August	82.5
March	66.8	September	81.1
April	72	October	74.9
May	77.3	November	67.5
June	80.9	December	62

D. Solar Radiation

Data	Value
Nearby city	Orlando
State	Florida
Years for data generation	25

E. Geomembrane and Area

Placement of geomembrane	good
Pinhole (# of defects/area)	2
Defect density per acre	2
Area assumed in program (acre)	1
Total area (cell 1)	18.04

Runoff curve number

Soil texture	4	Topsoil
Vegetation	5	excellent grass

Variables

Area of runoff	vary	%
Bottom slope	vary	%

	5%	25%
Liner path (average)=	630	135
Surface slope length (average)=	765	236

F. Properties of soil layers
Cover system with 25 percent surface slope

Layer	Type	Description	Thickness in	Texture number	Porosity vol/vol	Field cap. vol/vol	Wilting point vol/vol	k cm/sec	Length Drain ft	Slope %	
1	1	Vertical percolation	6	4	0.437	0.105	0.047	0.0017			Cover system 25 % surface slope
2	1	Vertical percolation	18	3	0.457	0.083	0.033	0.0031			
3	2	Lateral drainage	0.306		0.85	0.01	0.005	14.14	236	25	
4	4	Geomembrane liner	0.060	35				2E-13			
5	1	Vertical percolation	12	1	0.417	0.045	0.018	0.01			Liner system
6	1	Vertical percolation	1140	18	0.168	0.073	0.019	0.001			
7	1	Vertical percolation	24	1	0.417	0.045	0.018	0.010			
8	2	Lateral drainage	0.276		0.85	0.01	0.005	4.61	135	vary	
9	4	Geomembrane liner	0.060	35				2E-13			
10	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09			
11	2	Lateral drainage	0.167		0.850	0.010	0.005	1.35	135	vary	
12	4	Geomembrane liner	0.060	35				2E-13			
13	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09			
14	1	Vertical percolation	120.000	5	0.457	0.131	0.058	0.001			

Cover system with 5 percent surface slope

Layer	Type	Description	Thickness in	Texture number	Porosity vol/vol	Field cap. vol/vol	Wilting point vol/vol	k cm/sec	Length Drain ft	Slope %
1	1	Vertical percolation	6	4	0.437	0.105	0.047	0.0017		
2	1	Vertical percolation	18	3	0.457	0.083	0.033	0.0031		
3	4	Geomembrane liner	0.060	35				2E-13		
4	1	Vertical percolation	12	1	0.417	0.045	0.018	0.01		
5	1	Vertical percolation	1140	18	0.168	0.073	0.019	0.001		
6	1	Vertical percolation	24	1	0.417	0.045	0.018	0.010		
7	2	Lateral drainage	0.276		0.85	0.01	0.005	4.61	630	vary
8	4	Geomembrane liner	0.060	35				2E-13		
9	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
10	2	Lateral drainage	0.167		0.850	0.010	0.005	1.35	630	vary
11	4	Geomembrane liner	0.060	35				2E-13		
12	3	GCL	0.250	17	0.750	0.747	0.400	3.00E-09		
13	1	Vertical percolation	120.000	5	0.457	0.131	0.058	0.001		

Layers 1–3: 3 Cover system, 5 % surface slope

Layers 4–13: Liner system

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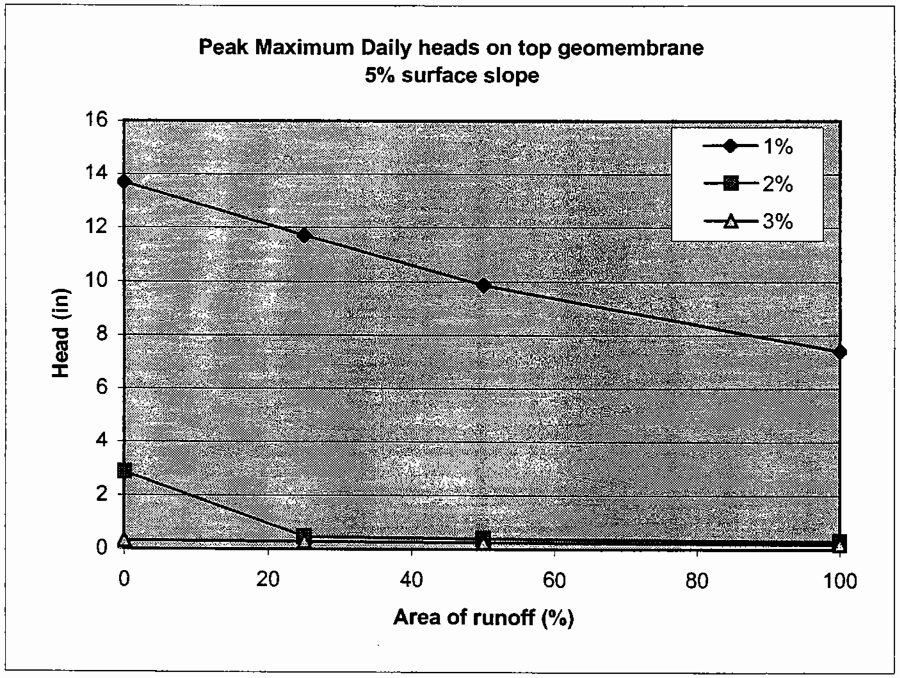
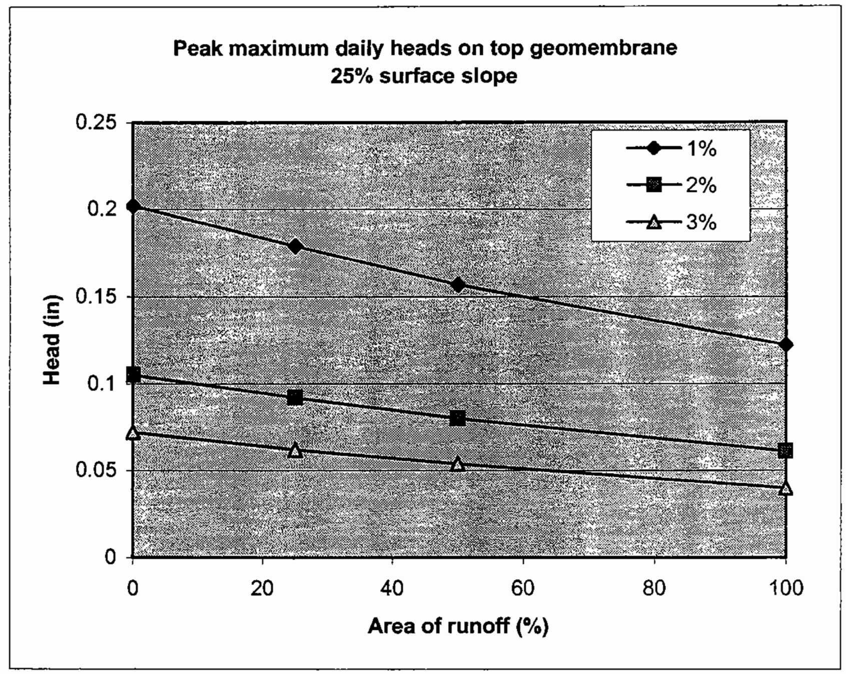
Attachment 5

Results of Parametric Study

RESULTS OF PARAMETRIC STUDY (CASE 1, 10 FT OF WASTE)

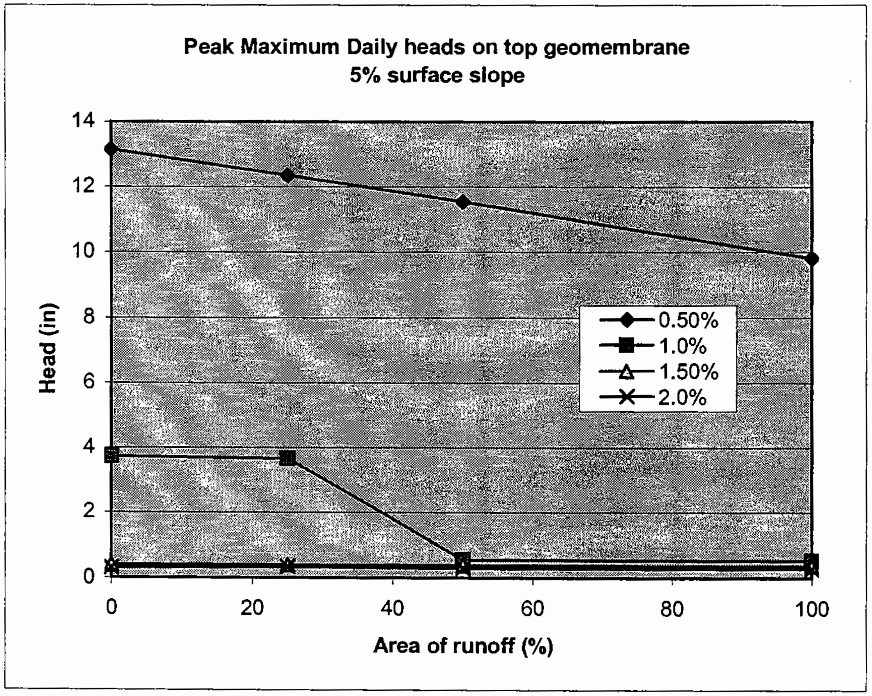
Variable		HEAD 1%			HEAD 2%			HEAD 3%		
Area of Runoff	Slope Surface %	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)
0	5	13.687	9.272	0.029	2.866	1.671	0.009	0.334	0.169	0.006
25	5	11.701	7.694	0.025	0.471	0.239	0.008	0.300	0.152	0.005
50	5	9.867	6.301	0.022	0.405	0.205	0.008	0.263	0.132	0.005
100	5	7.386	4.516	0.017	0.314	0.159	0.007	0.207	0.105	0.005
0	25	0.202	0.106	0.004	0.105	0.053	0.002	0.072	0.036	0.001
25	25	0.179	0.093	0.003	0.092	0.047	0.002	0.062	0.031	0.001
50	25	0.157	0.081	0.003	0.08	0.041	0.002	0.054	0.027	0.001
100	25	0.122	0.063	0.003	0.061	0.031	0.001	0.040	0.020	0.001

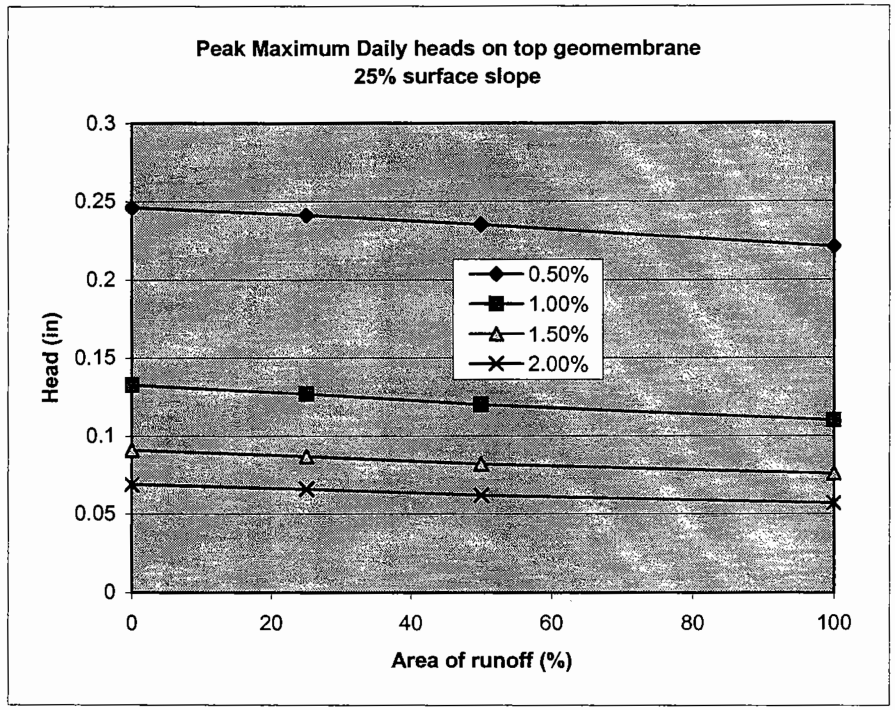




RESULTS OF PARAMETRIC STUDY (CASE 2-A, 30 FT OF WASTE)

Variable		HEAD 0.5%			HEAD 1%			HEAD 1.5%			HEAD 2%		
Area of Runoff	Slope Surface %	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)
0	5	13.144	10.282	0.119	3.730	2.120	0.017	0.405	0.206	0.011	0.310	0.156	0.008
25	5	12.348	9.541	0.106	3.663	2.102	0.016	0.397	0.202	0.011	0.34	0.154	0.008
50	5	11.538	8.789	0.094	0.556	0.287	0.016	0.39	0.198	0.01	0.298	0.151	0.008
100	5	9.806	7.19	0.074	0.526	0.271	0.015	0.37	0.188	0.01	0.285	0.144	0.008
0	25	0.246	0.134	0.007	0.133	0.069	0.003	0.091	0.046	0.002	0.069	0.035	0.002
25	25	0.241	0.132	0.007	0.127	0.066	0.003	0.087	0.044	0.002	0.066	0.033	0.002
50	25	0.235	0.128	0.007	0.12	0.062	0.003	0.082	0.042	0.002	0.062	0.031	0.002
100	25	0.221	0.12	0.006	0.11	0.057	0.003	0.076	0.039	0.002	0.057	0.029	0.002





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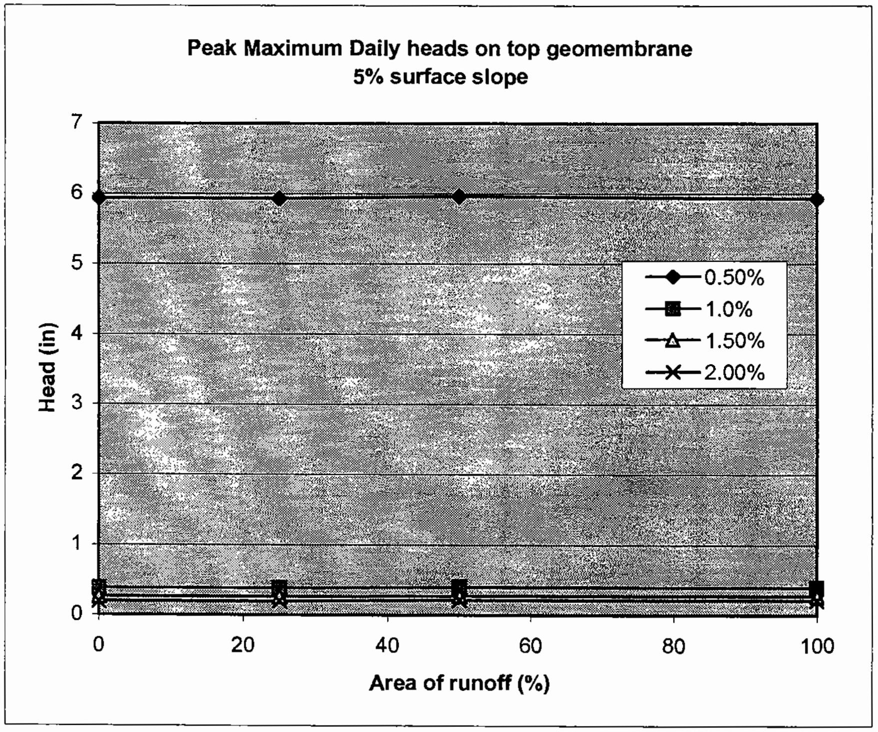
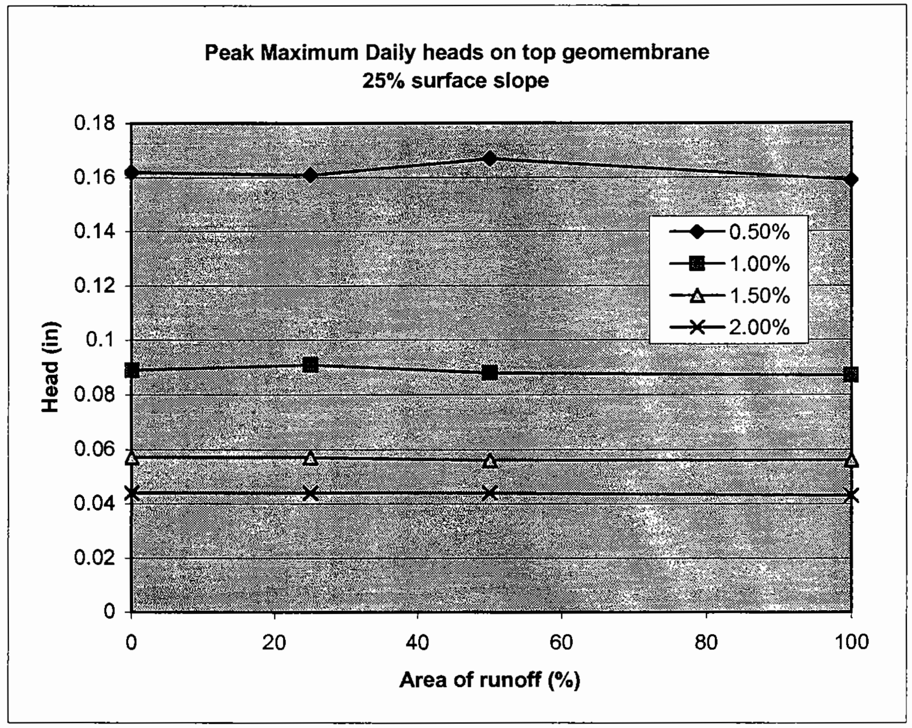
RESULTS OF PARAMETRIC STUDY (CASE 2-B, 60 FT OF WASTE)

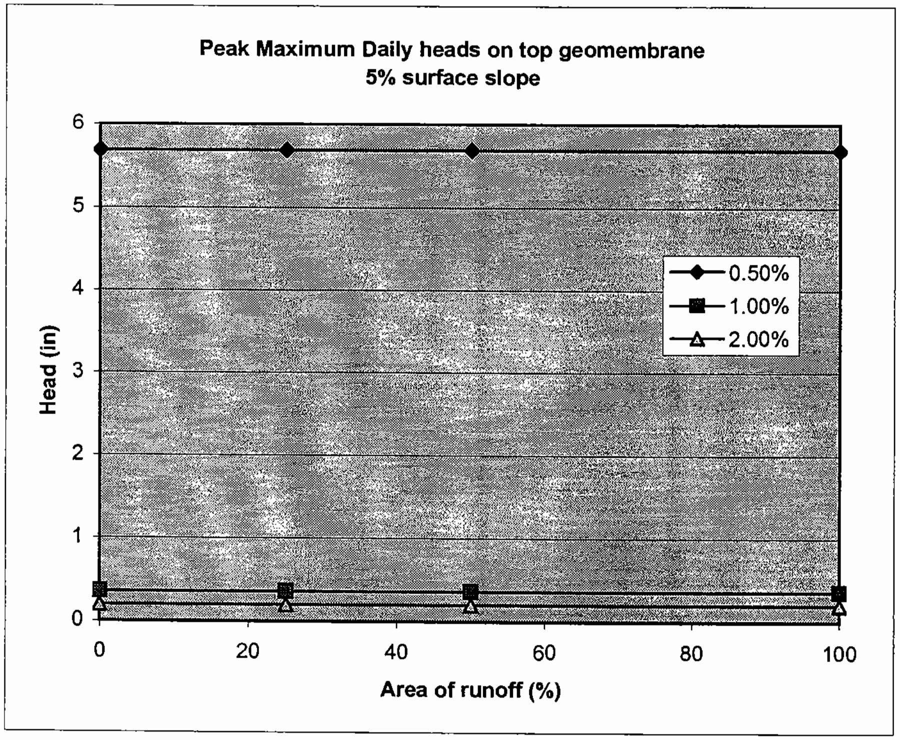
Variable		HEAD 0.5%			HEAD 1%			HEAD 1.5%			HEAD 2%		
Area of Runoff	Slope Surface %	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)
0	5	5.936	3.914	0.038	0.385	0.197	0.014	0.262	0.133	0.009	0.196	0.099	0.007
25	5	5.933	3.912	0.038	0.384	0.196	0.014	0.261	0.132	0.009	0.198	0.099	0.007
50	5	5.961	3.933	0.038	0.401	0.205	0.014	0.271	0.141	0.009	0.217	0.109	0.007
100	5	5.928	3.907	0.038	0.392	0.2	0.014	0.272	0.137	0.009	0.211	0.107	0.007
0	25	0.162	0.086	0.006	0.089	0.046	0.003	0.057	0.029	0.002	0.044	0.022	0.001
25	25	0.161	0.086	0.006	0.091	0.047	0.003	0.057	0.029	0.002	0.044	0.022	0.001
50	25	0.167	0.089	0.006	0.088	0.045	0.003	0.056	0.028	0.002	0.044	0.022	0.001
100	25	0.159	0.085	0.006	0.087	0.045	0.003	0.056	0.028	0.002	0.043	0.022	0.001

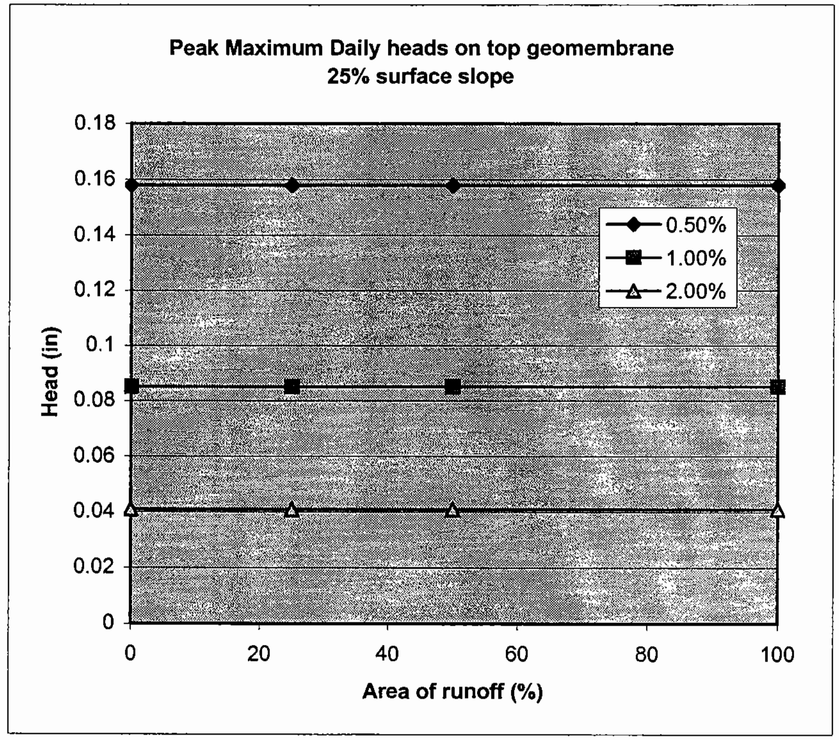




RESULTS OF PARAMETRIC STUDY (CASE 2-C, 95 FT OF WASTE)

Variable		HEAD 0.5%			HEAD 1%			HEAD 2%		
Area of Runoff	Slope Surface %	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)
0	5	5.69	3.723	0.053	0.356	0.182	0.022	0.194	0.098	0.011
25	5	5.69	3.723	0.053	0.356	0.182	0.022	0.194	0.098	0.011
50	5	5.69	3.723	0.053	0.356	0.182	0.022	0.194	0.098	0.011
100	5	5.69	3.723	0.053	0.356	0.182	0.022	0.194	0.098	0.011
0	25	0.158	0.084	0.01	0.085	0.044	0.005	0.041	0.021	0.002
25	25	0.158	0.084	0.01	0.085	0.044	0.005	0.041	0.021	0.002
50	25	0.158	0.084	0.01	0.085	0.044	0.005	0.041	0.021	0.002
100	25	0.158	0.084	0.01	0.085	0.044	0.005	0.041	0.021	0.002





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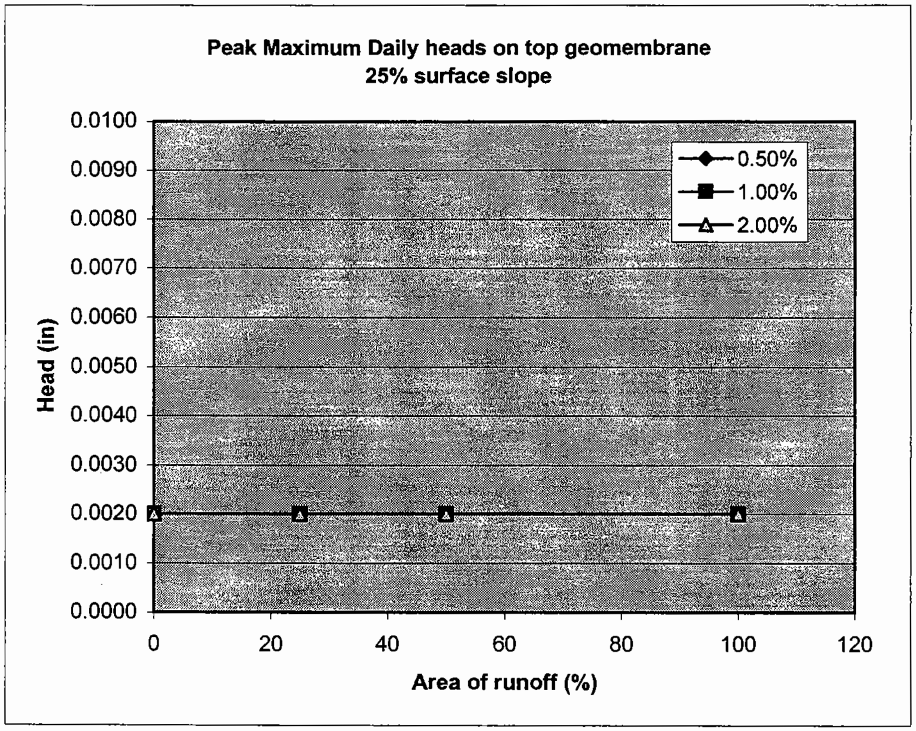
RESULST OF PARAMETRIC STUDY (CASE 3, LINER AND COVER SYSTEM, 95 FT OF WASTE)

Variable		HEAD 0.5%			HEAD 1%			HEAD 2%		
Area of Runoff	Slope Surface %	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)
0	25	0.002	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.000
25	25	0.002	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.000
50	25	0.002	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.000
100	25	0.002	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.000



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Attachment 6

Summary of Results from Help Model for Cases

HELP RESULTS FOR CASES ~~OAK HAMMOCK~~ OHD LANDFILL

Case	File Name	Surface Slope %	Bottom Slope %	Drainage Length (ft)	Slope Length in Surface (ft)	Height Waste ft	Evaporative zone	Runoff %	Leaf Area Index LAI	Vegetation surface	LEACHATE PRIMARY: Peak Daily Lateral Drainage Per Acre (in)	LEACHATE PRIMARY: Peak Daily Lateral Drainage Per Acre (ft^3)	LEACHATE PRIMARY: Peak Daily Lateral Drainage Per Acre (Gal)	LEACHATE SECONDARY: Peak Daily Lateral Drainage Per Acre (in)	LEACHATE SECONDARY: Peak Daily Lateral Drainage Per Acre (ft^3)	LEACHATE SECONDARY: Peak Daily Lateral Drainage Per Acre (Gal)	LEACHATE PRIMARY: Average Annual Total Lateral Drainage Per Acre (in)	LEACHATE PRIMARY: Average Annual Total Lateral Drainage Per Acre (ft^3)	LEACHATE PRIMARY: Average Annual Total Lateral Drainage Per Acre (Gal)	LEACHATE SECONDARY: Average Annual Total Lateral Drainage Per Acre (in)	LEACHATE SECONDARY: Average Annual Total Lateral Drainage Per Acre (ft^3)	LEACHATE SECONDARY: Average Annual Total Lateral Drainage Per Acre (Gal)
1 10'	Case1	5	2	630	765	10	12	0	0, bare ground	1, bare ground	1.07	3881.78	29037.70	0.0000	0.0018	0.013	12.24	44441.83	332447.99	0.0000	0.003	0.022
		25	2	135	236	10	12	0	0,bare ground	1, bare ground	0.98	3559.48	26626.72	0.0000	0.00005	0.00037	12.24	44418.82	332275.85	0.0000	0.007	0.052
2-A 30'	Case230	5	1.5	630	765	30	22	25	1, poor grass	2, poor grass	0.34	1239.56	9272.53	0.00000	0.0002	0.0013	6.61	24112.22	180371.91	0.0000	0.003	0.022
		25	1.5	135	236	30	22	25	1, poor grass	2, poor grass	0.35	1268.06	9485.73	0.00000	0.0000	0.00022	6.56	23816.19	178157.45	0.0000	0.001	0.007
2-B 60'	Case260	5	1.5	630	765	60	22	50	2, fair grass	3, fair grass	0.22	811.81	6072.79	0.00000	0.0001	0.00082	5.33	19341.81	144686.78	0.0000	0.003	0.022
95'		25	1.5	135	236	60	22	50	2, fair grass	3, fair grass	0.21	766.93	5737.03	0.00000	0.0000	0.00015	5.20	18862.09	141098.20	0.0000	0.001	0.007
2-C	Case295	5	1	630	765	95	22	100	3.5, good grass	4, good grass	0.18	650.80	4868.33	0.00000	0.0001	0.0010	8.03	29141.85	217996.19	0.0000	0.007	0.052
		25	1	135	236	95	22	100	3.5, good grass	4, good grass	0.20	728.46	5449.28	0.00000	0.0000	0.00015	8.01	29073.53	217485.07	0.0000	0.001	0.007
3 95'	Case95A	5	1	630	765	95	24	100	5, excellent grass	5, excellent grass	0.00	0.046	0.35	0.00000	0.00000	0.000000	0.00042	1.51	11.29	0.0000	0.0000	0.0000
	Case95B	25	1	135	236	95	24	100	5, excellent grass	5, excellent grass	0.00	0.00001	0.0001	0.00000	0.00000	0.000000	0.00000	0.002	0.015	0.0000	0.0000	0.0000

Case	Surface Slope %	Height Waste ft	LEAKAGE SECONDARY GEOCOMPOSITE CLAY LINER: Peak Daily Leakage to Groundwater Per Acre (in)	Peak Daily Leakage to Groundwater Per Acre (ft^3)	Peak Daily Leakage to Groundwater Per Acre (Gal)	Average Annual Total Leakage to Groundwater Per Acre (in)	Average Annual Total Leakage to Groundwater Per Acre (ft^3)	Average Annual Total Leakage to Groundwater Per Acre (Gal)	HEADS PRIMARY: Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)	Giroud's Method (in)	HEADS SECONDARY: Peak Day Max Head (in)	Peak Day Average Head (in)	Average Annual Total Head (in)
1	5	10	0.00000	0.00002	0.00015	0.00000	0.009	0.0673	2.87	1.67	0.0090	0.017	0.061	0.0000	0.0000
	25	10	0.00000	0.00001	0.000075	0.00000	0.002	0.0150	0.11	0.053	0.0020	0.0036	0.0020	0.0000	0.0000
2-A	5	30	0.00000	0.00002	0.00015	0.00000	0.009	0.0673	0.40	0.20	0.011	0.021	0.0310	0.0000	0.0000
	25	30	0.00000	0.00002	0.00015	0.00000	0.008	0.0598	0.09	0.044	0.0020	0.0046	0.0030	0.00000	0.00000
2-B	5	60	0.00000	0.00002	0.00015	0.00000	0.009	0.0673	0.28	0.14	0.0090	0.018	0.0290	0.00000	0.0000
	25	60	0.00000	0.00002	0.00015	0.00000	0.009	0.0673	0.06	0.028	0.0020	0.0038	0.0030	0.00000	0.00000
2-C	5	95	0.00000	0.00002	0.00015	0.00000	0.009	0.0673	0.36	0.18	0.0220	0.045	0.0450	0.00000	0.00000
	25	95	0.00000	0.00002	0.00015	0.00000	0.009	0.0673	0.09	0.044	0.0050	0.0095	0.0040	0.00000	0.00000
3	5	95	0.00000	0.00002	0.00015	0.00000	0.008	0.060	0.00000	0.00000	0.00000	0.0000	0.0050	0.00000	0.00000
	25	95	0.00000	0.00001	0.000075	0.00000	0.002	0.015	0.002	0.00000	0.00000	0.0000	0.0010	0.00000	0.00000

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Attachment 7

Help Model Outputs for Cases

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CASE 1 WITH 5% SURFACE SLOPE

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******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**               HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                 **
**                DEVELOPED BY ENVIRONMENTAL LABORATORY                     **
**                  USAE WATERWAYS EXPERIMENT STATION                       **
**           FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                **
**                                                                          **
**                                                                          **
******************************************************************************
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```
PRECIPITATION DATA FILE:    C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:      C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.D7
SOLAR RADIATION DATA FILE:  C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.D13
EVAPOTRANSPIRATION DATA:    C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.D11
SOIL AND DESIGN DATA FILE:  C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.D10
OUTPUT DATA FILE:           C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.OUT
```

TIME: 14:46   DATE: 3/18/2002

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******************************************************************************

     TITLE:  Oak Hammock Disposal Facility

******************************************************************************
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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

```
                          LAYER  1
                          --------

               TYPE 1 - VERTICAL PERCOLATION LAYER
                  MATERIAL TEXTURE NUMBER  18
     THICKNESS                    =     120.00   INCHES
     POROSITY                     =       0.6710 VOL/VOL
     FIELD CAPACITY               =       0.2920 VOL/VOL
     WILTING POINT                =       0.0770 VOL/VOL
     INITIAL SOIL WATER CONTENT   =       0.2780 VOL/VOL
     EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC

                          LAYER  2
                          --------
```

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00 INCHES
POROSITY	=	0.4170 VOL/VOL
FIELD CAPACITY	=	0.0450 VOL/VOL
WILTING POINT	=	0.0180 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0809 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02 CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.30 INCHES
POROSITY	=	0.8500 VOL/VOL
FIELD CAPACITY	=	0.0100 VOL/VOL
WILTING POINT	=	0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0124 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	21.8899994000 CM/SEC
SLOPE	=	2.00 PERCENT
DRAINAGE LENGTH	=	630.0 FEET

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06 INCHES
POROSITY	=	0.0000 VOL/VOL
FIELD CAPACITY	=	0.0000 VOL/VOL
WILTING POINT	=	0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY	=	2.00 HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00 HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08 CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.18	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	11.0500002000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	630.0	FEET

LAYER 7

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 8

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 9

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	120.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1310	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #18 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 5.% AND A SLOPE LENGTH OF 765. FEET.

SCS RUNOFF CURVE NUMBER	=	79.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	1.821	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	8.052	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.924	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	51.400	INCHES
TOTAL INITIAL WATER	=	51.400	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Fort Drum Florida WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING

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CASE1.OUT

COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	2.045	2.394	2.818	2.779	3.708	5.446
	5.346	4.891	4.436	3.171	2.043	1.801
STD. DEVIATIONS	0.771	0.927	1.467	1.253	1.366	1.467
	1.146	1.205	1.079	0.932	0.844	0.708
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.2001	0.4109	0.5430	0.5308	0.3503	1.0519
	2.3688	2.2127	1.8493	1.7590	0.7028	0.2634
STD. DEVIATIONS	0.2668	0.7727	0.8358	0.6444	0.4759	1.2732
	3.1155	1.7328	1.4808	1.6775	0.7811	0.1811
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED FROM LAYER 6						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0016	0.0037	0.0044	0.0045	0.0029	0.0089
	0.0223	0.0181	0.0157	0.0144	0.0059	0.0022
STD. DEVIATIONS	0.0022	0.0069	0.0068	0.0055	0.0039	0.0108
	0.0376	0.0142	0.0125	0.0137	0.0066	0.0015

DAILY AVERAGE HEAD ON TOP OF LAYER 7

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	53.22 (8.197)	193201.7	100.00
RUNOFF	0.000 (0.0000)	0.00	0.000
EVAPOTRANSPIRATION	40.877 (4.0128)	148384.42	76.803
LATERAL DRAINAGE COLLECTED FROM LAYER 3	12.24293 (6.00999)	44441.832	23.00282
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00000 (0.00000)	0.011	0.00001
AVERAGE HEAD ON TOP OF LAYER 4	0.009 (0.005)		

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LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.00000 (	0.00000)	0.003	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00000 (	0.00000)	0.009	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000 (	0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (	0.00001)	0.005	0.00000
CHANGE IN WATER STORAGE	0.103 (	0.9818)	375.39	0.194

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 3	1.06936	3881.77637
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000001	0.00248
AVERAGE HEAD ON TOP OF LAYER 4	1.671	
MAXIMUM HEAD ON TOP OF LAYER 4	2.866	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	37.7 FEET	
DRAINAGE COLLECTED FROM LAYER 6	0.00000	0.00180
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000000	0.00002 0.000025
AVERAGE HEAD ON TOP OF LAYER 7	0.000	
MAXIMUM HEAD ON TOP OF LAYER 7	0.061	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000038	0.13712
SNOW WATER	0.00	0.0000
MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.6355	
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0777	

*** Maximum heads are computed using McEnroe's equations. ***

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CASE1.OUT

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	34.5808	0.2882
2	3.2802	0.1367
3	0.0274	0.0921
4	0.0000	0.0000
5	0.1875	0.7500
6	0.0018	0.0100
7	0.0000	0.0000
8	0.1875	0.7500
9	15.7200	0.1310
SNOW WATER	0.000	

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CASE 1 WITH 25% OF SURFACE SLOPE

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******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                 DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                   USAE WATERWAYS EXPERIMENT STATION                      **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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```
PRECIPITATION DATA FILE:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:       C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.D7
SOLAR RADIATION DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.D13
EVAPOTRANSPIRATION DATA:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.D11
SOIL AND DESIGN DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.D10
OUTPUT DATA FILE:            C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE1.OUT
```

TIME: 14:49   DATE: 3/18/2002

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TITLE: Oak Hammock Disposal Facility

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

```
THICKNESS                  =    120.00    INCHES
POROSITY                   =      0.6710  VOL/VOL
FIELD CAPACITY             =      0.2920  VOL/VOL
WILTING POINT              =      0.0770  VOL/VOL
INITIAL SOIL WATER CONTENT =      0.2782  VOL/VOL
EFFECTIVE SAT. HYD. COND.  =  0.100000005000E-02 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0809	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.30	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0105	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	21.8899994000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	135.0	FEET

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.18	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	11.0500002000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	135.0	FEET

LAYER 7

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 8

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 9

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	120.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1310	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #18 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 25.% AND A SLOPE LENGTH OF 236. FEET.

SCS RUNOFF CURVE NUMBER	=	81.40	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	1.849	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	8.052	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.924	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	51.428	INCHES
TOTAL INITIAL WATER	=	51.428	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Fort Drum Florida WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA

AND STATION LATITUDE = 27.80 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	2.042	2.394	2.822	2.778	3.709	5.446
	5.347	4.892	4.437	3.171	2.042	1.801
STD. DEVIATIONS	0.770	0.925	1.465	1.253	1.369	1.469
	1.143	1.204	1.076	0.931	0.844	0.707
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.2027	0.4151	0.5434	0.5231	0.3472	1.0286
	2.3538	2.2154	1.8371	1.7890	0.7169	0.2643
STD. DEVIATIONS	0.2792	0.7721	0.8372	0.6378	0.4705	1.2585
	3.1338	1.7515	1.4542	1.7257	0.7959	0.1853
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED FROM LAYER 6						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0004	0.0008	0.0010	0.0009	0.0006	0.0019
	0.0041	0.0039	0.0033	0.0031	0.0013	0.0005
STD. DEVIATIONS	0.0005	0.0015	0.0015	0.0012	0.0008	0.0023
	0.0055	0.0031	0.0026	0.0030	0.0014	0.0003

DAILY AVERAGE HEAD ON TOP OF LAYER 7

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	53.22 (8.197)	193201.7	100.00
RUNOFF	0.000 (0.0000)	0.00	0.000
EVAPOTRANSPIRATION	40.881 (4.0237)	148397.92	76.810
LATERAL DRAINAGE COLLECTED FROM LAYER 3	12.23659 (6.01597)	44418.820	22.99091
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00000 (0.00000)	0.009	0.00000
AVERAGE HEAD ON TOP OF LAYER 4	0.002 (0.001)		
LATERAL DRAINAGE COLLECTED	0.00000 (0.00000)	0.007	0.00000

FROM LAYER 6				
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00000 (	0.00000)	0.002	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000 (	0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (	0.00000)	0.000	0.00000
CHANGE IN WATER STORAGE	0.106 (	0.9827)	384.90	0.199

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 3	0.98057	3559.47510
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00006
AVERAGE HEAD ON TOP OF LAYER 4	0.053	
MAXIMUM HEAD ON TOP OF LAYER 4	0.105	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	2.1 FEET	
DRAINAGE COLLECTED FROM LAYER 6	0.00000	0.00005
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000000	0.00001
AVERAGE HEAD ON TOP OF LAYER 7	0.000	
MAXIMUM HEAD ON TOP OF LAYER 7	0.002	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000000	0.00000
SNOW WATER	0.00	0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.5002

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0770

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	34.6689	0.2889
2	3.3044	0.1377
3	0.0083	0.0278
4	0.0000	0.0000
5	0.1875	0.7500
6	0.0018	0.0100
7	0.0000	0.0000
8	0.1875	0.7500
9	15.7200	0.1310
SNOW WATER	0.000	

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CASE 2-A WITH 5% SURFACE SLOPE

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                 HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)               **
**                 DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                   USAE WATERWAYS EXPERIMENT STATION                      **
**              FOR USEPA RISK REDUCTION ENGINEERING LABORATORY             **
**                                                                          **
**                                                                          **
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```
PRECIPITATION DATA FILE:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:       C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.D7
SOLAR RADIATION DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.D13
EVAPOTRANSPIRATION DATA:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.D11
SOIL AND DESIGN DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.D10
OUTPUT DATA FILE:            C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.OUT
```

TIME: 14:42   DATE: 3/18/2002

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******************************************************************************

     TITLE:  Oak Hammock Disposal Facility

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

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                   TYPE 1 - VERTICAL PERCOLATION LAYER
                        MATERIAL TEXTURE NUMBER 18
       THICKNESS                   =     360.00   INCHES
       POROSITY                    =       0.6710 VOL/VOL
       FIELD CAPACITY              =       0.2920 VOL/VOL
       WILTING POINT               =       0.0770 VOL/VOL
       INITIAL SOIL WATER CONTENT  =       0.2846 VOL/VOL
       EFFECTIVE SAT. HYD. COND.   =   0.100000005000E-02 CM/SEC
     NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  1.80
            FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

CASE230.OUT

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0910	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.29	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0155	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	12.5400000000	CM/SEC
SLOPE	=	1.50	PERCENT
DRAINAGE LENGTH	=	630.0	FEET

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.18	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	5.44000006000	CM/SEC
SLOPE	=	1.50	PERCENT
DRAINAGE LENGTH	=	630.0	FEET

LAYER 7

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 8

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 9

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	120.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1310	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #18 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 25.% AND A SLOPE LENGTH OF 236. FEET.

SCS RUNOFF CURVE NUMBER	=	74.70	
FRACTION OF AREA ALLOWING RUNOFF	=	25.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.750	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	14.762	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.694	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	120.732	INCHES
TOTAL INITIAL WATER	=	120.732	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	1.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Fort Drum Florida WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

CASE230.OUT

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.013	0.001	0.003	0.000	0.020	0.045
	0.030	0.013	0.051	0.007	0.000	0.000
STD. DEVIATIONS	0.046	0.002	0.008	0.001	0.045	0.084
	0.101	0.026	0.104	0.029	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	2.097	2.519	3.155	3.439	4.664	6.085
	6.112	5.719	4.911	3.643	2.241	1.784
STD. DEVIATIONS	0.691	0.918	1.383	1.242	1.178	1.573
	0.976	0.860	0.783	0.787	0.725	0.664
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.1103	0.1580	0.3218	0.3334	0.2280	0.2650
	0.6558	1.1065	1.0588	1.3572	0.7533	0.2069
STD. DEVIATIONS	0.0564	0.2649	0.7070	0.5696	0.3977	0.5590
	1.0520	1.4751	1.3214	1.2759	1.0194	0.1858
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED FROM LAYER 6						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0021	0.0033	0.0061	0.0066	0.0043	0.0052
	0.0125	0.0211	0.0209	0.0259	0.0148	0.0039
STD. DEVIATIONS	0.0011	0.0056	0.0135	0.0112	0.0076	0.0110
	0.0201	0.0281	0.0260	0.0243	0.0201	0.0035

DAILY AVERAGE HEAD ON TOP OF LAYER 7

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	53.22 (8.197)	193201.7	100.00
RUNOFF	0.184 (0.2173)	667.90	0.346
EVAPOTRANSPIRATION	46.370 (4.2166)	168321.33	87.122
LATERAL DRAINAGE COLLECTED FROM LAYER 3	6.55507 (5.46232)	23794.895	12.31609
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00000 (0.00000)	0.012	0.00001
AVERAGE HEAD ON TOP	0.011 (0.009)		

OF LAYER 4				
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.00000 (	0.00000)	0.003	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00000 (	0.00000)	0.009	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000 (	0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (	0.00001)	0.005	0.00000
CHANGE IN WATER STORAGE	0.115 (	1.3086)	417.51	0.216

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.358	1300.0316
DRAINAGE COLLECTED FROM LAYER 3	0.33985	1233.67163
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00021
AVERAGE HEAD ON TOP OF LAYER 4	0.201	
MAXIMUM HEAD ON TOP OF LAYER 4	0.395	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	10.1 FEET	
DRAINAGE COLLECTED FROM LAYER 6	0.00000	0.00017
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000000	0.00002
AVERAGE HEAD ON TOP OF LAYER 7	0.000	
MAXIMUM HEAD ON TOP OF LAYER 7	0.031	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000038	0.13712
SNOW WATER	0.00	0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4737

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0770

110/223

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	105.0953	0.2919
2	2.4123	0.1005
3	0.0030	0.0101
4	0.0000	0.0000
5	0.1875	0.7500
6	0.0018	0.0100
7	0.0000	0.0000
8	0.1875	0.7500
9	15.7200	0.1310
SNOW WATER	0.000	

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CASE 2-A WITH 25% SURFACE SLOPE

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**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**             HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                   **
**              DEVELOPED BY ENVIRONMENTAL LABORATORY                       **
**                 USAE WATERWAYS EXPERIMENT STATION                        **
**          FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                 **
**                                                                          **
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PRECIPITATION DATA FILE:      C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:        C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.D7
SOLAR RADIATION DATA FILE:    C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.D13
EVAPOTRANSPIRATION DATA:      C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.D11
SOIL AND DESIGN DATA FILE:    C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.D10
OUTPUT DATA FILE:             C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE230.OUT
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TIME: 14:37   DATE: 3/18/2002

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     TITLE:  Oak Hammock Disposal Facility

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

```
THICKNESS                  =    360.00   INCHES
POROSITY                   =      0.6710 VOL/VOL
FIELD CAPACITY             =      0.2920 VOL/VOL
WILTING POINT              =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT =      0.2848 VOL/VOL
EFFECTIVE SAT. HYD. COND.  =  0.100000005000E-02 CM/SEC
```

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 1.80 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0909	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.29	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0115	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	12.5400000000	CM/SEC
SLOPE	=	1.50	PERCENT
DRAINAGE LENGTH	=	135.0	FEET

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.18	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	5.44000006000	CM/SEC
SLOPE	=	1.50	PERCENT
DRAINAGE LENGTH	=	135.0	FEET

LAYER 7

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 8

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 9

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	120.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1310	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #18 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 25.% AND A SLOPE LENGTH OF 236. FEET.

SCS RUNOFF CURVE NUMBER	=	74.70	
FRACTION OF AREA ALLOWING RUNOFF	=	25.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.816	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	14.762	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.694	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	120.794	INCHES
TOTAL INITIAL WATER	=	120.794	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	1.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Fort Drum Florida WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

115/223

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.014	0.001	0.003	0.000	0.020	0.046
	0.031	0.013	0.052	0.008	0.000	0.000
STD. DEVIATIONS	0.048	0.002	0.008	0.001	0.047	0.086
	0.098	0.026	0.105	0.029	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	2.096	2.522	3.169	3.435	4.650	6.089
	6.105	5.715	4.909	3.643	2.239	1.790
STD. DEVIATIONS	0.699	0.921	1.377	1.236	1.184	1.572
	0.981	0.853	0.779	0.791	0.724	0.660
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.1123	0.1499	0.3489	0.3303	0.2309	0.2620
	0.6262	1.1163	1.0459	1.3674	0.7514	0.2195
STD. DEVIATIONS	0.0606	0.2383	0.7644	0.5468	0.4060	0.5548
	0.9928	1.5037	1.3005	1.2903	1.0311	0.2208
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED FROM LAYER 6						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0005	0.0007	0.0014	0.0014	0.0009	0.0011
	0.0026	0.0046	0.0044	0.0056	0.0032	0.0009
STD. DEVIATIONS	0.0002	0.0011	0.0031	0.0023	0.0017	0.0023
	0.0041	0.0061	0.0055	0.0053	0.0044	0.0009

DAILY AVERAGE HEAD ON TOP OF LAYER 7

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.22	(8.197)	193201.7	100.00
RUNOFF	0.188	(0.2172)	680.81	0.352
EVAPOTRANSPIRATION	46.362	(4.2265)	168292.52	87.107
LATERAL DRAINAGE COLLECTED FROM LAYER 3	6.56093	(5.50380)	23816.187	12.32711
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00000	(0.00000)	0.009	0.00000
AVERAGE HEAD ON TOP	0.002	(0.002)		

OF LAYER 4				
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.00000 (	0.00000)	0.001	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00000 (	0.00000)	0.008	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000 (	0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (	0.00001)	0.005	0.00000
CHANGE IN WATER STORAGE	0.114 (	1.3188)	412.14	0.213

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.360	1306.5647
DRAINAGE COLLECTED FROM LAYER 3	0.34933	1268.05701
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00006
AVERAGE HEAD ON TOP OF LAYER 4	0.044	
MAXIMUM HEAD ON TOP OF LAYER 4	0.087	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	2.3 FEET	
DRAINAGE COLLECTED FROM LAYER 6	0.00000	0.00003
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000000	0.00002
AVERAGE HEAD ON TOP OF LAYER 7	0.000	
MAXIMUM HEAD ON TOP OF LAYER 7	0.003	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000038	0.13713
SNOW WATER	0.00	0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4738
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0770

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	105.1641	0.2921
2	2.3690	0.0987
3	0.0030	0.0100
4	0.0000	0.0000
5	0.1875	0.7500
6	0.0018	0.0100
7	0.0000	0.0000
8	0.1875	0.7500
9	15.7200	0.1310
SNOW WATER	0.000	

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CASE 2-B WITH 5% OF SURFACE SLOPE

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**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                 DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                   USAE WATERWAYS EXPERIMENT STATION                      **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:      C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:        C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.D7
SOLAR RADIATION DATA FILE:    C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.D13
EVAPOTRANSPIRATION DATA:      C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.D11
SOIL AND DESIGN DATA FILE:    C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.D10
OUTPUT DATA FILE:             C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.OUT


TIME:  14:55     DATE:   3/18/2002


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     TITLE:  Oak Hammock Disposal Facility

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                        TYPE 1 - VERTICAL PERCOLATION LAYER
                           MATERIAL TEXTURE NUMBER  18
           THICKNESS                    =     720.00   INCHES
           POROSITY                     =       0.6710 VOL/VOL
           FIELD CAPACITY               =       0.2920 VOL/VOL
           WILTING POINT                =       0.0770 VOL/VOL
           INITIAL SOIL WATER CONTENT   =       0.2868 VOL/VOL
           EFFECTIVE SAT. HYD. COND.    =   0.100000005000E-02 CM/SEC
         NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  3.00
                  FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0818	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.29	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0167	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	11.7900000000	CM/SEC
SLOPE	=	1.50	PERCENT
DRAINAGE LENGTH	=	630.0	FEET

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.17	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	3.93799996000	CM/SEC
SLOPE	=	1.50	PERCENT
DRAINAGE LENGTH	=	630.0	FEET

LAYER 7

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 8

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 9

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	120.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1310	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #18 WITH A FAIR STAND OF GRASS, A SURFACE SLOPE OF 5.% AND A SLOPE LENGTH OF 765. FEET.

SCS RUNOFF CURVE NUMBER	=	54.20	
FRACTION OF AREA ALLOWING RUNOFF	=	50.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	2.652	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	14.762	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.694	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	224.532	INCHES
TOTAL INITIAL WATER	=	224.532	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	2.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Fort Drum Florida WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

CASE260.OUT

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.001
	0.003	0.000	0.004	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.005
	0.014	0.000	0.014	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	1.981	2.845	3.607	3.599	4.088	6.134
	6.351	5.928	5.048	3.990	2.435	1.723
STD. DEVIATIONS	0.632	0.790	1.412	1.693	1.589	1.768
	1.094	0.879	0.819	0.780	0.784	0.610
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.1234	0.0891	0.3285	0.1727	0.1021	0.1429
	0.3736	0.8713	0.9219	1.1631	0.6805	0.3593
STD. DEVIATIONS	0.1731	0.1082	0.7356	0.4225	0.2098	0.3432
	0.6636	1.3126	1.1287	1.2002	0.9909	0.7251
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED FROM LAYER 6						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0025	0.0020	0.0067	0.0036	0.0021	0.0030
	0.0076	0.0177	0.0193	0.0236	0.0143	0.0073
STD. DEVIATIONS	0.0035	0.0024	0.0149	0.0089	0.0043	0.0072
	0.0135	0.0266	0.0236	0.0243	0.0208	0.0147

DAILY AVERAGE HEAD ON TOP OF LAYER 7

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	53.22 (8.197)	193201.7	100.00
RUNOFF	0.008 (0.0194)	29.34	0.015
EVAPOTRANSPIRATION	47.727 (4.7152)	173250.69	89.674
LATERAL DRAINAGE COLLECTED FROM LAYER 3	5.32832 (4.62174)	19341.809	10.01120
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00000 (0.00000)	0.011	0.00001
AVERAGE HEAD ON TOP	0.009 (0.008)		

OF LAYER 4				
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.00000 (	0.00000)	0.003	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00000 (	0.00000)	0.009	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000 (	0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (	0.00001)	0.005	0.00000
CHANGE IN WATER STORAGE	0.160 (	1.1948)	579.83	0.300

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.062	225.9028
DRAINAGE COLLECTED FROM LAYER 3	0.22364	811.81348
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00015
AVERAGE HEAD ON TOP OF LAYER 4	0.141	
MAXIMUM HEAD ON TOP OF LAYER 4	0.278	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	7.6 FEET	
DRAINAGE COLLECTED FROM LAYER 6	0.00000	0.00011
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000000	0.00002
AVERAGE HEAD ON TOP OF LAYER 7	0.000	
MAXIMUM HEAD ON TOP OF LAYER 7	0.029	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000038	0.13712
SNOW WATER	0.00	0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4611
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0770

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	209.7150	0.2913
2	2.7106	0.1129
3	0.0029	0.0100
4	0.0000	0.0000
5	0.1875	0.7500
6	0.0017	0.0100
7	0.0000	0.0000
8	0.1875	0.7500
9	15.7200	0.1310
SNOW WATER	0.000	

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CASE260.OUT

CASE 2-B WITH 25% OF SURFACE SLOPE

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**             HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                   **
**              DEVELOPED BY ENVIRONMENTAL LABORATORY                       **
**                USAE WATERWAYS EXPERIMENT STATION                         **
**          FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                 **
**                                                                          **
**                                                                          **
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```
PRECIPITATION DATA FILE:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:       C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.D7
SOLAR RADIATION DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.D13
EVAPOTRANSPIRATION DATA:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.D11
SOIL AND DESIGN DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.D10
OUTPUT DATA FILE:            C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE260.OUT
```

TIME: 14:52   DATE: 3/18/2002

****

TITLE: Oak Hammock Disposal Facility

****

NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

```
THICKNESS                  =     720.00    INCHES
POROSITY                   =       0.6710  VOL/VOL
FIELD CAPACITY             =       0.2920  VOL/VOL
WILTING POINT              =       0.0770  VOL/VOL
INITIAL SOIL WATER CONTENT =       0.2868  VOL/VOL
EFFECTIVE SAT. HYD. COND.  =   0.100000005000E-02 CM/SEC
```

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 3.00
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0819	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.29	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0114	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	11.7900000000	CM/SEC
SLOPE	=	1.50	PERCENT
DRAINAGE LENGTH	=	135.0	FEET

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

```
THICKNESS                      =      0.17    INCHES
POROSITY                       =      0.8500 VOL/VOL
FIELD CAPACITY                 =      0.0100 VOL/VOL
WILTING POINT                  =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT     =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.      =   3.93799996000      CM/SEC
SLOPE                          =      1.50    PERCENT
DRAINAGE LENGTH                =    135.0     FEET
```

LAYER 7

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

```
THICKNESS                      =      0.06    INCHES
POROSITY                       =      0.0000 VOL/VOL
FIELD CAPACITY                 =      0.0000 VOL/VOL
WILTING POINT                  =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT     =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.      =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY            =      2.00    HOLES/ACRE
FML INSTALLATION DEFECTS       =      2.00    HOLES/ACRE
FML PLACEMENT QUALITY          =  3 - GOOD
```

LAYER 8

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

```
THICKNESS                      =      0.25    INCHES
POROSITY                       =      0.7500 VOL/VOL
FIELD CAPACITY                 =      0.7470 VOL/VOL
WILTING POINT                  =      0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT     =      0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.      =  0.300000003000E-08 CM/SEC
```

LAYER 9

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

```
THICKNESS                      =    120.00    INCHES
POROSITY                       =      0.4570 VOL/VOL
FIELD CAPACITY                 =      0.1310 VOL/VOL
WILTING POINT                  =      0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT     =      0.1310 VOL/VOL
EFFECTIVE SAT. HYD. COND.      =  0.100000005000E-02 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #18 WITH A FAIR STAND OF GRASS, A SURFACE SLOPE OF 25.% AND A SLOPE LENGTH OF 236. FEET.

SCS RUNOFF CURVE NUMBER	=	60.50	
FRACTION OF AREA ALLOWING RUNOFF	=	50.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	2.687	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	14.762	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.694	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	224.568	INCHES
TOTAL INITIAL WATER	=	224.568	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	2.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Fort Drum Florida WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.003	0.000	0.000	0.000	0.001	0.008
	0.008	0.000	0.017	0.001	0.000	0.000
STD. DEVIATIONS	0.011	0.000	0.000	0.000	0.003	0.024
	0.038	0.002	0.048	0.003	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	1.979	2.849	3.624	3.642	4.092	6.115
	6.387	5.931	5.059	3.986	2.443	1.723
STD. DEVIATIONS	0.606	0.782	1.392	1.713	1.583	1.767
	1.071	0.864	0.778	0.755	0.771	0.612
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.1385	0.0823	0.2866	0.1641	0.1030	0.1292
	0.3675	0.8334	0.8811	1.1327	0.7229	0.3549
STD. DEVIATIONS	0.2474	0.0998	0.6797	0.4389	0.2282	0.3270
	0.6823	1.2851	1.0930	1.1958	1.0305	0.7164
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED FROM LAYER 6						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0006	0.0004	0.0012	0.0007	0.0004	0.0006
	0.0016	0.0036	0.0040	0.0049	0.0032	0.0015
STD. DEVIATIONS	0.0011	0.0005	0.0030	0.0020	0.0010	0.0015
	0.0030	0.0056	0.0049	0.0052	0.0046	0.0031

DAILY AVERAGE HEAD ON TOP OF LAYER 7

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	53.22 (8.197)	193201.7	100.00
RUNOFF	0.037 (0.0667)	135.94	0.070
EVAPOTRANSPIRATION	47.830 (4.7734)	173621.58	89.865
LATERAL DRAINAGE COLLECTED FROM LAYER 3	5.19617 (4.56239)	18862.086	9.76290
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00000 (0.00000)	0.009	0.00000
AVERAGE HEAD ON TOP	0.002 (0.002)		

OF LAYER 4				
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.00000 (	0.00000)	0.001	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00000 (	0.00000)	0.009	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000 (	0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (	0.00001)	0.005	0.00000
CHANGE IN WATER STORAGE	0.160 (	1.2687)	582.06	0.301

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.183	664.0057
DRAINAGE COLLECTED FROM LAYER 3	0.21128	766.92908
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00005
AVERAGE HEAD ON TOP OF LAYER 4	0.028	
MAXIMUM HEAD ON TOP OF LAYER 4	0.056	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	1.4 FEET	
DRAINAGE COLLECTED FROM LAYER 6	0.00000	0.00002
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000000	0.00002
AVERAGE HEAD ON TOP OF LAYER 7	0.000	
MAXIMUM HEAD ON TOP OF LAYER 7	0.003	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000038	0.13713
SNOW WATER	0.00	0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4566

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0770

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	210.0066	0.2917
2	2.4708	0.1030
3	0.0029	0.0100
4	0.0000	0.0000
5	0.1875	0.7500
6	0.0017	0.0100
7	0.0000	0.0000
8	0.1875	0.7500
9	15.7200	0.1310
SNOW WATER	0.000	

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CASE 2-C WITH 5% OF SURFACE SLOPE

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                DEVELOPED BY ENVIRONMENTAL LABORATORY                     **
**                  USAE WATERWAYS EXPERIMENT STATION                       **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:      C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:        C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.D7
SOLAR RADIATION DATA FILE:    C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.D13
EVAPOTRANSPIRATION DATA:      C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.D11
SOIL AND DESIGN DATA FILE:    C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.D10
OUTPUT DATA FILE:             C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.OUT
```

TIME: 15: 0   DATE: 3/18/2002

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******************************************************************************

     TITLE:  Oak Hammock Disposal Facility

******************************************************************************
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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

```
                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER   1
        THICKNESS                   =       12.00    INCHES
        POROSITY                    =       0.4170 VOL/VOL
        FIELD CAPACITY              =       0.0450 VOL/VOL
        WILTING POINT               =       0.0180 VOL/VOL
        INITIAL SOIL WATER CONTENT  =       0.0216 VOL/VOL
        EFFECTIVE SAT. HYD. COND.   =  0.999999978000E-02 CM/SEC
     NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.63
            FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

CASE295.OUT

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1140.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2901	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0814	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC

LAYER 4

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.28	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0211	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.9600000000	CM/SEC
SLOPE	=	1.00	PERCENT
DRAINAGE LENGTH	=	630.0	FEET

LAYER 5

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 6

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08 CM/SEC

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.17 INCHES
POROSITY	=	0.8500 VOL/VOL
FIELD CAPACITY	=	0.0100 VOL/VOL
WILTING POINT	=	0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	3.20000005000 CM/SEC
SLOPE	=	1.00 PERCENT
DRAINAGE LENGTH	=	630.0 FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06 INCHES
POROSITY	=	0.0000 VOL/VOL
FIELD CAPACITY	=	0.0000 VOL/VOL
WILTING POINT	=	0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY	=	2.00 HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00 HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD

LAYER 9

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08 CM/SEC

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LAYER 10

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	120.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1310	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 1 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 5.% AND A SLOPE LENGTH OF 765. FEET.

SCS RUNOFF CURVE NUMBER	=	24.10	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	1.035	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	11.714	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.986	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	349.052	INCHES
TOTAL INITIAL WATER	=	349.052	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Fort Drum Florida

CASE295.OUT
WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	1.798	2.866	3.208	3.175	4.088	6.052
	6.070	5.543	4.842	3.543	2.191	1.673
STD. DEVIATIONS	0.479	0.830	1.606	1.595	1.646	1.642
	1.227	1.171	0.970	1.015	0.860	0.544
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.2735	0.2752	0.4223	0.3519	0.2265	0.3322
	0.6339	1.2159	1.2014	1.4135	1.1206	0.5611
STD. DEVIATIONS	0.5935	0.4610	0.7782	0.6492	0.3046	0.5077
	0.7192	1.1615	1.0111	1.1911	1.2024	0.9199

PERCOLATION/LEAKAGE THROUGH LAYER 6

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 7

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 10

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 5

AVERAGES	0.0089	0.0099	0.0138	0.0119	0.0074	0.0112
	0.0207	0.0398	0.0406	0.0462	0.0379	0.0184
STD. DEVIATIONS	0.0194	0.0167	0.0255	0.0219	0.0100	0.0172
	0.0235	0.0380	0.0342	0.0390	0.0406	0.0301

DAILY AVERAGE HEAD ON TOP OF LAYER 8

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.22	(8.197)	193201.7	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	45.050	(4.4748)	163532.94	84.644
LATERAL DRAINAGE COLLECTED FROM LAYER 4	8.02806	(4.34780)	29141.852	15.08364
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.00000	(0.00000)	0.016	0.00001
AVERAGE HEAD ON TOP OF LAYER 5	0.022	(0.012)		
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.00000	(0.00000)	0.007	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000	(0.00000)	0.009	0.00000
AVERAGE HEAD ON TOP OF LAYER 8	0.000	(0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00001)	0.005	0.00000
CHANGE IN WATER STORAGE	0.145	(1.9515)	526.89	0.273

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 4	0.17928	650.80078
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.000000	0.00019
AVERAGE HEAD ON TOP OF LAYER 5	0.182	
MAXIMUM HEAD ON TOP OF LAYER 5	0.356	
LOCATION OF MAXIMUM HEAD IN LAYER 4 (DISTANCE FROM DRAIN)	13.2 FEET	
DRAINAGE COLLECTED FROM LAYER 7	0.00000	0.00014
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000000	0.00002
AVERAGE HEAD ON TOP OF LAYER 8	0.000	

MAXIMUM HEAD ON TOP OF LAYER 8 0.045

LOCATION OF MAXIMUM HEAD IN LAYER 7
(DISTANCE FROM DRAIN) 0.0 FEET

PERCOLATION/LEAKAGE THROUGH LAYER 10 0.000038 0.13713

SNOW WATER 0.00 0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3678

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0448

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	0.3992	0.0333
2	333.9067	0.2929
3	2.2731	0.0947
4	0.0048	0.0174
5	0.0000	0.0000
6	0.1875	0.7500
7	0.0017	0.0100
8	0.0000	0.0000
9	0.1875	0.7500
10	15.7200	0.1310
SNOW WATER	0.000	

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CASE 2-C WITH 25% OF SURFACE SLOPE

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**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                 DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:       C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.D7
SOLAR RADIATION DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.D13
EVAPOTRANSPIRATION DATA:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.D11
SOIL AND DESIGN DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.D10
OUTPUT DATA FILE:            C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE295.OUT
```

TIME: 14:58   DATE: 3/18/2002

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TITLE: Oak Hammock Disposal Facility

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

```
THICKNESS                    =      12.00   INCHES
POROSITY                     =       0.4170 VOL/VOL
FIELD CAPACITY               =       0.0450 VOL/VOL
WILTING POINT                =       0.0180 VOL/VOL
INITIAL SOIL WATER CONTENT   =       0.0216 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999978000E-02 CM/SEC
```

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.63
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1140.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2901	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0804	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC

LAYER 4

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.28	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0121	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.9600000000	CM/SEC
SLOPE	=	1.00	PERCENT
DRAINAGE LENGTH	=	135.0	FEET

LAYER 5

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 6

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08 CM/SEC

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.17 INCHES
POROSITY	=	0.8500 VOL/VOL
FIELD CAPACITY	=	0.0100 VOL/VOL
WILTING POINT	=	0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	3.20000005000 CM/SEC
SLOPE	=	1.00 PERCENT
DRAINAGE LENGTH	=	135.0 FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06 INCHES
POROSITY	=	0.0000 VOL/VOL
FIELD CAPACITY	=	0.0000 VOL/VOL
WILTING POINT	=	0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY	=	2.00 HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00 HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD

LAYER 9

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08 CM/SEC

LAYER 10

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	120.00 INCHES
POROSITY	=	0.4570 VOL/VOL
FIELD CAPACITY	=	0.1310 VOL/VOL
WILTING POINT	=	0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1310 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 1 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 25.% AND A SLOPE LENGTH OF 236. FEET.

SCS RUNOFF CURVE NUMBER	=	41.70	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	1.026	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	11.714	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.986	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	349.015	INCHES
TOTAL INITIAL WATER	=	349.015	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80 DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50
START OF GROWING SEASON (JULIAN DATE)	=	0
END OF GROWING SEASON (JULIAN DATE)	=	367
EVAPORATIVE ZONE DEPTH	=	22.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00 %

NOTE: PRECIPITATION DATA FOR Fort Drum Florida

CASE295.OUT
WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	1.796	2.861	3.218	3.170	4.091	6.047
	6.066	5.544	4.856	3.551	2.197	1.672
STD. DEVIATIONS	0.477	0.838	1.600	1.591	1.631	1.637
	1.218	1.171	0.960	1.009	0.854	0.545
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.2801	0.2813	0.4273	0.3461	0.2307	0.3183
	0.6254	1.2112	1.1959	1.4069	1.1121	0.5739
STD. DEVIATIONS	0.6033	0.4978	0.7733	0.6335	0.3225	0.4883
	0.6839	1.1655	1.0229	1.1978	1.1991	0.9535

PERCOLATION/LEAKAGE THROUGH LAYER 6

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 7

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 10

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 5

AVERAGES	0.0020	0.0022	0.0030	0.0025	0.0016	0.0023
	0.0044	0.0085	0.0087	0.0099	0.0081	0.0040
STD. DEVIATIONS	0.0042	0.0039	0.0054	0.0046	0.0023	0.0035
	0.0048	0.0082	0.0074	0.0084	0.0087	0.0067

DAILY AVERAGE HEAD ON TOP OF LAYER 8

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

CASE295.OUT

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.22	(8.197)	193201.7	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	45.070	(4.3984)	163602.39	84.680
LATERAL DRAINAGE COLLECTED FROM LAYER 4	8.00924	(4.28693)	29073.525	15.04828
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.00000	(0.00000)	0.010	0.00001
AVERAGE HEAD ON TOP OF LAYER 5	0.005	(0.003)		
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.00000	(0.00000)	0.001	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000	(0.00000)	0.009	0.00000
AVERAGE HEAD ON TOP OF LAYER 8	0.000	(0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00001)	0.005	0.00000
CHANGE IN WATER STORAGE	0.145	(2.0397)	525.72	0.272

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 4	0.20068	728.46313
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.000000	0.00006
AVERAGE HEAD ON TOP OF LAYER 5	0.044	
MAXIMUM HEAD ON TOP OF LAYER 5	0.085	
LOCATION OF MAXIMUM HEAD IN LAYER 4 (DISTANCE FROM DRAIN)	3.1 FEET	
DRAINAGE COLLECTED FROM LAYER 7	0.00000	0.00003
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000000	0.00002
AVERAGE HEAD ON TOP OF LAYER 8	0.000	

MAXIMUM HEAD ON TOP OF LAYER 8	0.004	
LOCATION OF MAXIMUM HEAD IN LAYER 7 (DISTANCE FROM DRAIN)	0.0 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000038	0.13712
SNOW WATER	0.00	0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3581

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0448

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	0.4057	0.0338
2	333.8854	0.2929
3	2.2444	0.0935
4	0.0032	0.0114
5	0.0000	0.0000
6	0.1875	0.7500
7	0.0017	0.0100
8	0.0000	0.0000
9	0.1875	0.7500
10	15.7200	0.1310
SNOW WATER	0.000	

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CASE 3
5 PERCENT SURFACE SLOPE

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                 DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                   USAE WATERWAYS EXPERIMENT STATION                      **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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```
PRECIPITATION DATA FILE:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:       C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95A.D7
SOLAR RADIATION DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95A.D13
EVAPOTRANSPIRATION DATA:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95A.D11
SOIL AND DESIGN DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95A.D10
OUTPUT DATA FILE:            C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95A.OUT
```

TIME: 15:18   DATE: 3/21/2002

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******************************************************************************

     TITLE:  Oak Hammock Disposal Facility

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

```
                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER   4
   THICKNESS                  =       6.00   INCHES
   POROSITY                   =       0.4370 VOL/VOL
   FIELD CAPACITY             =       0.1050 VOL/VOL
   WILTING POINT              =       0.0470 VOL/VOL
   INITIAL SOIL WATER CONTENT =       0.0493 VOL/VOL
   EFFECTIVE SAT. HYD. COND.  =   0.170000002000E-02 CM/SEC
 NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
        FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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                    LAYER  2
                    --------

           TYPE 1 - VERTICAL PERCOLATION LAYER
               MATERIAL TEXTURE NUMBER   3
THICKNESS                  =     18.00   INCHES
POROSITY                   =      0.4570 VOL/VOL
FIELD CAPACITY             =      0.0830 VOL/VOL
WILTING POINT              =      0.0330 VOL/VOL
INITIAL SOIL WATER CONTENT =      0.3118 VOL/VOL
EFFECTIVE SAT. HYD. COND.  =  0.310000009000E-02 CM/SEC


                    LAYER  3
                    --------

             TYPE 4 - FLEXIBLE MEMBRANE LINER
               MATERIAL TEXTURE NUMBER  35
THICKNESS                  =      0.04   INCHES
POROSITY                   =      0.0000 VOL/VOL
FIELD CAPACITY             =      0.0000 VOL/VOL
WILTING POINT              =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.  =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY        =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS   =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY      =  4 - POOR


                    LAYER  4
                    --------

           TYPE 1 - VERTICAL PERCOLATION LAYER
               MATERIAL TEXTURE NUMBER   1
THICKNESS                  =     12.00   INCHES
POROSITY                   =      0.4170 VOL/VOL
FIELD CAPACITY             =      0.0450 VOL/VOL
WILTING POINT              =      0.0180 VOL/VOL
INITIAL SOIL WATER CONTENT =      0.0450 VOL/VOL
EFFECTIVE SAT. HYD. COND.  =  0.999999978000E-02 CM/SEC


                    LAYER  5
                    --------

           TYPE 1 - VERTICAL PERCOLATION LAYER
               MATERIAL TEXTURE NUMBER  18
THICKNESS                  =   1140.00   INCHES
POROSITY                   =      0.6710 VOL/VOL
FIELD CAPACITY             =      0.2920 VOL/VOL
WILTING POINT              =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT =      0.2920 VOL/VOL
EFFECTIVE SAT. HYD. COND.  =  0.100000005000E-02 CM/SEC
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LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0450	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.28	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	4.61000013000	CM/SEC
SLOPE	=	1.00	PERCENT
DRAINAGE LENGTH	=	630.0	FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 9

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 10

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.17	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	1.35000002000	CM/SEC
SLOPE	=	1.00	PERCENT
DRAINAGE LENGTH	=	630.0	FEET

LAYER 11

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 12

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.25	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

LAYER 13

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	120.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1310	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 4 WITH AN EXCELLENT STAND OF GRASS, A SURFACE SLOPE OF 5.% AND A SLOPE LENGTH OF 765. FEET.

SCS RUNOFF CURVE NUMBER	=	38.70	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	5.908	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.848	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.876	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	356.507	INCHES
TOTAL INITIAL WATER	=	356.507	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	5.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Fort Drum Florida WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.212	0.063	0.000	0.000	0.008	0.518
	0.391	0.083	0.385	0.023	0.000	0.000
STD. DEVIATIONS	0.775	0.229	0.000	0.000	0.041	1.515
	1.804	0.231	1.067	0.113	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	1.873	3.193	4.188	4.485	4.772	6.188
	6.478	6.094	5.196	4.427	2.807	1.907
STD. DEVIATIONS	0.508	0.751	1.497	1.921	1.619	1.749
	1.085	0.774	0.725	0.434	0.490	0.511
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED FROM LAYER 7						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 9						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 10

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 12

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 13

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	7.5444	8.2035	6.6064	4.3491	1.7567	3.7449
	5.9556	8.3677	9.9762	9.4254	7.7744	6.6892
STD. DEVIATIONS	6.3221	6.4945	5.5570	4.6941	3.8295	5.8443
	6.2705	7.0197	7.0882	6.8306	6.3946	5.9051

DAILY AVERAGE HEAD ON TOP OF LAYER 8

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

DAILY AVERAGE HEAD ON TOP OF LAYER 11

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.22	(8.197)	193201.7	100.00
RUNOFF	1.684	(3.7337)	6112.59	3.164
EVAPOTRANSPIRATION	51.607	(5.3044)	187333.84	96.963
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.00042	(0.00021)	1.509	0.00078
AVERAGE HEAD ON TOP OF LAYER 3	6.699	(3.301)		
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.00042	(0.00020)	1.509	0.00078
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000	(0.00000)	0.008	0.00000
AVERAGE HEAD ON TOP OF LAYER 8	0.000	(0.000)		
LATERAL DRAINAGE COLLECTED FROM LAYER 10	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 12	0.00000	(0.00000)	0.008	0.00000
AVERAGE HEAD ON TOP OF LAYER 11	0.000	(0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 13	0.00000	(0.00001)	0.005	0.00000
CHANGE IN WATER STORAGE	-0.068	(2.9342)	-246.31	-0.127

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	4.278	15529.3350
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.000004	0.01482
AVERAGE HEAD ON TOP OF LAYER 3	24.000	
DRAINAGE COLLECTED FROM LAYER 7	0.00001	0.04628
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000000	0.00002
AVERAGE HEAD ON TOP OF LAYER 8	0.000	

```
MAXIMUM HEAD ON TOP OF LAYER  8               0.000

LOCATION OF MAXIMUM HEAD IN LAYER  7
      (DISTANCE FROM DRAIN)                   0.0 FEET

DRAINAGE COLLECTED FROM LAYER 10              0.00000          0.00000

PERCOLATION/LEAKAGE THROUGH LAYER 12          0.000000         0.00002

AVERAGE HEAD ON TOP OF LAYER 11               0.000

MAXIMUM HEAD ON TOP OF LAYER 11               0.005

LOCATION OF MAXIMUM HEAD IN LAYER 10
      (DISTANCE FROM DRAIN)                   0.0 FEET

PERCOLATION/LEAKAGE THROUGH LAYER 13          0.000038         0.13712

SNOW WATER                                    0.00             0.0000


MAXIMUM VEG. SOIL WATER (VOL/VOL)                     0.4520

MINIMUM VEG. SOIL WATER (VOL/VOL)                     0.0365

 ***  Maximum heads are computed using McEnroe's equations.  ***

      Reference:  Maximum Saturated Depth over Landfill Liner
                  by Bruce M. McEnroe, University of Kansas
                  ASCE Journal of Environmental Engineering
                  Vol. 119, No. 2, March 1993, pp. 262-270.

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              FINAL WATER STORAGE AT END OF YEAR   25
    ----------------------------------------------------------------------
               LAYER         (INCHES)        (VOL/VOL)
               -----         --------        ---------
                 1            0.3067          0.0511

                 2            3.9049          0.2169

                 3            0.0000          0.0000

                 4            0.5400          0.0450

                 5          332.8799          0.2920

                 6            1.0800          0.0450

                 7            0.0028          0.0100

                 8            0.0000          0.0000

                 9            0.1875          0.7500
```

10	0.0017	0.0100
11	0.0000	0.0000
12	0.1875	0.7500
13	15.7200	0.1310
SNOW WATER	0.000	

****
****

CASE 3
25 PERCENT SURFACE SLOPE

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:       C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95B.D7
SOLAR RADIATION DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95B.D13
EVAPOTRANSPIRATION DATA:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95B.D11
SOIL AND DESIGN DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95B.D10
OUTPUT DATA FILE:            C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95B.OUT


TIME:  15:38     DATE:   3/21/2002


******************************************************************************

     TITLE:  Oak Hammock Disposal Facility

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                       TYPE 1 - VERTICAL PERCOLATION LAYER
                           MATERIAL TEXTURE NUMBER   4
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4370 VOL/VOL
          FIELD CAPACITY               =      0.1050 VOL/VOL
          WILTING POINT                =      0.0470 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.0447 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.170000002000E-02 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
               FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

162/223


```
                        LAYER  2
                        --------

            TYPE 1 - VERTICAL PERCOLATION LAYER
                MATERIAL TEXTURE NUMBER   3
THICKNESS                    =       18.00   INCHES
POROSITY                     =        0.4570 VOL/VOL
FIELD CAPACITY               =        0.0830 VOL/VOL
WILTING POINT                =        0.0330 VOL/VOL
INITIAL SOIL WATER CONTENT   =        0.0569 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   0.310000009000E-02 CM/SEC


                        LAYER  3
                        --------

              TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =        0.31   INCHES
POROSITY                     =        0.8500 VOL/VOL
FIELD CAPACITY               =        0.0100 VOL/VOL
WILTING POINT                =        0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =        0.0103 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =    14.1400003000      CM/SEC
SLOPE                        =       25.00   PERCENT
DRAINAGE LENGTH              =      236.0    FEET


                        LAYER  4
                        --------

              TYPE 4 - FLEXIBLE MEMBRANE LINER
                MATERIAL TEXTURE NUMBER  35
THICKNESS                    =        0.06   INCHES
POROSITY                     =        0.0000 VOL/VOL
FIELD CAPACITY               =        0.0000 VOL/VOL
WILTING POINT                =        0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =        0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY          =        0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =        0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =   4 - POOR


                        LAYER  5
                        --------

            TYPE 1 - VERTICAL PERCOLATION LAYER
                MATERIAL TEXTURE NUMBER   1
THICKNESS                    =       12.00   INCHES
POROSITY                     =        0.4170 VOL/VOL
FIELD CAPACITY               =        0.0450 VOL/VOL
WILTING POINT                =        0.0180 VOL/VOL
INITIAL SOIL WATER CONTENT   =        0.0450 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   0.999999978000E-02 CM/SEC
```

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1140.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 1

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0450	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.28	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	4.61000013000	CM/SEC
SLOPE	=	1.00	PERCENT
DRAINAGE LENGTH	=	135.0	FEET

LAYER 9

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

```
THICKNESS                   =      0.25   INCHES
POROSITY                    =      0.7500 VOL/VOL
FIELD CAPACITY              =      0.7470 VOL/VOL
WILTING POINT               =      0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.300000003000E-08 CM/SEC
```

LAYER 11

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

```
THICKNESS                   =      0.17   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   1.35000002000     CM/SEC
SLOPE                       =      1.00   PERCENT
DRAINAGE LENGTH             =    135.0    FEET
```

LAYER 12

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

```
THICKNESS                   =      0.06   INCHES
POROSITY                    =      0.0000 VOL/VOL
FIELD CAPACITY              =      0.0000 VOL/VOL
WILTING POINT               =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY         =      2.00   HOLES/ACRE
FML INSTALLATION DEFECTS    =      2.00   HOLES/ACRE
FML PLACEMENT QUALITY       =  3 - GOOD
```

LAYER 13

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

```
THICKNESS                   =      0.25   INCHES
POROSITY                    =      0.7500 VOL/VOL
FIELD CAPACITY              =      0.7470 VOL/VOL
WILTING POINT               =      0.4000 VOL/VOL
```

```
INITIAL SOIL WATER CONTENT  =       0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.300000003000E-08 CM/SEC
```

LAYER 14

```
          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER   5
THICKNESS                   =     120.00   INCHES
POROSITY                    =       0.4570 VOL/VOL
FIELD CAPACITY              =       0.1310 VOL/VOL
WILTING POINT               =       0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT  =       0.1310 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

```
NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
         SOIL DATA BASE USING SOIL TEXTURE # 4 WITH AN
         EXCELLENT STAND OF GRASS, A SURFACE SLOPE OF 25.%
         AND A SLOPE LENGTH OF  236. FEET.

SCS RUNOFF CURVE NUMBER              =     49.30
FRACTION OF AREA ALLOWING RUNOFF     =    100.0     PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000   ACRES
EVAPORATIVE ZONE DEPTH               =     24.0     INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      1.292   INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =     10.848   INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.876   INCHES
INITIAL SNOW WATER                   =      0.000   INCHES
INITIAL WATER IN LAYER MATERIALS     =    351.895   INCHES
TOTAL INITIAL WATER                  =    351.895   INCHES
TOTAL SUBSURFACE INFLOW              =      0.00    INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

```
NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
         ORLANDO               FLORIDA

     STATION LATITUDE                        =  27.80 DEGREES
     MAXIMUM LEAF AREA INDEX                 =   5.00
     START OF GROWING SEASON (JULIAN DATE)   =      0
     END OF GROWING SEASON (JULIAN DATE)     =    367
     EVAPORATIVE ZONE DEPTH                  =  24.0  INCHES
     AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
     AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  72.00 %
     AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
     AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  80.00 %
     AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %
```

CASE95B.OUT

NOTE: PRECIPITATION DATA FOR Fort Drum Florida
WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.005	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.025	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.456	0.774	0.761	0.801	1.692	2.861
	2.636	2.324	2.303	1.430	0.481	0.359
STD. DEVIATIONS	0.228	0.891	0.391	0.678	1.242	1.712
	1.435	1.107	1.352	1.031	0.319	0.164
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	2.0442	2.4339	2.5704	1.7809	3.4724	4.8485
	5.6497	4.2265	3.5940	2.5771	1.3071	1.8511

STD. DEVIATIONS	1.2725	1.4534	1.6128	1.1493	1.9338	2.0010
	2.5275	1.4590	1.3856	1.0637	0.7346	1.0667

PERCOLATION/LEAKAGE THROUGH LAYER 4

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 10

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 11

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 13

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 14

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0008	0.0011	0.0010	0.0007	0.0014	0.0020
	0.0023	0.0017	0.0015	0.0010	0.0005	0.0007
STD. DEVIATIONS	0.0005	0.0006	0.0007	0.0005	0.0008	0.0008

	0.0010	0.0006	0.0006	0.0004	0.0003	0.0004

DAILY AVERAGE HEAD ON TOP OF LAYER 9

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

DAILY AVERAGE HEAD ON TOP OF LAYER 12

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	53.22 (8.197)	193201.7	100.00
RUNOFF	0.005 (0.0250)	18.30	0.009
EVAPOTRANSPIRATION	16.880 (4.1018)	61272.59	31.714
LATERAL DRAINAGE COLLECTED FROM LAYER 3	36.35572 (5.77861)	131971.250	68.30752
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00000 (0.00000)	0.005	0.00000
AVERAGE HEAD ON TOP OF LAYER 4	0.001 (0.000)		
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000 (0.00000)	0.002	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000 (0.00000)	0.002	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000 (0.000)		
LATERAL DRAINAGE COLLECTED FROM LAYER 11	0.00000 (0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 13	0.00000 (0.00000)	0.002	0.00000
AVERAGE HEAD ON TOP OF LAYER 12	0.000 (0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 14	0.00000 (0.00000)	0.000	0.00000

CHANGE IN WATER STORAGE	-0.017	(0.1685)	-60.47	-0.031

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□
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PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.125	453.5941
DRAINAGE COLLECTED FROM LAYER 3	3.52113	12781.70310
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000000	0.00003
AVERAGE HEAD ON TOP OF LAYER 4	0.044	
MAXIMUM HEAD ON TOP OF LAYER 4	0.123	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	0.0 FEET	
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00001
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00001
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.002	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
DRAINAGE COLLECTED FROM LAYER 11	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 13	0.000000	0.00001
AVERAGE HEAD ON TOP OF LAYER 12	0.000	
MAXIMUM HEAD ON TOP OF LAYER 12	0.001	
LOCATION OF MAXIMUM HEAD IN LAYER 11 (DISTANCE FROM DRAIN)	0.0 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 14	0.000000	0.00000
SNOW WATER	0.00	0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.2995
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0365

*** Maximum heads are computed using McEnroe's equations. ***

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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	0.2680	0.0447
2	0.6080	0.0338
3	0.0031	0.0100
4	0.0000	0.0000
5	0.5400	0.0450
6	332.8799	0.2920
7	1.0800	0.0450
8	0.0028	0.0100
9	0.0000	0.0000
10	0.1875	0.7500
11	0.0017	0.0100
12	0.0000	0.0000
13	0.1875	0.7500
14	15.7200	0.1310
SNOW WATER	0.000	

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****

Attachment 8

Spreadsheet for Leachate Estimates for Scenarios Presented During Construction

LEACHATE DURING PHASES OF CONSTRUCTION FOR OAK HAMMOCK FACILITY

			HELP RESULTS				USED IN CALCULATIONS (gal/day/acre)			
			Primary		Secondary		Primary		Secondary	
Case	Surface Slope %	Height Waste ft	Peak Daily Lateral Drainage Per Acre (Gal)	Average Annual Total Lateral Drainage Per Acre (Gal)	Peak Daily Lateral Drainage Per Acre (Gal)	Average Annual Total Lateral Drainage Per Acre (Gal)	Peak Lateral Drainage	Average Lateral Drainage	Peak Lateral Drainage	Average Lateral Drainage
1	5	10	29037.704	332447.990	0.013	0.022	27832.213	910.581	0.007	0.000
	25	10	26626.723	332275.848	0.000	0.052				
2-A	5	30	9272.534	180371.909	0.001	0.022	9379.130	491.136	0.001	0.000
	25	30	9485.725	178157.451	0.000	0.007				
2-B	5	60	6072.787	144686.779	0.001	0.022	5904.907	391.486	0.000	0.000
	25	60	5737.028	141098.202	0.000	0.007				
2-C	5	95	4868.328	217996.192	0.001	0.052	5158.805	596.550	0.001	0.000
	25	95	5449.283	217485.070	0.000	0.007				
3	5	95	0.346	11.288	0.000	0.000	0.173	0.015	0.000	0.000
	25	95	0.000	0.015	0.000	0.000				

						LEACHATE PER CELL (gal/day)				TOTAL LEACHATE FOR SCENARIO(gal/day)			
						Primary		Secondary		Primary		Secondary	
No. Scenario	Cells	Area of Cell (acres)	Case Applied	Area under Case (%)	Total Area (acres)	Peak leachate	Average leachate	Peak leachate	Average leachate	Peak leachate	Average leachate	Peak leachate	Average leachate
1	1	18.04	1	100	18.04	502093.1	16426.9	0.12	0.00	**502093.1**	**16426.9**	**0.1**	**0.0**
2	1	18.04	1	70	12.628	351465.2	11498.8	0.09	0.00				
		18.04	2-A	30	5.412	50759.8	2658.0	0.00	0.00	**402225.0**	**14156.8**	**0.09**	**0.00**
3	1	18.04	2-B	33.33	6.0127	35504.6	2353.9	0.00292	0.00025				
		18.04	2-A	33.33	6.0127	56394.2	2953.1	0.00450	0.00025				
		18.04	1	33.33	6.0127	167347.6	5475.1	0.04160	0.00062	**259246.5**	**10782.0**	**0.05**	**0.00**
4	1	18.04	2-B	33.33	6.0127	35504.6	2353.9	0.00292	0.00025				
		18.04	2-A	33.33	6.0127	56394.2	2953.1	0.00450	0.00025				
		18.04	1	33.33	6.0127	167347.6	5475.1	0.04160	0.00062				
	2	12.44	1	100	12.4400	346232.7	11327.6	0.08608	0.00127	**605479.2**	**22109.7**	**0.135**	**0.002**

5	1	18.04	2-B	33.33	6.0127	35504.6	2353.9	0.00292	0.00025				
		18.04	2-A	33.33	6.0127	56394.2	2953.1	0.00450	0.00025				
		18.04	1	33.33	6.0127	167347.6	5475.1	0.04160	0.00062				
	2	12.44	2-A	33.33	4.146252	38888.2	2036.4	0.00310	0.00017				
		12.44	1	66.66	8.292504	230798.7	7551.0	0.05738	0.00085	**528933.4**	**20369.4**	**0.11**	**0.00**
6	1	18.04	2-B	33.33	6.0127	35504.6	2353.9	0.003	0.000				
		18.04	2-A	33.33	6.0127	56394.2	2953.1	0.004	0.000				
		18.04	1	33.33	6.0127	167347.6	5475.1	0.042	0.001				
	2	12.44	2-B	33.33	4.1463	24483.2	1623.2	0.002	0.000				
		12.44	2-A	33.33	4.1463	38888.2	2036.4	0.003	0.000				
		12.44	1	33.33	4.1463	115399.4	3775.5	0.029	0.000	**438017.3**	**18217.1**	**0.083**	**0.002**
7	1	18.04	2-B	66.66	12.025	71009.2	4707.8	0.006	0.000				
		18.04	1	33.33	6.013	167347.6	5475.1	0.042	0.001				
	2	12.44	2-B	33.33	4.146	24483.2	1623.2	0.002	0.000				
		12.44	2-A	33.33	4.146	38888.2	2036.4	0.003	0.000				
		12.44	1	33.33	4.146	115399.4	3775.5	0.029	0.000	**417128**	**17618**	**0.081**	**0.002**
8	1	18.04	2-B	66.66	12.025	71009.25	4707.80	0.006	0.000				
		18.04	1	33.33	6.013	167347.64	5475.08	0.042	0.001				
	2	12.44	2-B	33.33	4.146	24483.23	1623.20	0.002	0.000				
		12.44	2-A	33.33	4.146	38888.23	2036.37	0.003	0.000				
		12.44	1	33.33	4.146	115399.37	3775.50	0.029	0.000				
	3	10.98	1	100	10.980	305597.70	9998.17	0.076	0.001	**722725.43**	**27616.13**	**0.157**	**0.003**
9	1	18.04	2-B	66.66	12.025	71009.25	4707.80	0.01	0.00				
		18.04	2-A	33.33	6.013	56394.19	2953.07	0.00	0.00				
	2	12.44	2-B	33.33	4.146	24483.23	1623.20	0.00	0.00				
		12.44	2-A	66.66	8.293	77776.47	4072.75	0.01	0.00				
	3	10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
		10.98	1	50	5.490	152798.85	4999.09	0.04	0.00	**433953.42**	**21052.25**	**0.06**	**0.00**
10	1	18.04	2-B	100	18.040	106524.53	7062.41	0.01	0.00				
	2	12.44	2-B	60	7.464	44074.23	2922.05	0.00	0.00				
		12.44	2-A	40	4.976	46670.55	2443.89	0.00	0.00				

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	3	10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
		10.98	1	50	5.490	152798.85	4999.09	0.04	0.00	**401559.58**	**20123.78**	**0.06**	**0.00**
11	1	18.04	2-B	100	18.040	106524.53	7062.41	0.01	0.00				
	2	12.44	2-B	100	12.440	73457.05	4870.09	0.01	0.00				
	4	10.98	1	100	10.980	305597.70	9998.17	0.08	0.00				
	3	10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
		10.98	1	50	5.490	152798.85	4999.09	0.04	0.00	**689869.55**	**29626.10**	**0.13**	**0.00**
12	1	18.04	2-B	100	18.040	106524.53	7062.41	0.01	0.00				
	2	12.44	2-B	100	12.440	73457.05	4870.09	0.01	0.00				
	4	10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
		10.98	1	50	5.490	152798.85	4999.09	0.04	0.00				
	3	10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
		10.98	1	50	5.490	152798.85	4999.09	0.04	0.00	**588562.12**	**27323.35**	**0.10**	**0.00**
13	1	18.04	2-C	66.66	12.025	62037.03	7173.79	0.01	0.00				
		18.04	2-B	33.33	6.013	35504.62	2353.90	0.00	0.00				
	2	12.44	2-C	66.66	8.293	42779.41	4946.89	0.00	0.00				
		12.44	2-B	33.33	4.146	24483.23	1623.20	0.00	0.00				
	4	10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
		10.98	1	50	5.490	152798.85	4999.09	0.04	0.00				
	3	10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
		10.98	1	50	5.490	152798.85	4999.09	0.04	0.00	**573384.84**	**31488.63**	**0.10**	**0.00**
14	1	18.04	2-C	66.66	12.025	62037.03	7173.79	0.01	0.00				
		18.04	2-B	33.33	6.013	35504.62	2353.90	0.00	0.00				
	2	12.44	2-C	66.66	8.293	42779.41	4946.89	0.00	0.00				
		12.44	2-B	33.33	4.146	24483.23	1623.20	0.00	0.00				
	4	10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
		10.98	1	50	5.490	152798.85	4999.09	0.04	0.00				
	3	10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
		10.98	1	50	5.490	152798.85	4999.09	0.04	0.00				
	5	11.15	1	100	11.150	310329.18	10152.97	0.08	0.00	**883714.02**	**41641.60**	**0.1784**	**0.0048**
15	1	18.04	2-C	100	18.040	93064.85	10761.76	0.01	0.00	Critical Scenario			

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	2	12.44	2-C	100	12.440	64175.54	7421.08	0.01	0.00				
	4	10.98	2-B	50	5.490	32417.94	2149.26	0.00	0.00				
		10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
	3	10.98	2-B	50	5.490	32417.94	2149.26	0.00	0.00				
		10.98	2-A	50	5.490	51491.42	2696.34	0.00	0.00				
	5	11.15	2-A	50	5.575	52288.65	2738.08	0.00	0.00				
		11.15	1	50	5.575	155164.59	5076.49	0.04	0.00	**532512.35**	**35688.60**	**0.07**	**0.00**
16	1	18.04	2-C	100	18.040	93064.85	10761.76	0.01	0.00				
	2	12.44	2-C	100	12.440	64175.54	7421.08	0.01	0.00				
	4	10.98	2-B	100	10.980	64835.88	4298.52	0.01	0.00				
	3	10.98	2-B	100	10.980	64835.88	4298.52	0.01	0.00				
	5	11.15	2-A	50	5.575	52288.65	2738.08	0.00	0.00				
		11.15	1	50	5.575	155164.59	5076.49	0.04	0.00	**494365.38**	**34594.44**	**0.07**	**0.00**
17	1	18.04	3	100	18.040	3.12	0.28	0.00	0.00				
	2	12.44	3	100	12.440	2.15	0.19	0.00	0.00				
	4	10.98	2-C	50	5.490	28321.84	3275.06	0.00	0.00				
		10.98	2-B	50	5.490	32417.94	2149.26	0.00	0.00				
	3	10.98	2-C	50	5.490	28321.84	3275.06	0.00	0.00				
		10.98	2-B	50	5.490	32417.94	2149.26	0.00	0.00				
	5	11.15	2-A	50	5.575	52288.65	2738.08	0.00	0.00				
		11.15	1	50	5.575	155164.59	5076.49	0.04	0.00	**328938.08**	**18663.68**	**0.05**	**0.00**
18	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	2-C	50	5.490	28321.841	3275.058	0.003	0.000				
		10.98	2-B	50	5.490	32417.941	2149.260	0.003	0.000				
	3	10.98	2-C	50	5.490	28321.841	3275.058	0.003	0.000				
		10.98	2-B	50	5.490	32417.941	2149.260	0.003	0.000				
	5	11.15	2-A	50	5.575	52288.647	2738.084	0.004	0.000				
		11.15	1	50	5.575	155164.589	5076.487	0.039	0.001				
	6	12.5	1	100	12.500	347902.666	11382.258	0.086	0.001	**676840.743**	**30045.935**	**0.141**	**0.003**
19	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				

	4	10.98	2-C	40	4.392	22657.473	2620.046	0.003	0.000				
		10.98	2-B	60	6.588	38901.529	2579.112	0.003	0.000				
	3	10.98	2-C	40	4.392	22657.473	2620.046	0.003	0.000				
		10.98	2-B	60	6.588	38901.529	2579.112	0.003	0.000				
	5	11.15	2-B	50	5.575	32919.858	2182.536	0.003	0.000				
		11.15	2-A	50	5.575	52288.647	2738.084	0.004	0.000				
	6	12.5	2-A	50	6.250	58619.560	3069.601	0.005	0.000				
		12.5	1	50	6.250	173951.333	5691.129	0.043	0.001	**440902.679**	**24080.137**	**0.066**	**0.003**
20	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	2-C	50	5.490	28321.841	3275.058	0.003	0.000				
		10.98	2-B	50	5.490	32417.941	2149.260	0.003	0.000				
	3	10.98	2-C	50	5.490	28321.841	3275.058	0.003	0.000				
		10.98	2-B	50	5.490	32417.941	2149.260	0.003	0.000				
	5	11.15	2-B	100	11.150	65839.716	4365.072	0.005	0.000				
	6	12.5	2-A	60	7.500	70343.472	3683.521	0.006	0.000				
		12.5	1	40	5.000	139161.066	4552.903	0.035	0.001	**396829.095**	**23450.602**	**0.058**	**0.003**
21	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	2-C	100	10.980	56643.682	6550.115	0.007	0.001				
	3	10.98	2-C	100	10.980	56643.682	6550.115	0.007	0.001				
	5	11.15	2-B	100	11.150	65839.716	4365.072	0.005	0.000				
	6	12.5	2-A	60	7.500	70343.472	3683.521	0.006	0.000				
		12.5	1	40	5.000	139161.066	4552.903	0.035	0.001	**388636.895**	**25702.199**	**0.059**	**0.003**
22	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	2-C	100	10.980	56643.682	6550.115	0.007	0.001				
	3	10.98	2-C	100	10.980	56643.682	6550.115	0.007	0.001				
	5	11.15	2-C	50	5.575	28760.339	3325.764	0.003	0.000				
		11.15	2-B	50	5.575	32919.858	2182.536	0.003	0.000				
	6	12.5	2-B	33.33	4.166	24601.320	1631.030	0.002	0.000				
		12.5	2-A	33.33	4.166	39075.799	2046.196	0.003	0.000				
		12.5	1	33.33	4.166	115955.959	3793.706	0.029	0.000	**354605.915**	**26079.935**	**0.053**	**0.003**

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23	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	2-C	100	10.980	56643.682	6550.115	0.007	0.001				
	3	10.98	2-C	100	10.980	56643.682	6550.115	0.007	0.001				
	5	11.15	2-C	50	5.575	28760.339	3325.764	0.003	0.000				
		11.15	2-B	50	5.575	32919.858	2182.536	0.003	0.000				
	7	12.13	1	100	12.130	337604.747	11045.343	0.084	0.001				
	6	12.5	2-B	33.33	4.166	24601.320	1631.030	0.002	0.000				
		12.5	2-A	33.33	4.166	39075.799	2046.196	0.003	0.000				
		12.5	1	33.33	4.166	115955.959	3793.706	0.029	0.000	**692210.663**	**37125.278**	**0.137**	**0.004**
24	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	2-C	100	10.980	56643.682	6550.115	0.007	0.001				
	3	10.98	2-C	100	10.980	56643.682	6550.115	0.007	0.001				
	5	11.15	2-C	100	11.150	57520.679	6651.529	0.007	0.001				
	7	12.13	2-A	50	6.065	56884.421	2978.741	0.005	0.000				
		12.13	1	50	6.065	168802.374	5522.671	0.042	0.001				
	6	12.5	2-C	60	7.500	38691.040	4474.123	0.004	0.001				
		12.5	2-B	40	5.000	29524.536	1957.431	0.002	0.000	**464715.690**	**34685.197**	**0.073**	**0.004**
25	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	5	11.15	2-C	100	11.150	57520.679	6651.529	0.007	0.001				
	7	12.13	2-B	50	6.065	35813.262	2374.364	0.003	0.000				
		12.13	2-A	50	6.065	56884.421	2978.741	0.005	0.000				
	6	12.5	2-C	100	12.500	64485.066	7456.871	0.007	0.001				
	8	11.94	1	100	11.940	332316.627	10872.332	0.083	0.001	**547029.134**	**30334.649**	**0.104**	**0.004**
26	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	5	11.15	2-C	100	11.150	57520.679	6651.529	0.007	0.001				
	7	12.13	2-C	50	6.065	31288.154	3618.074	0.004	0.000				

		12.13	2-B	50	6.065	35813.262	2374.364	0.003	0.000				
	6	12.5	2-C	100	12.500	64485.066	7456.871	0.007	0.001				
	8	11.94	2-A	50	5.970	55993.404	2932.083	0.004	0.000				
		11.94	1	50	5.970	166158.313	5436.166	0.041	0.001	**411267.957**	**28469.899**	**0.067**	**0.004**
27	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	5	11.15	2-C	100	11.150	57520.679	6651.529	0.007	0.001				
	7	12.13	2-C	100	12.130	62576.308	7236.148	0.007	0.001				
	6	12.5	2-C	100	12.500	64485.066	7456.871	0.007	0.001				
	8	11.94	2-B	50	5.970	35252.296	2337.173	0.003	0.000				
		11.94	2-A	50	5.970	55993.404	2932.083	0.004	0.000				
	9	10.07	1	100	10.070	280270.388	9169.547	0.070	0.001	**556107.220**	**35784.162**	**0.098**	**0.004**
28	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	5	11.15	2-C	100	11.150	57520.679	6651.529	0.007	0.001				
	7	12.13	2-C	100	12.130	62576.308	7236.148	0.007	0.001				
	6	12.5	2-C	100	12.500	64485.066	7456.871	0.007	0.001				
	8	11.94	2-C	50	5.970	30798.067	3561.402	0.004	0.000				
		11.94	2-B	50	5.970	35252.296	2337.173	0.003	0.000				
	9	10.07	1	50	5.035	140135.194	4584.773	0.035	0.001				
		10.07	2-A	50	5.035	47223.918	2472.870	0.004	0.000	**438000.607**	**34301.578**	**0.066**	**0.004**
29	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.150	1.930	0.173	0.000	0.000				
	7	12.13	2-C	100	12.130	62576.308	7236.148	0.007	0.001				
	6	12.5	3	40	5.000	0.866	0.077	0.000	0.000				
		12.5	2-C	60	7.500	38691.040	4474.123	0.004	0.001				
	8	11.94	2-C	100	11.940	61596.135	7122.803	0.007	0.001				

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	9	10.07	2-A	50	5.035	47223.918	2472.870	0.004	0.000				
		10.07	2-B	50	5.035	29731.208	1971.133	0.002	0.000				
	10	11.82	1	100	11.820	328976.761	10763.063	0.082	0.001	**568807.244**	**34041.202**	**0.107**	**0.004**
30	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.150	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.130	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.500	2.164	0.194	0.000	0.000				
	8	11.94	2-C	100	11.940	61596.135	7122.803	0.007	0.001				
	9	10.07	2-B	100	10.070	59462.416	3942.267	0.005	0.000				
	10	11.82	2-A	50	5.910	55430.656	2902.614	0.004	0.000				
		11.82	1	50	5.910	164488.381	5381.531	0.041	0.001	**340992.861**	**19350.582**	**0.057**	**0.002**
31	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.150	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.130	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.500	2.164	0.194	0.000	0.000				
	8	11.94	2-C	100	11.940	61596.135	7122.803	0.007	0.001				
	9	10.07	2-C	100	10.070	51949.169	6007.255	0.006	0.001				
	10	11.82	2-B	60	7.092	41877.602	2776.421	0.003	0.000				
		11.82	2-A	30	3.546	33258.394	1741.569	0.003	0.000				
		11.82	1	10	1.182	32897.676	1076.306	0.008	0.000				
	11	12.06	1	100	12.060	335656.492	10981.602	0.083	0.001	**557250.742**	**29707.322**	**0.111**	**0.004**
32	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.150	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.130	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.500	2.164	0.194	0.000	0.000				

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	8	11.94	2-C	100	11.940	61596.135	7122.803	0.007	0.001				
	9	10.07	2-C	100	10.070	51949.169	6007.255	0.006	0.001				
	10	11.82	2-B	60	7.092	41877.602	2776.421	0.003	0.000				
		11.82	2-A	30	3.546	33258.394	1741.569	0.003	0.000				
		11.82	1	10	1.182	32897.676	1076.306	0.008	0.000				
	11	12.06	2-A	50	6.030	56556.151	2961.551	0.005	0.000				
		12.06	1	50	6.030	167828.246	5490.801	0.042	0.001	**445978.648**	**27178.072**	**0.074**	**0.003**
33	1	18.04	3	100	18.040	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.440	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.980	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.150	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.130	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.500	2.164	0.194	0.000	0.000				
	8	11.94	2-C	100	11.940	61596.135	7122.803	0.007	0.001				
	9	10.07	2-C	100	10.070	51949.169	6007.255	0.006	0.001				
	10	11.82	2-B	50	5.91	34898.002	2313.684	0.003	0.000				
		11.82	2-A	50	5.91	55430.656	2902.614	0.004	0.000				
	11	12.06	2-B	50	6.03	35606.591	2360.662	0.003	0.000				
		12.06	2-A	50	6.03	56556.151	2961.551	0.005	0.000				
	12	11.82	1	100	11.82	328976.761	10763.063	0.082	0.001	**625028.739**	**34432.998**	**0.110**	**0.004**
34	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	2-C	100	11.94	61596.135	7122.803	0.007	0.001				
	9	10.07	2-C	100	10.07	51949.169	6007.255	0.006	0.001				
	10	11.82	2-B	100	11.82	69796.004	4627.368	0.006	0.000				
	11	12.06	2-B	100	12.06	71213.181	4721.324	0.006	0.000				
	12	11.82	2-A	50	5.91	55430.656	2902.614	0.004	0.000				
		11.82	1	50	5.91	164488.381	5381.531	0.041	0.001	**474488.799**	**30764.262**	**0.070**	**0.004**

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35	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	2-C	100	11.94	61596.135	7122.803	0.007	0.001				
	9	10.07	2-C	100	10.07	51949.169	6007.255	0.006	0.001				
	10	11.82	2-C	100	11.82	60977.078	7051.217	0.007	0.001				
	11	12.06	2-C	50	6.03	31107.596	3597.195	0.004	0.000				
		12.06	2-B	50	6.03	35606.591	2360.662	0.003	0.000				
	12	11.82	2-A	50	5.91	55430.656	2902.614	0.004	0.000				
		11.82	1	50	5.91	164488.381	5381.531	0.041	0.001	**461170.879**	**34424.644**	**0.072**	**0.004**
36	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	2-C	100	11.94	61596.135	7122.803	0.007	0.001				
	9	10.07	2-C	100	10.07	51949.169	6007.255	0.006	0.001				
	10	11.82	2-C	100	11.82	60977.078	7051.217	0.007	0.001				
	11	12.06	2-C	50	6.03	31107.596	3597.195	0.004	0.000				
		12.06	2-B	50	6.03	35606.591	2360.662	0.003	0.000				
	12	11.82	2-B	50	5.91	34898.002	2313.684	0.003	0.000				
		11.82	2-A	50	5.91	55430.656	2902.614	0.004	0.000				
	13	15.16	1	100	15.16	421936.353	13804.402	0.105	0.002	**753516.854**	**45161.198**	**0.139**	**0.006**
37	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				

	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	2-C	100	12.06	62215.192	7194.389	0.007	0.001				
	12	11.82	2-B	100	11.82	69796.004	4627.368	0.006	0.000				
	13	15.16	1	50	7.58	210968.177	6902.201	0.052	0.001				
		15.16	2-A	50	7.58	71093.802	3722.812	0.006	0.000	**414094.306**	**22448.659**	**0.071**	**0.003**
38	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	2-C	100	12.06	62215.192	7194.389	0.007	0.001				
	12	11.82	2-C	50	5.91	30488.539	3525.609	0.004	0.000				
		11.82	2-B	50	5.91	34898.002	2313.684	0.003	0.000				
	14	12.03	1	100	12.03	334821.526	10954.285	0.083	0.001				
	13	15.16	2-B	30	4.548	26855.518	1780.480	0.002	0.000				
		15.16	2-A	50	7.58	71093.802	3722.812	0.006	0.000				
		15.16	1	20	3.032	84387.271	2760.880	0.021	0.000	**644780.981**	**32254.028**	**0.126**	**0.004**
39	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				

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	11	12.06	2-C	100	12.06	62215.192	7194.389	0.007	0.001				
	12	11.82	2-C	100	11.82	60977.078	7051.217	0.007	0.001				
	14	12.03	3	50	6.015	1.041	0.093	0.000	0.000				
		12.03	2-A	50	6.015	56415.465	2954.184	0.004	0.000				
	13	15.16	2-B	40	6.064	35807.357	2373.973	0.003	0.000				
		15.16	2-A	50	7.58	71093.802	3722.812	0.006	0.000				
		15.16	1	10	1.516	42193.635	1380.440	0.010	0.000	**328724.702**	**24678.997**	**0.038**	**0.003**
40	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	2-C	100	12.06	62215.192	7194.389	0.007	0.001				
	12	11.82	2-C	100	11.82	60977.078	7051.217	0.007	0.001				
	14	12.03	2-B	70	8.421	49725.224	3296.706	0.004	0.000				
		12.03	2-A	30	3.609	33849.279	1772.510	0.003	0.000				
	15	12.04	1	100	12.04	335099.848	10963.390	0.083	0.001				
	13	15.16	2-B	70	10.612	62662.876	4154.452	0.005	0.000				
		15.16	2-A	30	4.548	42656.281	2233.687	0.003	0.000	**647206.909**	**36668.242**	**0.113**	**0.004**
41	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	3	100	12.06	2.088	0.187	0.000	0.000				

	12	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	14	12.03	2-B	100	12.03	71036.034	4709.580	0.006	0.000				
	15	12.04	2-A	50	6.02	56462.360	2956.639	0.005	0.000				
		12.04	1	50	6.02	167549.924	5481.695	0.042	0.001				
	15	15.16	2-C	100	15.16	78207.488	9043.693	0.009	0.001	**373281.072**	**22193.867**	**0.061**	**0.003**
42	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	0.000	0.000	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	3	100	12.06	2.088	0.187	0.000	0.000				
	12	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	14	12.03	2-B	100	12.03	71036.034	4709.580	0.006	0.000				
	15	12.04	2-B	50	6.02	35547.542	2356.747	0.003	0.000				
		12.04	2-A	50	6.02	56462.360	2956.639	0.005	0.000				
	13	15.16	2-C	100	15.16	78207.488	9043.693	0.009	0.001				
	16	12.07	1	100	12.07	335934.814	10990.708	0.084	0.001	**577211.350**	**30059.434**	**0.106**	**0.003**
43	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	3	100	12.06	2.088	0.187	0.000	0.000				
	12	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	14	12.03	2-B	100	12.03	71036.034	4709.580	0.006	0.000				

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	15	12.04	2-B	100	12.04	71095.083	4713.495	0.006	0.000				
	13	15.16	2-C	100	15.16	78207.488	9043.693	0.009	0.001				
	16	12.07	2-A	60	7.242	67923.657	3556.808	0.005	0.000				
		12.07	1	40	4.828	134373.926	4396.283	0.033	0.000	**422661.453**	**26422.118**	**0.060**	**0.003**
44	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	3	100	12.06	2.088	0.187	0.000	0.000				
	12	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	14	12.03	2-C	100	12.03	62060.427	7176.493	0.007	0.001				
	15	12.04	2-B	100	12.04	71095.083	4713.495	0.006	0.000				
	13	15.16	2-C	100	15.16	78207.488	9043.693	0.009	0.001				
	16	12.07	2-A	50	6.035	56603.047	2964.006	0.005	0.000				
		12.07	1	50	6.035	167967.407	5495.354	0.042	0.001				
	17	12.93	1	100	12.93	359870.518	11773.807	0.089	0.001	**795829.237**	**41169.107**	**0.158**	**0.005**
45	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	3	100	12.06	2.088	0.187	0.000	0.000				
	12	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	14	12.03	3	100	12.03	2.083	0.186	0.000	0.000				

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	15	12.04	2-B	100	12.04	71095.083	4713.495	0.006	0.000				
	13	15.16	3	100	15.16	2.625	0.235	0.000	0.000				
	16	12.07	2-B	50	6.035	35636.115	2362.620	0.003	0.000				
		12.07	2-A	50	6.035	56603.047	2964.006	0.005	0.000				
	17	12.93	2-A	50	6.465	60636.073	3175.195	0.005	0.000				
		12.93	1	50	6.465	179935.259	5886.904	0.045	0.001	**403935.551**	**19104.900**	**0.063**	**0.002**
46	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	3	100	12.06	2.088	0.187	0.000	0.000				
	12	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	14	12.03	3	100	12.03	2.083	0.186	0.000	0.000				
	15	12.04	2-C	100	12.04	62112.015	7182.458	0.007	0.001				
	13	15.16	3	100	15.16	2.625	0.235	0.000	0.000				
	16	12.07	2-B	80	9.656	57017.784	3780.191	0.005	0.000				
		12.07	2-A	20	2.414	22641.219	1185.603	0.002	0.000				
	17	12.93	2-B	70	9.051	53445.315	3543.342	0.004	0.000				
		12.93	1	15	1.9395	53980.578	1766.071	0.013	0.000				
		12.93	2-A	15	1.9395	18190.822	952.558	0.001	0.000	**267417.707**	**18412.904**	**0.033**	**0.002**
47	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.5	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				

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	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	3	100	12.06	2.088	0.187	0.000	0.000				
	12	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	14	12.03	3	100	12.03	2.083	0.186	0.000	0.000				
	15	12.04	2-C	100	12.04	62112.015	7182.458	0.007	0.001				
	13	15.16	3	100	15.16	2.625	0.235	0.000	0.000				
	16	12.07	2-C	100	12.07	62266.780	7200.355	0.007	0.001				
	17	12.93	2-C	25	3.23	16675.838	1928.347	0.002	0.000				
		12.93	2-B	50	6.47	38175.225	2530.959	0.003	0.000				
		12.93	2-A	25	3.23	30318.036	1587.597	0.002	0.000	**209577.868**	**20432.396**	**0.022**	**0.003**
48	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.50	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				
	9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
	10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	11	12.06	3	100	12.06	2.088	0.187	0.000	0.000				
	12	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
	14	12.03	3	100	12.03	2.083	0.186	0.000	0.000				
	15	12.04	2-C	100	12.04	62112.015	7182.458	0.007	0.001				
	13	15.16	3	100	15.16	2.625	0.235	0.000	0.000				
	16	12.07	2-C	100	12.07	62266.780	7200.355	0.007	0.001				
	17	12.93	2-C	100	12.93	66703.352	7713.387	0.008	0.001	**191112.121**	**22098.880**	**0.022**	**0.003**
49	1	18.04	3	100	18.04	3.123	0.279	0.000	0.000				
	2	12.44	3	100	12.44	2.154	0.193	0.000	0.000				
	4	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	3	10.98	3	100	10.98	1.901	0.170	0.000	0.000				
	5	11.15	3	100	11.15	1.930	0.173	0.000	0.000				
	7	12.13	3	100	12.13	2.100	0.188	0.000	0.000				
	6	12.5	3	100	12.50	2.164	0.194	0.000	0.000				
	8	11.94	3	100	11.94	2.067	0.185	0.000	0.000				

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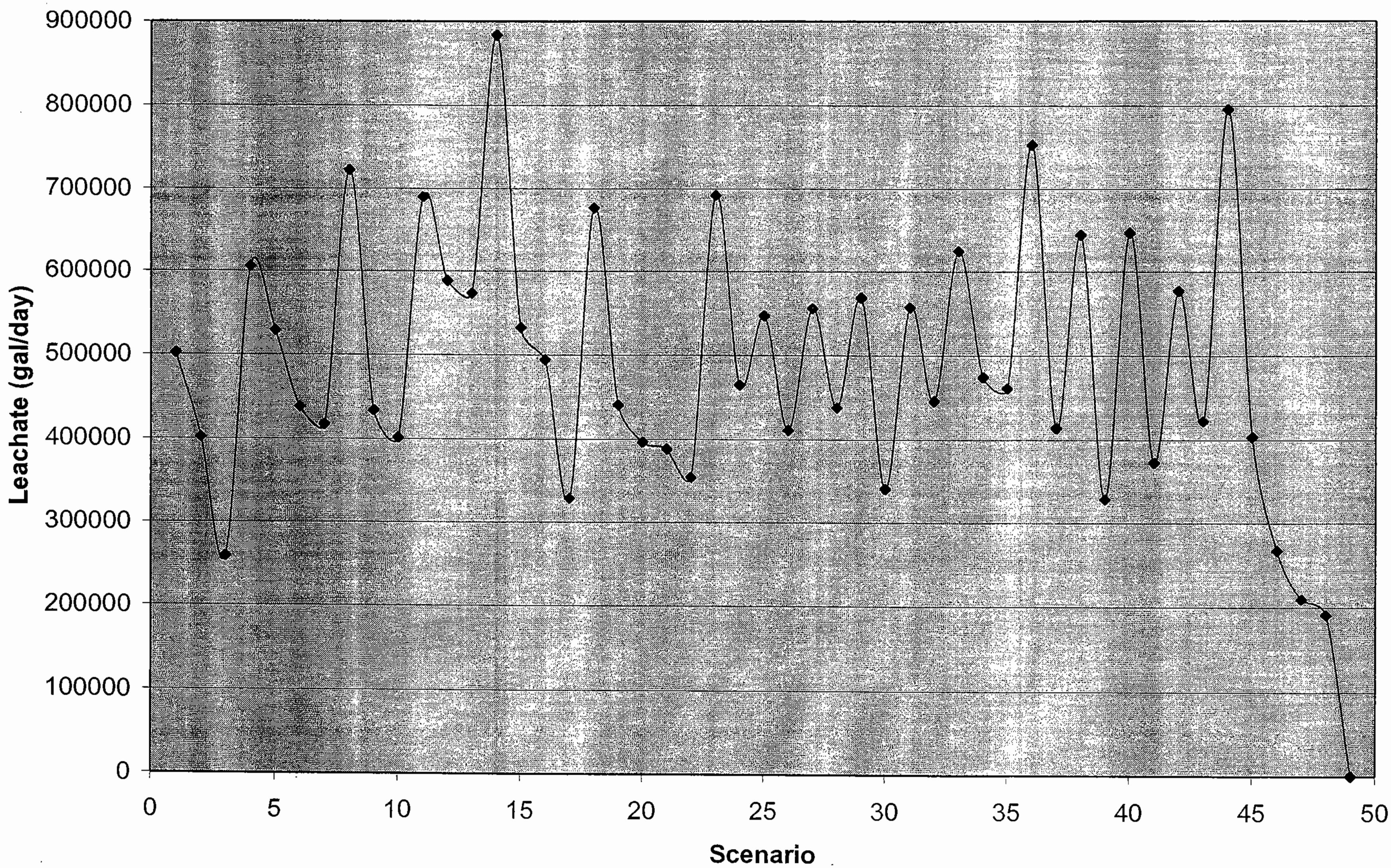
9	10.07	3	100	10.07	1.743	0.156	0.000	0.000				
10	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
11	12.06	3	100	12.06	2.088	0.187	0.000	0.000				
12	11.82	3	100	11.82	2.046	0.183	0.000	0.000				
14	12.03	3	100	12.03	2.083	0.186	0.000	0.000				
15	12.04	3	100	12.04	2.085	0.186	0.000	0.000				
13	15.16	3	100	15.16	2.625	0.235	0.000	0.000				
16	12.07	3	100	12.07	2.090	0.187	0.000	0.000				
17	12.93	3	100	12.93	2.239	0.200	0.000	0.000	**36.386**	**3.254**	**0.000**	**0.000**

Peak Total Leachate in Primary Geocomposite for Scenarios



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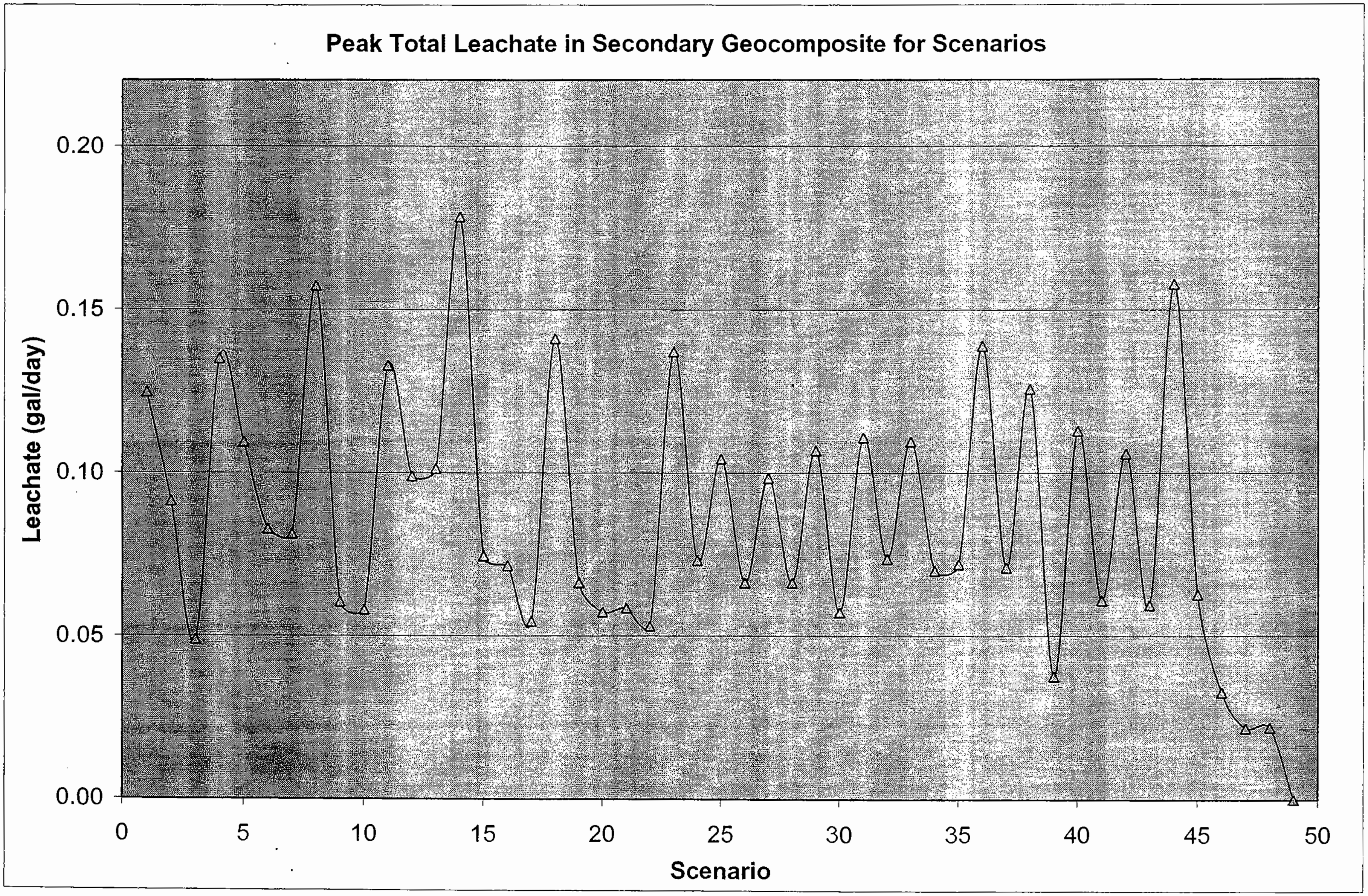
Peak Total Leachate in Secondary Geocomposite for Scenarios
Leachate (gal/day)
0.20
0.15
0.10
0.05
0.00
0
5
10
15
20
25
30
35
40
45
50
Scenario

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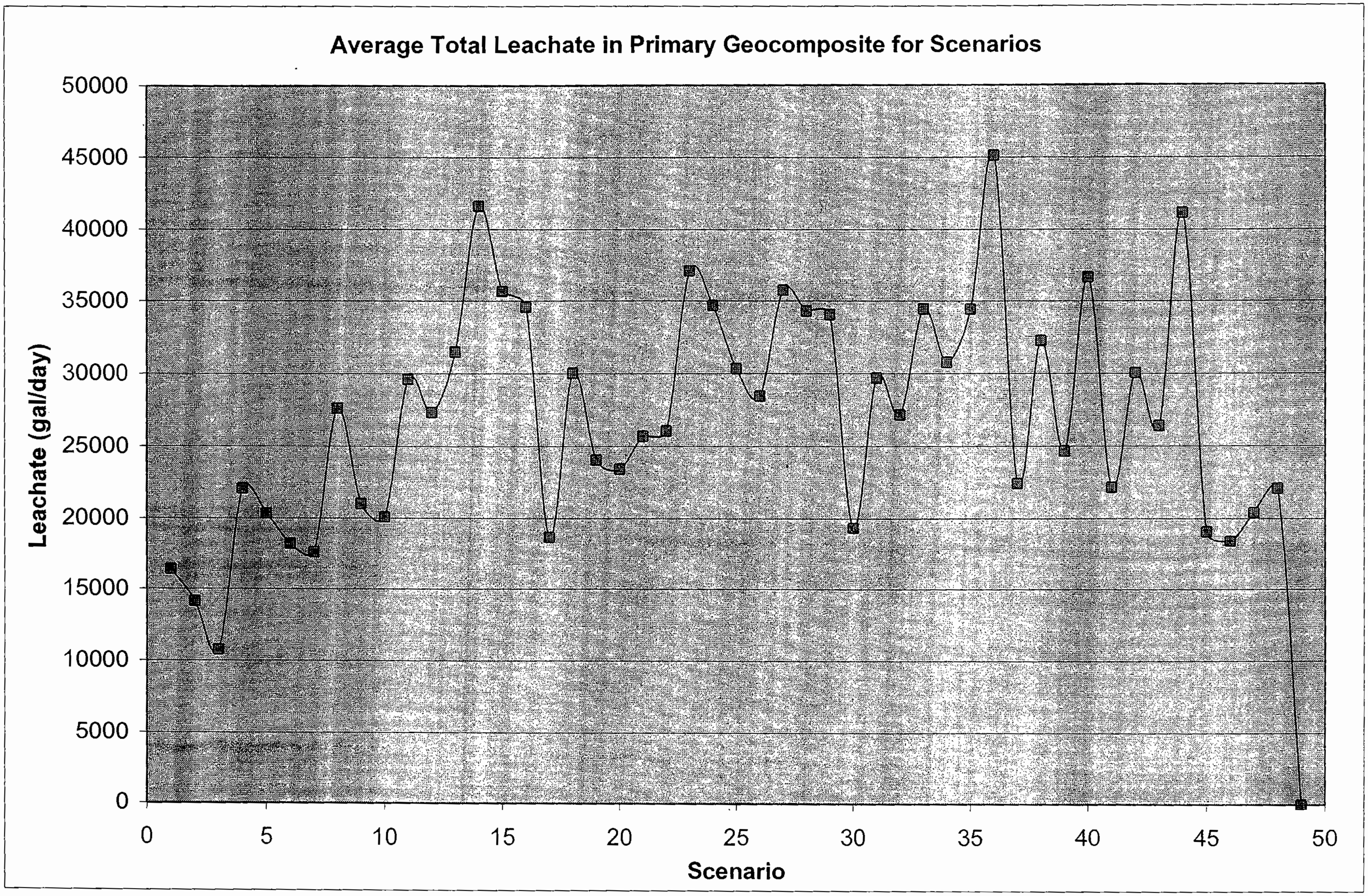
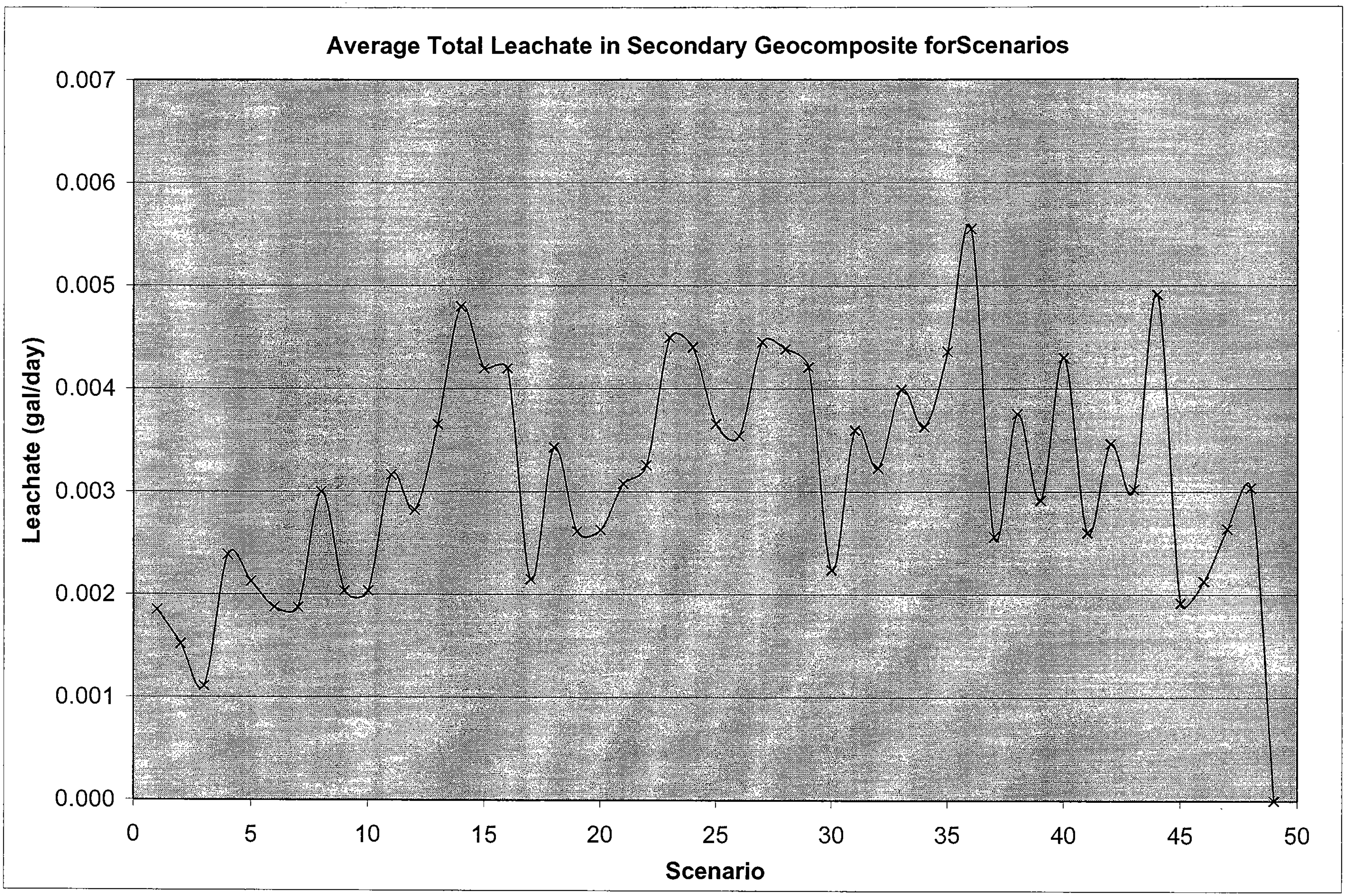


Average Total Leachate in Primary Geocomposite for Scenarios
Leachate (gal/day)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
0
5
10
15
20
25
30
35
40
45
50
Scenario


Average Total Leachate in Secondary Geocomposite forScenarios
Leachate (gal/day)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
0 5 10 15 20 25 30 35 40 45 50
Scenario

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Attachment 9

Spreadsheet for Leakage Estimates for Critical Scenario

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LEAKAGE FOR CRITICAL SCENARIO

Case	Surface Slope (%)	Height Waste (ft)	HELP RESULTS Peak Daily Leakage to Groundwater Per Acre (Gal)	USED IN CALCULATIONS Average Peak Leakage for Cases (gal/day/acre)
1	5	10	0.000150	0.00011
	25	10	0.000075	
2-A	5	30	0.000150	0.00015
	25	30	0.000150	
2-B	5	60	0.000150	0.00015
	25	60	0.000150	
2-C	5	95	0.000150	0.00015
	25	95	0.000150	
3	5	95	0.000150	0.00011
	25	95	0.000075	

Critical Scenario

No. Scenario	Cells	Area of Cell (acres)	Case Applied	Area under Case (%)	Total Area per Cell(acres)	Peak Leakage Per Cell (gal/day)
14	1	18.04	2-C	66.66	12.025	0.001799
		18.04	2-B	33.33	6.013	0.000900
	2	12.44	2-C	66.66	8.293	0.001241
		12.44	2-B	33.33	4.146	0.000620
	4	10.98	2-A	50	5.490	0.000821
		10.98	1	50	5.490	0.000616
	3	10.98	2-A	50	5.490	0.000821
		10.98	1	50	5.490	0.000616
	5	11.15	1	100	11.150	0.001251

Total Leakage for Critical Scenario= 0.01 gal/day
Total Area= 63.587 acres

Attachment 10

Spreadsheet for Verification of Heads Using Giroud's Method

Giroud's Method for Verification of Heads

θ1	Hydraulic transmissivity of primary geocomposite
θ2	Hydraulic transmissivity of sand
k1=	Hydraulic conductivity of primary geocomposite
k2=	Hydraulic conductivity of sand
qh=	Rate of liquid supply
L_u	Lenth of upstream section
t_1	Thickness of geocomposite
t_2	Thickness of sand

Case	Surface Slope %	Bottom Slope %	Drainage Length, L (ft)	Height Waste (ft)	t1, m	t2, m	θ1, m^2/sec	θ2, m^2/sec	k1, m/sec	k2, m/sec	Average Annual Total Lateral Drainage Per Acre (in/year)	qh (in/day)	qh (m/sec)	Lu, m	hmax, (m)	hmax, (in)
1	5	2	192	10	0.0075	0.61	1.65E-03	0.0001	0.22	0.0001	12.24	0.034	9.86E-09	3348	0.00043	0.017
	25	2	41	10	0.0075	0.61	1.65E-03	0.0001	0.22	0.0001	12.24	0.034	9.86E-09	3350	0.00009	0.0036
												0.000				
2-A	5	1.5	192	30	0.0075	0.61	9.40E-04	0.0001	0.13	0.0001	6.61	0.018	5.33E-09	2646	0.00054	0.021
	25	1.5	41	30	0.0075	0.61	9.40E-04	0.0001	0.13	0.0001	6.56	0.018	5.28E-09	2667	0.00012	0.0046
2-B	5	1.5	192	60	0.0073	0.61	8.65E-04	0.0001	0.12	0.0001	5.33	0.015	4.29E-09	3024	0.00047	0.018
	25	1.5	41	60	0.0073	0.61	8.65E-04	0.0001	0.12	0.0001	5.20	0.014	4.19E-09	3101	0.00010	0.0038
2-C	5	1	192	95	0.0070	0.61	7.68E-04	0.0001	0.11	0.0001	8.03	0.022	6.47E-09	1188	0.0011	0.045
	25	1	41	95	0.0070	0.61	7.68E-04	0.0001	0.11	0.0001	8.01	0.022	6.45E-09	1191	0.00024	0.0095
3	5	1	192	95	0.0070	0.61	3.23E-04	0.0001	0.046	0.0001	0.00000	0.0000	0.0000	-	0.00000	0.0000
	25	1	41	95	0.0070	0.61	3.23E-04	0.0001	0.046	0.0001	0.00000	0.0000	0.0000	-	0.00000	0.0000

Equations:

$$L_u = \frac{\theta_1 \sin\beta}{q_h} \qquad h_{\max} \approx \frac{q_h L}{k_1 \tan\beta}$$

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Attachment 11

Data for Leachate Collection System Pipe Design

Designation: D 448 – 86

1981223

Standard Classification for Sizes of Aggregate for Road and Bridge Construction[1]

This standard is issued under the fixed designation D 448; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This classification defines aggregate size designations and ranges in mechanical analyses for standard sizes of coarse aggregate and screenings for use in the construction and maintenance of various types of highways and bridges.

1.2 With regard to sieve sizes and the size of aggregate as determined by the use of testing sieves, the values in inch-pound units are shown for the convenience of the user; however, the standard sieve designation shown in parentheses is the standard value as stated in Specification E 11.

2. Referenced Documents

2.1 *ASTM Standards:*

C 136 Method for Sieve Analysis of Fine and Coarse Aggregates[2]

D 75 Practice for Sampling Aggregates[3]

E 11 Specification for Wire-Cloth Sieves for Testing Purposes[4]

3. Significance and Use

3.1 Contract documents may specify certain of thes aggregate sizes for specific uses or may suggest one or mor of these sizes as appropriate for the preparation of variou end-product mixtures. In some cases, closer limits on vari ability of the aggregate grading may be required.

4. Manufacture

4.1 The standard sizes of aggregate described in thi classification may be manufactured by means of any suitabl process used to separate raw material into the desired siz ranges. Standard sizes may also be produced by blending tw or more different components.

5. Standard Sizes

5.1 Standard sizes of coarse aggregate shall comply witl the sizes given in Table 1. All sizes shall be determined b means of laboratory sieves having square openings an conforming to Specification E 11.

6. Basis of Classification

6.1 Classification is based upon the size number and siz ranges shown in Table 1 with the aggregate sampled i accordance with Practice D 75 and tested for grading b Method C 136.

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[1] This classification is under the jurisdiction of ASTM Committee D-4 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.50 on Aggregate Specifications.

Current edition approved March 27, 1986. Published June 1986. Originally published as D 448 – 37T. Last previous edition D 448 – 80.

[2] *Annual Book of ASTM Standards*, Vols 04.02 and 04.03.

[3] *Annual Book of ASTM Standards*, Vol 04.03.

[4] *Annual Book of ASTM Standards*, Vols 04.01 and 14.02.

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TABLE 1 Standard Sizes of Processed Aggregate

Size Number	Nominal Size, Square Openings	Amounts Finer than Each Laboratory Sieve (Square Openings), weight percent														
		4-in. (100-mm)	3½-in. (90-mm)	3-in. (75-mm)	2½-in. (63-mm)	2-in. (50-mm)	1½-in. (37.5-mm)	1-in. (25.0-mm)	¾-in. (19.0-mm)	½-in. (12.5-mm)	⅜-in. (9.5-mm)	No. 4 (4.75-mm)	No. 8 (2.36-mm)	No. 16 (1.18-mm)	No. 50 (300-µm)	No. 100 (150-µm)
1	3½ to 1½-in. (90 to 37.5-mm)	100	90 to 100	...	25 to 60	...	0 to 15	...	0 to 5	...	...	...	...	...	...	...
2	2½ to 1½-in. (63 to 37.5-mm)	...	...	100	90 to 100	35 to 70	0 to 15	...	0 to 5	...	...	...	...	...	...	...
24	2½ to ¾-in. (63 to 19.0-mm)	...	...	100	90 to 100	...	25 to 60	...	0 to 10	0 to 5	...	...	...	...	...	...
3	2 to 1-in. (50 to 25.0-mm)	...	...	...	100	90 to 100	35 to 70	0 to 15	...	0 to 5	...	...	...	...	...	...
357	2-in. to No. 4 (50 to 4.75-mm)	...	...	...	100	95 to 100	...	35 to 70	...	10 to 30	...	0 to 5	...	...	...	...
4	1½ to ¾-in. (37.5 to 19.0-mm)	...	...	...	...	100	90 to 100	20 to 55	0 to 15	...	0 to 5	...	...	...	...	...
467	1½-in. to No. 4 (37.5 to 4.75-mm)	...	...	...	...	100	95 to 100	...	35 to 70	...	10 to 30	0 to 5	...	...	...	...
5	1 to ½-in. (25.0 to 12.5-mm)	...	...	...	...	...	100	90 to 100	20 to 55	0 to 10	0 to 5	...	...	...	...	...
56	1 to ⅜-in. (25.0 to 9.5-mm)	...	...	...	...	...	100	90 to 100	40 to 85	10 to 40	0 to 15	0 to 5	...	...	...	...
57	1-in. to No. 4 (25.0 to 4.75-mm)	...	...	...	...	...	100	95 to 100	...	25 to 60	...	0 to 10	0 to 5	...	...	...
6	¾ to ⅜-in. (19.0 to 9.5-mm)	...	...	...	...	...	...	100	90 to 100	20 to 55	0 to 15	0 to 5	...	...	...	...
67	¾-in. to No. 4 (19.0 to 4.75-mm)	...	...	...	...	...	...	100	90 to 100	...	20 to 55	0 to 10	0 to 5	...	...	...
68	¾-in. to No. 8 (19.0 to 2.36-mm)	...	...	...	...	...	...	100	90 to 100	...	30 to 65	5 to 25	0 to 10	0 to 5	...	...
7	½-in. to No. 4 (12.5 to 4.75-mm)	...	...	...	...	...	...	...	100	90 to 100	40 to 70	0 to 15	0 to 5	...	...	...
78	½-in. to No. 8 (12.5 to 2.36-mm)	...	...	...	...	...	...	...	100	90 to 100	40 to 75	5 to 25	0 to 10	0 to 5	...	...
8	⅜-in. to No. 8 (9.5 to 2.36-mm)	...	...	...	...	...	...	...	...	100	85 to 100	10 to 30	0 to 10	0 to 5	...	...
89	⅜-in. to No. 16 (9.5 to 1.18-mm)	...	...	...	...	...	...	...	...	100	90 to 100	20 to 55	5 to 30	0 to 10	0 to 5	...
9	No. 4 to No. 16 (4.75 to 1.18-mm)	...	...	...	...	...	...	...	...	...	100	85 to 100	10 to 40	0 to 10	0 to 5	...
10	No. 4 to 0[A] (4.75-mm)	...	...	...	...	...	...	...	...	...	100	85 to 100	...	...	...	10 to 30

[A] Screenings.

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Manning's Coefficient

(from Chevron 1994)

Surface	n, Range	n, Design
Polyethylene pipe	0.008-0.011	0.009
Uncoated cast or ductile iron pipe	0.012-0.015	0.013
Corrugated steel pipe	0.021-0.030	0.024
Concrete pipe	0.012-0.016	0.015
Vitrified clay pipe	0.011-0.017	0.013
Brick & cement mortar sewers	0.012-0.017	0.015
Wood stave	0.010-0.013	0.011
Rubble masonry	0.017-0.030	0.021

001/223

6" → $\frac{B_c}{2H} = \frac{0.552'}{2 \times 1} = 0.276$

$\frac{L}{2H} = \frac{3'}{2 \times 1} = 1.5$

$C_s = 0.324$

8" → $\frac{B_c}{2H} = \frac{0.7188'}{2 \times 1} = 0.36$

$\frac{L}{2H} = \frac{3'}{2 \times 1} = 1.5$

C_s 0.383

Values of Load Coefficients, C_s, for Concentrated and Distributed Superimposed Loads Vertically Centered over Sewer Pipe[a]

$\frac{D}{2H}$ or $\frac{B_c}{2H}$ (1)	$\frac{M}{2H}$ or $\frac{L}{2H}$: 0.1 (2)	0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)	0.6 (7)	0.7 (8)	0.8 (9)	0.9 (10)	1.0 (11)	1.2 (12)	1.5 (13)	2.0 (14)	5.0 (15)
0.1	0.019	0.037	0.053	0.067	0.079	0.089	0.097	0.103	0.108	0.112	0.117	0.121	0.124	0.128
0.2	0.037	0.072	0.103	0.131	0.155	0.174	0.189	0.202	0.211	0.219	0.229	0.238	0.244	0.248
0.3	0.053	0.103	0.149	0.190	0.224	0.252	0.274	0.292	0.306	0.318	0.333	0.345	0.355	0.360
0.4	0.067	0.131	0.190	0.241	0.284	0.320	0.349	0.373	0.391	0.405	0.425	0.440	0.454	0.460
0.5	0.079	0.155	0.224	0.284	0.336	0.379	0.414	0.441	0.463	0.481	0.505	0.525	0.540	0.548
0.6	0.089	0.174	0.252	0.320	0.379	0.428	0.467	0.499	0.524	0.544	0.572	0.596	0.613	0.624
0.7	0.097	0.189	0.274	0.349	0.414	0.467	0.511	0.546	0.584	0.597	0.628	0.650	0.674	0.688
0.8	0.103	0.202	0.292	0.373	0.441	0.499	0.546	0.584	0.615	0.639	0.674	0.703	0.725	0.740
0.9	0.108	0.211	0.306	0.391	0.463	0.524	0.574	0.615	0.647	0.673	0.711	0.742	0.766	0.784
1.0	0.112	0.219	0.318	0.405	0.481	0.544	0.597	0.639	0.673	0.701	0.740	0.774	0.800	0.816
1.2	0.117	0.229	0.333	0.425	0.505	0.572	0.628	0.674	0.711	0.740	0.783	0.820	0.849	0.868
1.5	0.121	0.238	0.345	0.440	0.525	0.596	0.650	0.703	0.742	0.774	0.820	0.861	0.894	0.916
2.0	0.124	0.244	0.355	0.454	0.540	0.613	0.674	0.725	0.766	0.800	0.849	0.894	0.930	0.956

[a] Influence coefficients for solution of Holl's and Newmark's integration of the Boussinesq equation for vertical stress.

PE 3408 Industrial Piping System
Pipe Data and Pressure Ratings

Bulletin No. 301

Chevron **Plexco**

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(Pipe weights are calculated in accordance with PPI TR-7) Average inside diameter calculated in using nominal OD and minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary. When designing components to fit the pipe ID, refer to pipe dimensions and tolerances in applicable pipe specifications.

Pressure Ratings are for water at 73ºF. For other fluids and service temperatures ratings may differ, refer to Plexco/Spirolite Engineering Manual Book 1 Engineering Properties.

Pressure Rating		255 psi DR 7.3			200 psi DR 9.0			160psi DR 11.0			130 psi DR 13.5			110 psi DR 15.5			
IPS* Pipe Size	Nominal OD (in.)	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	IPS* Pipe Size
1¼"	1.660	0.227	1.179	0.44	0.184	1.270	0.37	0.151	1.340	0.31	0.123	1.399	0.26	0.107	1.433	0.23	1¼"
1½"	1.900	0.260	1.349	0.58	0.211	1.453	0.49	0.173	1.533	0.41	0.141	1.601	0.34	0.123	1.639	0.30	1½"
2"	2.375	0.325	1.686	0.91	0.264	1.815	0.76	[redacted]	[redacted]	0.64	0.176	2.002	0.53	0.153	2.051	0.47	2"
3"	3.500	0.479	2.485	1.98	0.389	2.675	1.65	0.318	2.826	1.39	0.259	2.951	1.15	0.226	3.021	1.02	3"
4"	4.500	0.616	3.194	3.27	0.500	3.440	2.74	[redacted]	[redacted]	2.30	0.333	3.794	1.90	0.290	3.885	1.67	4"
5⅜"	5.375	0.736	3.815	4.66	0.597	4.109	3.90	0.489	4.338	3.27	0.398	4.531	2.72	0.347	4.639	2.40	5⅜"
5"	5.563	0.762	3.948	5.00	0.618	4.253	4.18	0.506	4.490	3.50	0.412	4.690	2.91	0.359	4.802	2.57	5"
6"	6.625	0.908	4.700	7.09	0.736	5.065	5.93	[redacted]	[redacted]	4.97	0.491	5.584	4.13	0.427	5.720	3.64	6"
7⅛"	7.125	0.976	5.056	8.20	0.792	5.446	6.87	0.648	5.751	5.75	0.528	6.006	4.78	0.460	6.150	4.21	7⅛"
8"	8.625	1.182	6.119	12.01	0.958	6.594	10.05	0.784	6.963	8.42	0.639	7.270	7.00	0.556	7.446	6.16	8"
10"	10.750	1.473	7.627	18.66	1.194	8.219	15.62	0.977	8.679	13.09	0.796	9.062	10.87	0.694	9.279	9.59	10"
12"	12.750	1.747	9.046	26.25	1.417	9.746	21.97	1.159	10.293	18.42	0.944	10.749	15.30	0.823	11.005	13.47	12"
13⅜"	13.375	1.832	9.491	28.88	1.486	10.225	24.17	1.216	10.797	20.26	0.991	11.274	16.83	0.863	11.545	14.83	13⅜"
14"	14.000	1.918	9.934	31.64	1.556	10.701	26.49	1.273	11.301	22.20	1.037	11.802	18.44	0.903	12.086	16.24	14"
16"	16.000	2.192	11.353	41.34	1.778	12.231	34.61	1.455	12.915	29.00	1.185	13.488	24.09	1.032	13.812	21.21	16"
18"	18.000	2.466	12.772	52.31	2.000	13.760	43.79	1.636	14.532	36.69	1.333	15.174	30.48	1.161	15.539	26.85	18"
20"	20.000	2.740	14.191	64.57	2.222	15.289	54.05	1.818	16.146	45.30	1.481	16.860	37.64	1.290	17.265	33.13	20"
22"	22.000	3.014	15.610	78.15	2.444	16.819	65.41	2.000	17.760	54.82	1.630	18.544	45.56	1.419	18.992	40.09	22"
24"	24.000	3.288	17.029	92.99	2.667	18.346	77.85	2.182	19.374	65.24	1.778	20.231	54.22	1.548	20.718	47.72	24"
†26"	26.000	3.562	18.449	109.15	2.889	19.875	91.35	2.364	20.988	76.58	1.926	21.917	63.63	1.677	22.445	56.02	†26"
†28"	28.000				3.111	21.405	105.96	2.545	22.605	88.79	2.074	23.603	73.76	1.806	24.171	64.94	†28"
†30"	30.000				3.333	22.934	121.62	2.727	24.219	101.94	2.222	25.289	84.68	1.935	25.898	74.56	†30"
†32"	32.000							2.909	25.833	115.99	2.370	26.976	96.35	2.065	27.622	84.88	†32"
†34"	34.000							3.091	27.447	130.92	2.519	28.660	108.80	2.194	29.349	95.83	†34"
†36"	36.000													2.323	31.075	107.40	†36"
†42"	42.000																†42"
†48"	48.000																†48"
†54"	54.000																†54"

*Industrial PE (polyethylene) pipe sizes are identified by IPS (iron pipe size) diameters which designate the nominal diameter for 12" IPS AND SMALLER PIPE, AND O.D. (outside diameter) for 14" IPS and larger pipe.

PLEXCO can produce to specialized pipe dimensions. Check with your PLEXCO sales office for availability of dimensions not listed.
†SUBJECT TO MINIMUM ORDER QUANTITIES, AND AVAILABILITY OF TOOLING.

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PE 3408 Industrial Piping System
Pipe Data and Pressure Ratings

Bulletin No. 301

Chevron Plexco

(Pipe weights are calculated in accordance with PPI TR-7) Average inside diameter calculated in using nominal OD and minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary. When designing components to fit the pipe ID, refer to pipe dimensions and tolerances in applicable pipe specifications.

Pressure Ratings are for water at 73ºF. For other fluids and service temperatures ratings may differ, refer to Plexco/Spirolite Engineering Manual Book 1 Engineering Properties.

Pressure Rating		100 psi DR 17.0			80 psi DR 21.0			65psi DR 26.0			50 psi DR 32.5			40 psi DR 41.0			
IPS Pipe Size	Nominal OD (in.)	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	Minimum Wall (in.)	Average ID (in.)	Weight LB/FT	IPS Pipe Size
1¼"																	1¼"
1½"																	1½"
2"	2.375	0.140	2.078	0.43													2"
3"	3.500	0.206	3.063	0.93													3"
4"	4.500	0.265	3.938	1.54	0.214	4.046	1.26										4"
5⅜"	5.375	0.316	4.705	2.20	0.256	4.832	1.80	0.207	4.936	1.47							5⅜"
5"	5.563	0.327	4.870	2.35	0.265	5.001	1.93	0.214	5.109	1.58							5"
6"	6.625	0.390	5.798	3.34	0.315	5.957	2.73	0.255	6.084	2.23	0.204	6.193	1.80				6"
7⅛"	7.125	0.419	6.237	3.86	0.339	6.406	3.16	0.274	6.544	2.58	0.219	6.661	2.08				7⅛"
8"	8.625	0.507	7.550	5.65	0.411	7.754	4.64	0.332	7.921	3.79	0.265	8.063	3.05				8"
10"	10.750	0.632	9.410	8.78	0.512	9.665	7.21	0.413	9.874	5.87	0.331	10.048	4.75				10"
12"	12.750	0.750	11.160	12.36	0.607	11.463	10.13	0.490	11.711	8.26	0.392	11.919	6.67				12"
13⅜"	13.375	0.787	11.707	13.60	0.637	12.025	11.15	0.514	12.285	9.09	0.412	12.502	7.35				13⅜"
14"	14.000	0.824	12.253	14.91	0.667	12.586	12.22	0.538	12.859	9.96	0.431	13.086	8.05				14"
16"	16.000	0.941	14.005	19.46	0.762	14.385	15.97	0.615	14.696	13.02	0.492	14.957	10.51				16"
18"	18.000	1.059	15.755	24.65	0.857	16.183	20.19	0.692	16.533	16.48	0.554	16.826	13.29				18"
20"	20.000	1.176	17.507	30.42	0.952	17.982	24.92	0.769	18.370	20.34	0.615	18.696	16.41				20"
22"	22.000	1.294	19.257	36.81	1.048	19.778	30.19	0.846	20.206	24.62	0.677	20.565	19.87				22"
24"	24.000	1.412	21.007	43.82	1.143	21.577	35.92	0.923	22.043	29.29	0.738	22.435	23.62				24"
†26"	26.000	1.529	22.759	51.40	1.238	23.375	42.13	1.000	23.880	34.39	0.800	24.304	27.74				†26"
†28"	28.000	1.647	24.508	59.62	1.333	25.174	48.86	1.077	25.717	39.89	0.862	26.173	32.20				†28"
†30"	30.000	1.765	26.258	68.45	1.429	26.971	56.13	1.154	27.554	45.78	0.923	28.043	36.92	0.732	28.448	29.50	†30"
†32"	32.000	1.882	28.010	77.86	1.524	28.769	63.83	1.231	29.390	52.10	0.985	29.912	42.04	0.780	30.346	33.53	†32"
†34"	34.000	2.000	29.760	87.91	1.619	30.568	72.06	1.308	31.227	58.79	1.046	31.782	47.44	0.829	32.243	37.87	†34"
†36"	36.000	2.118	31.510	98.56	1.714	32.366	80.79	1.385	33.064	65.93	1.108	33.651	53.18	0.878	34.139	42.47	†36"
†42"	42.000				2.000	37.760	109.97	1.615	38.576	89.71	1.292	39.261	72.40	1.024	39.829	57.74	†42"
†48"	48.000				2.286	43.154	143.64	1.846	44.086	117.20	1.477	44.869	94.58	1.171	45.517	75.48	†48"
†54"	54.000				2.571	48.549	181.74	2.077	49.597	148.35	1.662	50.477	119.72	1.317	51.208	95.52	†54"

*Industrial PE (polyethylene) pipe sizes are identified by IPS (iron pipe size) diameters which designate the nominal diameter for 12" IPS AND SMALLER PIPE, AND O.D. (outside diameter) for 14" IPS and larger pipe.

PLEXCO can produce to specialized pipe dimensions. Check with your PLEXCO sales office for availability of dimensions not listed.
†SUBJECT TO MINIMUM ORDER QUANTITIES, AND AVAILABILITY OF TOOLING.

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a comparison, the short-term modulus, derived from short-term tensile tests, is between 100,000 to 130,000 psi. Figure 3.11 represents typical tensile creep moduli data for polyethylene.

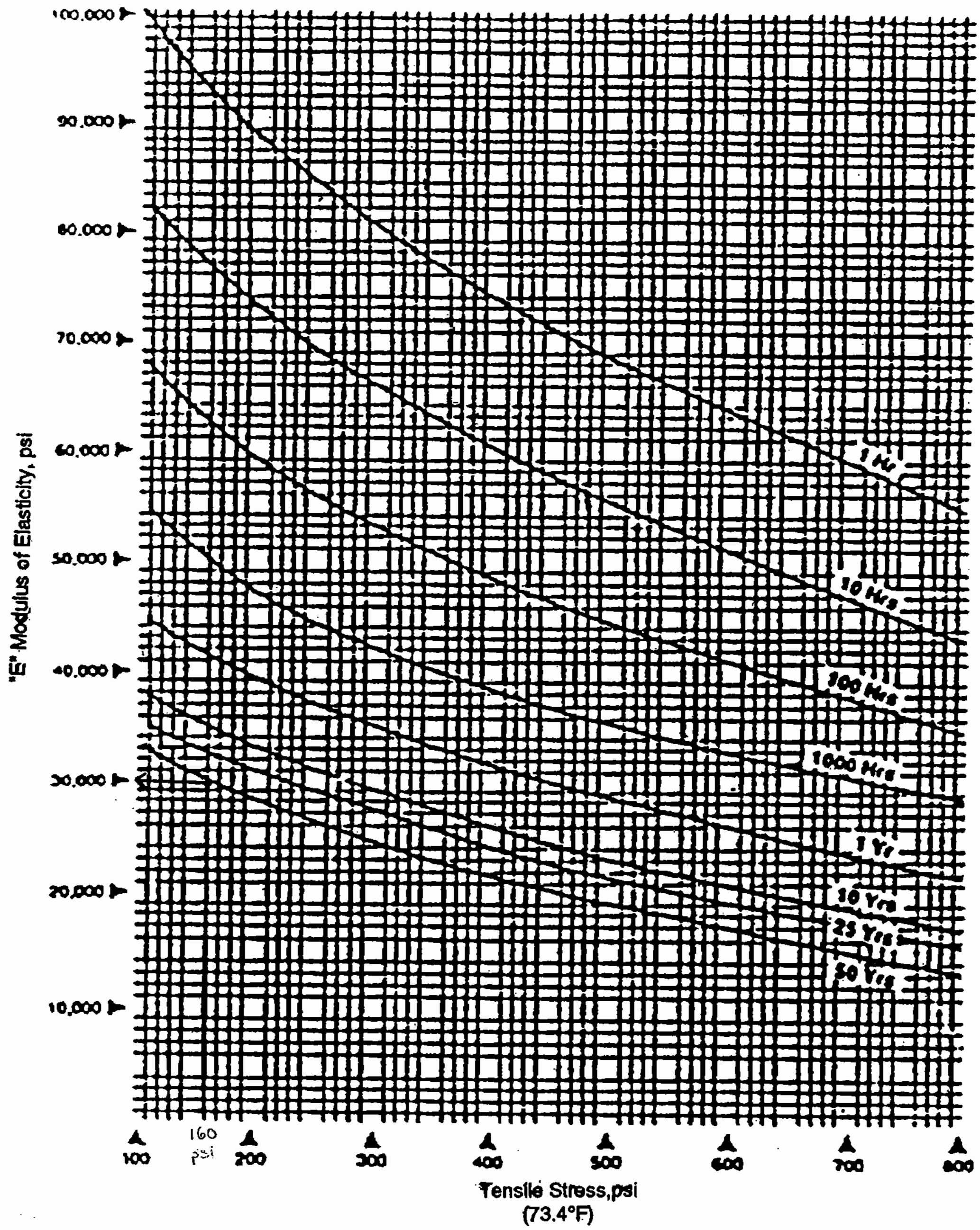

Figure 3.11. Tensile Creep Modulus versus Stress Intensity for a High-Density Polyethylene

Modulus of Soil Reaction (E') for Pipe Bedding Material.
(from Selig, 1990)

Soil Type: SW, SP, GW, GP						
Stress level	95% D698			85% D698		
psi (kPa)	E_s	B	ν_s	E_s	B	ν_s
1 (7)	1600 (11)	2800 (19)	0.40	1300 (9)	900 (6)	0.26
5 (34)	4100 (28)	3300 (23)	0.29	2100 (14)	1200 (8)	0.21
10 (70)	6000 (41)	3900 (27)	0.24	2600 (18)	1400 (10)	0.19
20 (140)	8600 (59)	5300 (37)	0.23	3300 (23)	1800 (12)	0.19
40 (280)	13000 (90)	8700 (60)	0.25	4100 (28)	2500 (17)	0.23
60 (410)	16000 (110)	13000 (90)	0.29	4700 (32)	3500 (24)	0.28

Soil Type: GM, SM, ML, and GC, SC with < 20% fines						
Stress level	95% D698			85% D698		
psi (kPa)	E_s	B	ν_s	E_s	B	ν_s
1 (7)	1800 (12)	1900 (13)	0.34	600 (4)	400 (3)	0.25
5 (34)	2500 (17)	2000 (14)	0.29	700 (5)	450 (3)	0.24
10 (70)	2900 (20)	2100 (14)	0.27	800 (6)	500 (3)	0.23
20 (140)	3200 (22)	2500 (17)	0.29	850 (6)	700 (5)	0.30
40 (280)	3700 (25)	3400 (23)	0.32	900 (6)	1200 (8)	0.38
60 (410)	4100 (28)	4500 (31)	0.35	1000 (7)	1800 (12)	0.41

Soil Type: CL, MH, GC, SC						
Stress level	95% D698			85% D698		
psi (kPa)	E_s	B	ν_s	E_s	B	ν_s
1 (7)	400 (3)	800 (6)	0.42	100 (1)	100 (1)	0.33
5 (34)	800 (6)	900 (6)	0.35	250 (2)	200 (1)	0.29
10 (70)	1100 (8)	1000 (7)	0.32	400 (3)	300 (2)	0.28
20 (140)	1300 (9)	1100 (8)	0.30	600 (4)	400 (3)	0.25
40 (280)	1400 (10)	1600 (11)	0.35	700 (5)	800 (6)	0.35
60 (410)	1500 (10)	2100 (14)	0.38	800 (6)	1300 (9)	0.40

Note: Units of E_s and B are psi (MPa).

Deflections of buried flexible pipe are commonly calculated using the Iowa formula [1] which uses the modulus of soil reaction (E') as the parameter representing soil stiffness. Since E' is not a directly measureable soil parameter, but must be determined by back-calculation using observed pipe deflections, studies have been carried out to seek a correlation between E' and soil stiffness parameters such as Young's modulus (E_s) and constrained modulus (M_s), where E_s and M_s are related

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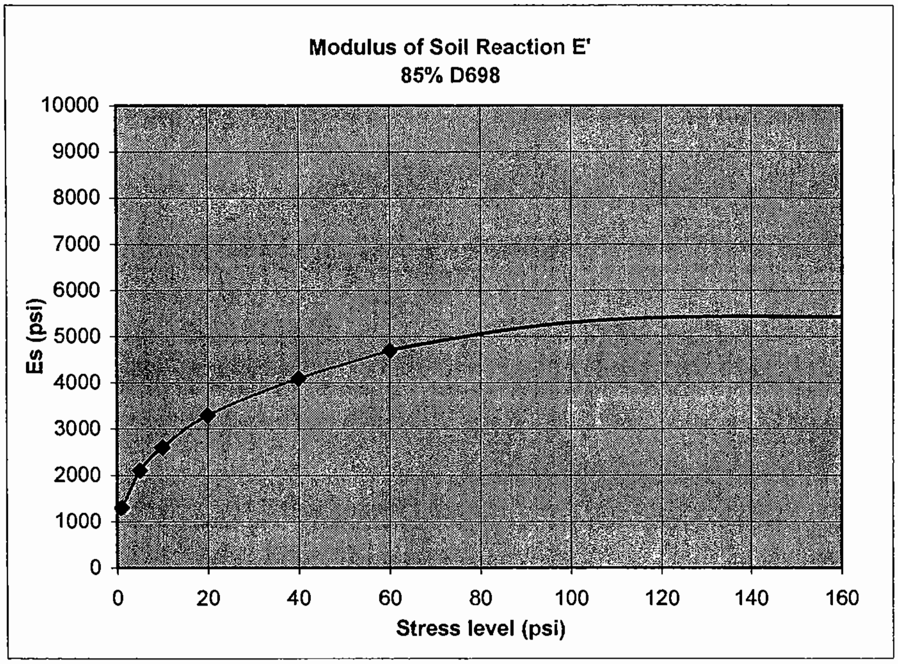
Plot for Modulus of Soil Reaction (E') for Pipe Bedding Material
85% D698
Selig, 1990

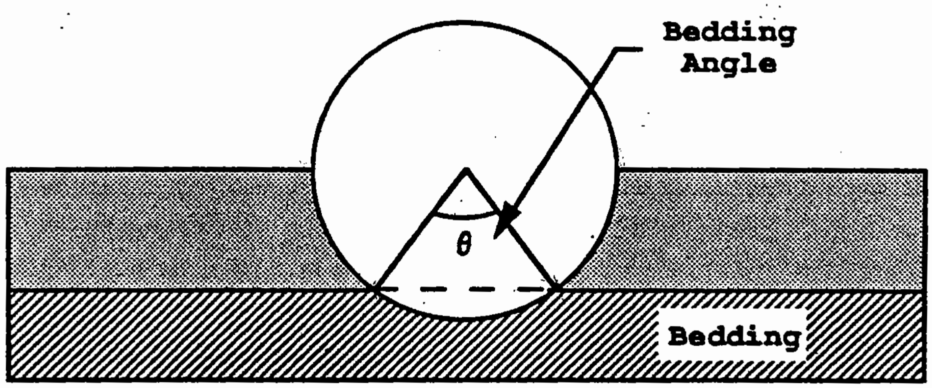
GW, 85% D698

Stress level psi	Es psi
1	1300
5	2100
10	2600
20	3300
40	4100
60	4700



Values of Bedding Constant

Bedding Angle (degrees)	K
0	0.110
30	0.108
45	0.105
60	0.102
90	0.096
120	0.090
180	0.083



(from Wilson-Fahmy and Koerner, 1994)

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Pecan Row - 18 in. Riser Pipe Structural Stability

Gina Kates Martin

Calculate the ring deflection using the Modified Iowa Equation:

$$\Delta X = \frac{D_L K W_c}{(EI/r^3) + (0.061E')}$$

Input parameters:

D_L	1.25	
K	0.083	
W_c	494	lb/in.
γ_{avg}	70	pcf
d_c	60	ft
E	27,000	psi
E'	5434	psi
Pipe/HDPE:		
SDR	**17**	
D_{od}	16.94	in.
I	0.09897	in.^{4}/in.
t_{min}	1.059	in.
t_{avg}	1.059	in.
r_{mean}	7.94	in.

ΔX = maximum horizontal deflection or change in diameter, in;
D_L = deflection lag factor (assume 1.25) [Wilson-Fahmy and Koerner, 1994];
K = bedding constant (assume 0.083) [Wilson-Fahmy and Koerner, 1994, Figure 4];
W_c = Marston's prism load per unit length of pipe, lb/in.;
γ_{avg} = average unit weight of overlying materials (waste, and cover), pcf;
d_c = Maximum thickness of overlying materials, ft;
E = Long-term modulus of elasticity of the pipe material [Driscopipe, 1991; Figure 2], psi;
E' = the modulus of soil reaction for pipe bedding material [Selig,1990]), psi;
D_{od} = outer diameter of pipe, in [Chevron, 1994];
I = the moment of inertia of the pipe wall per unit length ($t_{min}^3/12$), in.^{4}/in.;
t_{min} = minimum diameter, in. [Chevron, 1994]
r_{mean} = mean radius, in. [Chevron, 1994]
$\Delta X\%$ = the ring deflection, %.
= $100(\Delta X/D_{od})$

Change in diameter, ΔX = 0.15 in.

Ring deflection, $\Delta X\%$ = **0.90** %

Calculate the pipe wall bending strain, ε_b.

$$\varepsilon_b = 6 \cdot \frac{t \cdot \Delta y}{D^2}$$

ε_b = Bending strain, %;
t = wall thickness, in.;
Δy = Vertical deflection, in.
= ΔX
D = inner diameter;
= Mean diameter (D_{od}-t_{min}), in.

t	1.059	in.
Δy	0.152	in.
D	15.88	in.

Bending strain, ε_b = **0.38 %**

Allowable wall ring bending strain: 5%

A pipeline that is anchored intermittently will deflect laterally in response to temperature variations, and this lateral displacement creates stress within the pipe wall. The relationships between these variables are determined as follows:

Lateral Deflection (Approximate from Catenary Eq.) **(Eq. 8.5)**

$$\Delta y = L[0.5\alpha(\Delta T)]^{1/2}$$

where: Δy = Lateral deflection (in.)

L = Distance between anchor points (in.)

α = Coefficient of expansion/contraction

= 0.0001 in./in./°F

ΔT = Temperature change $(T_2 - T_1)$ in °F

Bending Strain Development **(Eq. 8.6)**

$$\varepsilon = \frac{D[96\alpha(\Delta T)]^{1/2}}{L}$$

where: ε = Strain in pipe wall (%)

D = Outside diameter of pipe (in.)

α = Coefficient of expansion/contraction
= 0.0001 in./in./°F

ΔT = $(T_2 - T_1)$ in °F

L = Length between anchor points (in.)

As a general rule, the frequency of stabilization points is an economic decision. For example, if lateral deflection must be severely limited, the frequency of stabilization points increases significantly. On the other hand, if substantial lateral deflection is permissible, fewer anchor points will be required and the associated costs are decreased.

Allowable lateral deflection of polyethylene is not without a limit. The upper limit is determined by the maximum permissible strain in the pipe wall itself. This limit is a conservative 5% for the majorityof above-ground applications, as determined by Equation 8.6.

Equations 8.5 and 8.6 are used to determine the theoretical lateral deflection or strain in overland pipelines. Actual deflections and strain characteristics may be significantly less due to the friction imposed by the

0210/223

Attachment 12

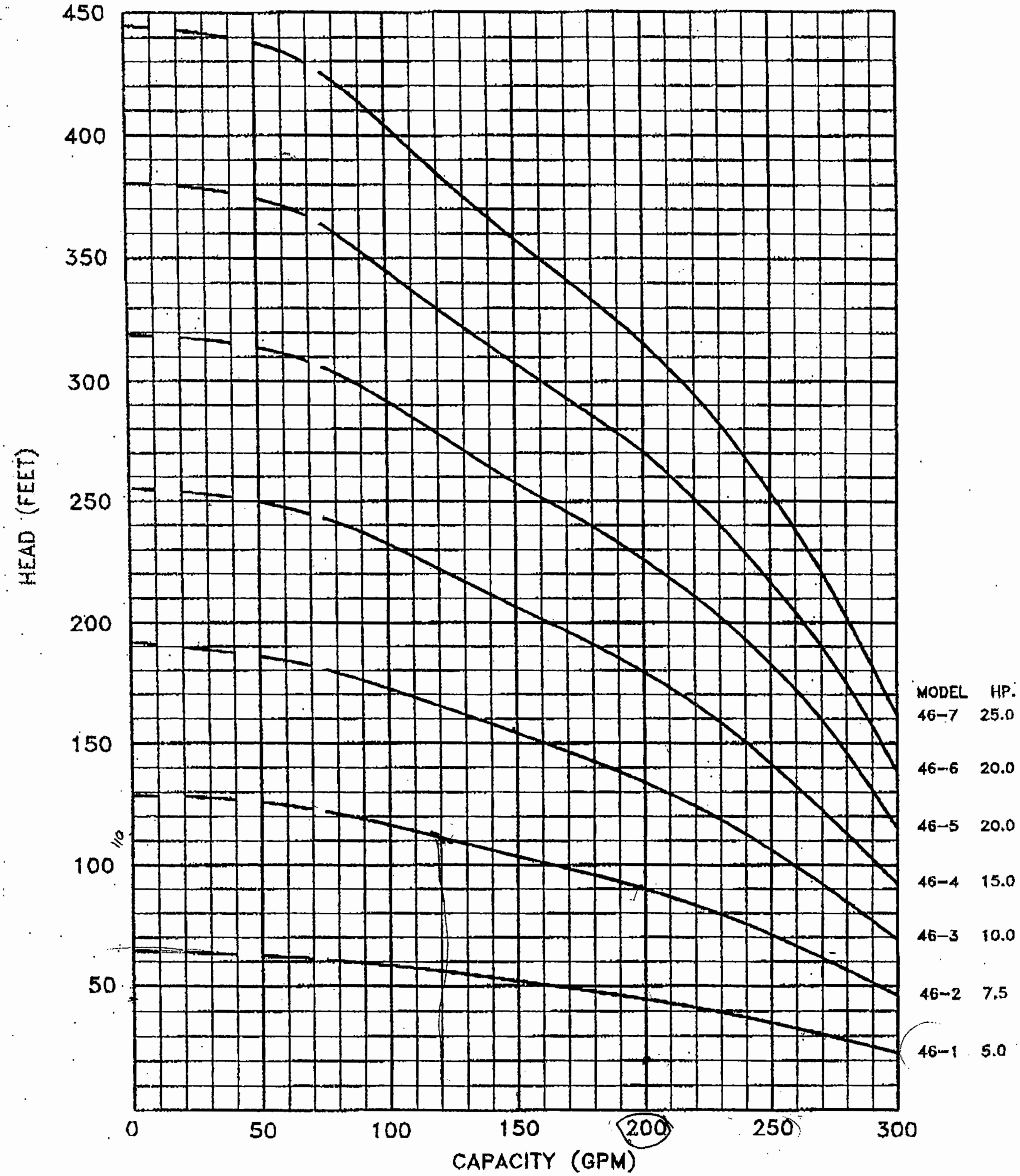
Data for Leachate Transmission System Design

211/223

SERIES 46 SurePump™

901

Flow Range 75–300 GPM



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

CALCULATION OF HEAD LOSSES

DATA FOR HEAD LOST IN SUMPS

Average leachate in sump=	356688	gal/day
No. of pumps=	2	
Q per pump=	178344.00	gal/day
	123.8500	gal/min
	0.2759	ft^3/sec
viscosity=	0.00001410	ft^2/sec
g=	32.20	ft/sec^2

DATA FOR PIPES

Pipe in	DR	OD in	ID in	Area ID in^2	Area ID ft^2
2	11	2.375	1.917	2.886	0.02004
4	11	4.5	3.633	10.366	0.07199
6	11	6.625	5.349	22.472	0.15605
8	11	8.625	6.963	38.079	0.264
3 (flex.hose)			2.5	4.909	0.03409

REFERENCE POINTS

Reference	Pipe length (ft)
A	
B	19
C	5
D	32
E	57
F	OBTAIN

EQUATIONS

$$Re = \frac{VD}{\nu} \qquad f = \frac{0.316}{R_e^{0.25}}$$

$$h_L = K\frac{V^2}{2g}$$

$$h_f = f\frac{L}{D}\frac{V^2}{2g}$$

HEAD LOST IN SUMP — INPUT — CALCULATIONS

SECTION	REFERENCE	FITTING	K	Number	Total K	Elevation (ft)	Pipe Length (ft)	PIPE DIAM (in)	Area (ft^2)	Q (ft^3/sec)	Q (gpm)	V=Q/A (ft/sec)	Re	f	Fittings head lost (ft)	Friction head lost (ft)	Potential head (ft)	Head required in pump (ft)
A-B	A	-	0			77												
		-	0															
	B	90 elbow	0.9	1	0.9	96	19	3	0.034	0.276	123.850	8.095	143524.648	0.016	0.916	0.000	19	19.916
					0.9													
B_C	B					96												
		Gate valve	0.2	1	0.2													
		Swing check valve	1.7	1	1.7													
	C	90 elbow	0.9	1	0.9	96	5	4	0.072	0.276	123.850	3.833	90617.995	0.018	0.593	0.062	0	0.656
					2.6													
C-D	C					96												
	D	90 elbow	0.9	1	0.9	96	32	4	0.072	0.552	247.700	7.666	181235.990	0.015	0.821	1.342	0	2.163
					0.9													
D-E	D					96												
		45 elbow	0.4	1	0.4													
		Gate valve	0.2	1	0.2													
	E	Tee	1.8	1	1.8	81	57	4	0.07199	0.551877891	247.700	7.666	181235.990	0.015	2.190	2.390	-15	4.580
					2.4													
												HEAD LOST IN SUMP (FITTINGS+FRICTION)=					8.315	ft

HEAD LOST IN LEACHATE TRANSMISSION LINE (3 PUMPS)

4 PUMPS	800.00	gpm
	1.7824	ft^3/sec
HEAD IN PUMP=	90	ft

Cell 1 to Tank in Critical Scenario

SECTION	REFERENCE	FITTING	K	Number	Total K	Elevation (ft)	Pipe Length (ft)	PIPE DIAM (in)	Area (ft^2)	Q (ft^3/sec)	Q (gpm)	V=Q/A (ft/sec)	Re	f	Fittings head lost (ft)	Friction head lost (ft)	Potential head (ft)	Head required in pump (ft)
	Cell					81		**6**	0.15605	1.7824	800.00	11.422	405028.221	0.013	**29.576**	obtain later	**27**	obtain later
		Tee	1.8	6	10.8			**8**	0.26444	1.7824	800.00	6.740	318695.864	0.013	**10.300**	obtain later	**27**	obtain later
		90 elbow	0.9	1	0.9													
		Check valve	1.7	1	1.7							HEAD REQUIRED 6" (FITTINGS+POTENTIAL HEAD)=					56.576	ft
		Gate valve	0.2	6	1.2							HEAD REQUIRED 8" (FITTINGS+POTENTIAL HEAD)=					37.300	ft
	Tanks				**14.6**	108												

OBTAIN MAXIMUM LENGTH FROM SUMP TO TANKS

$$h_f = f\frac{L}{D}\frac{V^2}{2g}$$

Flow (gpm)	Head in pump (ft)	Pipe diameter (in)	Required head obtained before (ft)	Head left (ft)	Max. Length from sump to tanks
800	90	6	64.89	25.11	494.78
800	90	8	45.615	44.39	3153.67

213/223
T = 73°F

ISO EQUATION FOR PRESSURE

Chevron **Plexco**®

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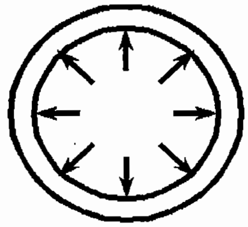
INTERNAL PRESSURE



$$P = \frac{2\ HDB\ fe\ ft}{DR - 1}$$

Equation 3-1, Vol.2, p4

PROJECT INFORMATION

Project Name = Oak Hammock Landfill

Today's Date = 3/22/02

Comments = Leachate Transmission Pipeline

The information contained herein cannot be guaranteed because the conditions of use are beyond our control. This document should not be substituted for the judgement of a professional engineer in determining the suitability of any pipe for a given project as the methodology herein may not accurately represent the site conditions or be inclusive of all parameters that must be considered. The user of this information assumes all risk associated with its use.

ENTER A VALUE IN EVERY BOX BELOW

HDB = Hydrostatic Design Basis (@ 73°F) =	1600	psi
fe = Environmental Factor =	0.50	
ft = Temperature Factor =	1.00	
P = Internal Pressure =	160.	psi
DR = Dimension Ratio =	11	

NOTE: This program does not consider manufacturing capabilities or fitting availability.

2/14/2023
Temp= 73°F

WATER HAMMER - PRESSURE SURGE (ASSUMING WATER AS A FLUID)

Chevron Plexco®

(630) 350-3700
www.plexco.com

$$V = \frac{0.4085\,Q}{d^2}$$

Equation 4-3, Vol.2, p7

$$S = \sqrt{\frac{(144\ E)\ E_B}{\left(\frac{w}{g}\right)\left[144\ E + \frac{E_B D}{t'}\right]}}$$

Equation 4-19, Vol.2, p11

$$\pm P = \frac{\left[\left(\frac{w}{g}\right) S\ V\right]}{144}$$

Equation 4-18, Vol.2, p11

PROJECT INFORMATION

Project Name = Oak Hammock Landfill

Today's Date = 3/22/02

Comments = Leachate Collection Pipeline

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ENTER A VALUE IN EVERY BOX BELOW

E = Pipe Modulus =	110000	psi
Q = Flow Rate =	200	gpm
OD = Outside Diameter =	3.500	in
DR = Dimension Ratio =	11	

RESULTS

V = VELOCITY CHANGE (ft/s) =	10.23
S = WAVE VELOCITY (ft/s) =	967.22
P = PRESSURE CHANGE (psi) =	± 133.21

ADDITIONAL CALCULATED VALUES

d = INSIDE DIAMETER (in) =	2.83
E_B = WATER BULK MODULUS (psf) =	44000000
w = DENSITY OF WATER (pcf) =	62.4
g = GRAVITY (ft/s/s) =	32.2
D = INSIDE DIAMETER (ft) =	.2355
t' = WALL THICKNESS (ft) =	.0281

215/223
T=73°F

WATER HAMMER - PRESSURE SURGE (ASSUMING WATER AS A FLUID)

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$$V = \frac{0.4085\,Q}{d^2}$$

Equation 4-3, Vol.2, p7

$$S = \sqrt{\frac{(144\ E)\ E_B}{\left(\frac{w}{g}\right)\left[144\,E + \frac{E_B D}{t'}\right]}}$$

Equation 4-19, Vol.2, p11

$$\pm P = \frac{\left[\left(\frac{w}{g}\right) S\ V\right]}{144}$$

Equation 4-18, Vol.2, p11

PROJECT INFORMATION

Project Name = Oak Hammock Landfill

Today's Date = 3/22/02

Comments = Leachate Transmission Pipeline

The information contained herein cannot be guaranteed because the conditions of use are beyond our control. This document should not be substituted for the judgement of a professional engineer in determining the suitability of any pipe for a given project as the methodology herein may not accurately represent the site conditions or be inclusive of all parameters that must be considered. The user of this information assumes all risk associated with its use.

ENTER A VALUE IN EVERY BOX BELOW

E = Pipe Modulus =	110000	psi
Q = Flow Rate =	400	gpm
OD = Outside Diameter =	4.500	in
DR = Dimension Ratio =	11	

RESULTS

V = VELOCITY CHANGE (ft/s) =	12.38
S = WAVE VELOCITY (ft/s) =	967.22
P = PRESSURE CHANGE (psi) =	± 161.17

ADDITIONAL CALCULATED VALUES

d = INSIDE DIAMETER (in) =	3.63
E_B = WATER BULK MODULUS (psf) =	44000000
w = DENSITY OF WATER (pcf) =	62.4
g = GRAVITY (ft/s/s) =	32.2
D = INSIDE DIAMETER (ft) =	.3027
t'= WALL THICKNESS (ft) =	.0361

PLEXCALC - Version 2.0

216/223
Temp = 73°F

WATER HAMMER - PRESSURE SURGE (ASSUMING WATER AS A FLUID)

Chevron Plexco®

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$$V = \frac{0.4085\,Q}{d^2}$$

Equation 4-3, Vol.2, p7

$$S = \sqrt{\frac{(144\ E)\ E_B}{\left(\frac{w}{g}\right)\left[144\,E + \frac{E_B D}{t'}\right]}}$$

Equation 4-19, Vol.2, p11

$$\pm P = \frac{\left[\left(\frac{w}{g}\right) S\ V\right]}{144}$$

Equation 4-18, Vol.2, p11

PROJECT INFORMATION

Project Name = Oak Hammock Landfill

Today's Date = 3/22/02

Comments = Leachate Transmission Pipeline

The information contained herein cannot be guaranteed because the conditions of use are beyond our control. This document should not be substituted for the judgement of a professional engineer in determining the suitability of any pipe for a given project as the methodology herein may not accurately represent the site conditions or be inclusive of all parameters that must be considered. The user of this information assumes all risk associated with its use.

ENTER A VALUE IN EVERY BOX BELOW

E = Pipe Modulus =	110000	psi
Q = Flow Rate =	800	gpm
OD = Outside Diameter =	8.625	in
DR = Dimension Ratio =	11	

RESULTS

V = VELOCITY CHANGE (ft/s) =	6.74
S = WAVE VELOCITY (ft/s) =	967.22
P = PRESSURE CHANGE (psi) =	± 87.74

ADDITIONAL CALCULATED VALUES

d = INSIDE DIAMETER (in) =	6.96
E_B = WATER BULK MODULUS (psf) =	44000000
w = DENSITY OF WATER (pcf) =	62.4
g = GRAVITY (ft/s/s) =	32.2
D = INSIDE DIAMETER (ft) =	.5802
t'= WALL THICKNESS (ft) =	.0693

PLEXCALC - Version 2.0

217/223
Temp = 120 °F

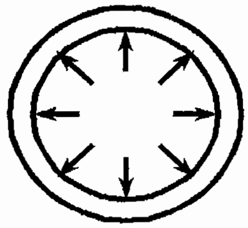
ISO EQUATION FOR PRESSURE

Chevron Plexco

(630) 350-3700

www.plexco.com

INTERNAL PRESSURE



$$P = \frac{2\ HDB\ fe\ ft}{DR - 1}$$

Equation 3-1, Vol.2, p4

PROJECT INFORMATION

Project Name =	Oak Hammock Landfill
Today's Date =	3/22/02
Comments =	Leachate Collection Pipeline

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ENTER A VALUE IN EVERY BOX BELOW

HDB = Hydrostatic Design Basis (@ 73°F) =	1600	psi
fe = Environmental Factor =	0.50	
ft = Temperature Factor =	0.63	
P = Internal Pressure =	100.8	psi
DR = Dimension Ratio =	11	

NOTE: This program does not consider manufacturing capabilities or fitting availability.

0218/0223

Temp = 120° F

WATER HAMMER - PRESSURE SURGE (ASSUMING WATER AS A FLUID)

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$$V = \frac{0.4085\,Q}{d^2}$$

Equation 4-3, Vol.2, p7

$$S = \sqrt{\frac{(144\ E)\ E_B}{\left(\frac{w}{g}\right)\left[144\ E + \frac{E_B D}{t'}\right]}}$$

Equation 4-19, Vol.2, p11

$$\pm P = \frac{\left[\left(\frac{w}{g}\right) S\ V\right]}{144}$$

Equation 4-18, Vol.2, p11

PROJECT INFORMATION

Project Name =	Oak Hammock Landfill
Today's Date =	3/22/02
Comments =	Leachate Transmission Pipeline

The information contained herein cannot be guaranteed because the conditions of use are beyond our control. This document should not be substituted for the judgement of a professional engineer in determining the suitability of any pipe for a given project as the methodology herein may not accurately represent the site conditions or be inclusive of all parameters that must be considered. The user of this information assumes all risk associated with its use.

ENTER A VALUE IN EVERY BOX BELOW

E = Pipe Modulus =	65000	psi
Q = Flow Rate =	200	gpm
OD = Outside Diameter =	3.500	in
DR = Dimension Ratio =	11	

RESULTS

V = VELOCITY CHANGE (ft/s) =	10.23
S = WAVE VELOCITY (ft/s) =	749.85
P = PRESSURE CHANGE (psi) =	± 103.27

ADDITIONAL CALCULATED VALUES

d = INSIDE DIAMETER (in) =	2.83
E_B = WATER BULK MODULUS (psf) =	44000000
w = DENSITY OF WATER (pcf) =	62.4
g = GRAVITY (ft/s/s) =	32.2
D = INSIDE DIAMETER (ft) =	.2355
t'= WALL THICKNESS (ft) =	.0281

219/223

Temp = 120° F

WATER HAMMER - PRESSURE SURGE (ASSUMING WATER AS A FLUID)

Chevron Plexco®

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$$V = \frac{0.4085\,Q}{d^2}$$

Equation 4-3, Vol.2, p7

$$S = \sqrt{\frac{(144\ E)\ E_B}{\left(\frac{w}{g}\right)\left[144\,E + \frac{E_B D}{t'}\right]}}$$

Equation 4-19, Vol.2, p11

$$\pm P = \frac{\left[\left(\frac{w}{g}\right) S\ V\right]}{144}$$

Equation 4-18, Vol.2, p11

PROJECT INFORMATION

Project Name = Oak Hammock Landfill

Today's Date = 3/22/02

Comments = Leachate Transmission Pipeline

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ENTER A VALUE IN EVERY BOX BELOW

E = Pipe Modulus =	65000	psi
Q = Flow Rate =	400	gpm
OD = Outside Diameter =	4.500	in
DR = Dimension Ratio =	11	

RESULTS

V = VELOCITY CHANGE (ft/s) =	12.38
S = WAVE VELOCITY (ft/s) =	749.85
P = PRESSURE CHANGE (psi) =	± 124.95

ADDITIONAL CALCULATED VALUES

d = INSIDE DIAMETER (in) =	3.63
E_B = WATER BULK MODULUS (psf) =	44000000
w = DENSITY OF WATER (pcf) =	62.4
g = GRAVITY (ft/s/s) =	32.2
D = INSIDE DIAMETER (ft) =	.3027
t'= WALL THICKNESS (ft) =	.0361

PLEXCALC - Version 2.0

220/223
Temp = 120° F

WATER HAMMER - PRESSURE SURGE (ASSUMING WATER AS A FLUID)

Chevron Plexco

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$$V = \frac{0.4085\,Q}{d^2}$$

Equation 4-3, Vol.2, p7

$$S = \sqrt{\frac{(144\ E)\ E_B}{\left(\frac{w}{g}\right)\left[144\,E + \frac{E_B D}{t'}\right]}}$$

Equation 4-19, Vol.2, p11

$$\pm P = \frac{\left[\left(\frac{w}{g}\right) S\ V\right]}{144}$$

Equation 4-18, Vol.2, p11

PROJECT INFORMATION

Project Name = Oak Hammock Landfill

Today's Date = 3/22/02

Comments = Leachate Transmission Pipeline

The information contained herein cannot be guaranteed because the conditions of use are beyond our control. This document should not be substituted for the judgement of a professional engineer in determining the suitability of any pipe for a given project as the methodology herein may not accurately represent the site conditions or be inclusive of all parameters that must be considered. The user of this information assumes all risk associated with its use.

ENTER A VALUE IN EVERY BOX BELOW

E = Pipe Modulus =	65000	psi
Q = Flow Rate =	800	gpm
OD = Outside Diameter =	8.625	in
DR = Dimension Ratio =	11	

RESULTS

V = VELOCITY CHANGE (ft/s) =	6.74
S = WAVE VELOCITY (ft/s) =	749.85
P = PRESSURE CHANGE (psi) =	± 68.02

ADDITIONAL CALCULATED VALUES

d = INSIDE DIAMETER (in) =	6.96
E_B = WATER BULK MODULUS (psf) =	44000000
w = DENSITY OF WATER (pcf) =	62.4
g = GRAVITY (ft/s/s) =	32.2
D = INSIDE DIAMETER (ft) =	.5802
t' = WALL THICKNESS (ft) =	.0693

PLEXCALC - Version 2.0

Written by: R LOWRY Date: 02/01/24 (YY/MM/DD) Reviewed by: ________ Date: __/__/__ (YY/MM/DD)

Client: OMNI Project: ~~FW0400~~ OMNI OAKGROVE Project/Proposal No.: FW0400 Task No.: 04

LEACHATE COLLECTION SUMP VOLUME

SECONDARY LC SUMP VOL BY HORIZ. SLICE METHOD

$$(EL_2 - EL_1) \times \left(\frac{A_1 + A_2}{2}\right) = VOL$$

SECONDARY

~~ELEV. (FT) AREA (FT²) VOL (FT³)~~

E_1 (FT)	E_2 (FT)	A_1 (FT²)	A_2 (FT²)	VOL (FT³)	TOTAL VOL (FT³)
77.0	78.0	60.0	80.0	70.0	70.0
78.0	78.56	80.0	641.11	201.91	271.91
78.56	80.0	641.11	670.0	944	1215.91

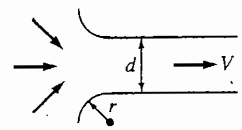
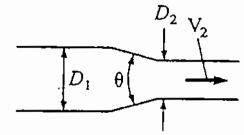
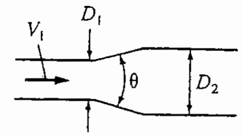
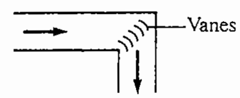
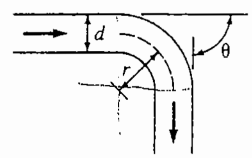
1215.91 FT³ x 7.48 GAL/FT³ x 0.4 (POROSITY) = 3638 GAL

PRIMARY

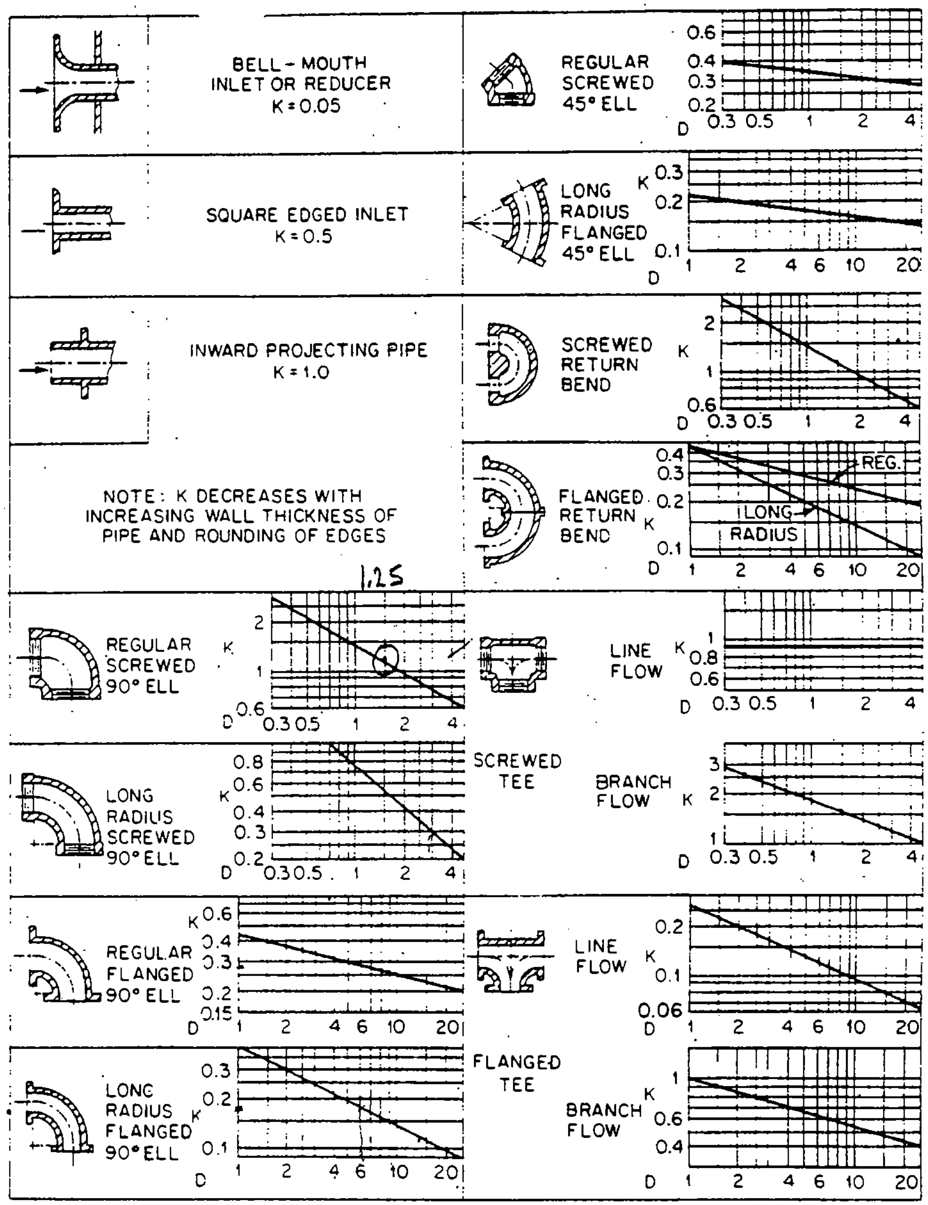
E_1 (FT)	E_2 (FT)	A_1 (FT²)	A_2 (FT²)	VOL (FT³)	TOTAL VOL (FT³)
77.0	78.0	72.0	112.0	92.0	92.0
78.0	78.56	112.0	968.79	302.62	394.62
78.56	80.0	968.79	1206.0	1565.85	1960.47

1960.47 FT³ x 7.48 GAL/FT³ x 0.4 (POROSITY) = 5865.72 GAL

Loss Coefficients f[illegible]ious Transitions and Fittings

Description	S[illegible]a	Additional Data	K		Source
		r/d	K_e		(7)
Pipe entrance		0.0	0.50		
		0.1	0.12		
$h_L = K_e V^2/2g$		>0.2	0.03		
			K_C	K_C	
Contraction		D_2/D_1	$\theta = 60°$	$\theta = 180°$	(7)
		0.0	0.08	0.50	
		0.20	0.08	0.49	
		0.40	0.07	0.42	
		0.60	0.06	0.32	
		0.80	0.05	0.18	
$h_L = K_C V_2^2/2g$		0.90	0.04	0.10	
			K_E	K_E	
Expansion		D_1/D_2	$\theta = 10°$	$\theta = 180°$	(7)
		0.0		1.00	
		0.20	0.13	0.92	
		0.40	0.11	0.72	
		0.60	0.06	0.42	
$h_L = K_E V_1^2/2g$		0.80	0.03	0.16	
90° miter bend		Without vanes	$K_b = 1.1$		(42)
		With vanes	$K_b = 0.2$		(42)
		r/d	K_b	K_b	(14)
			$\theta = 45°$	$\theta = 90°$	
Smooth bend		1	0.10	0.35	(22)
		2	0.09	0.19	and
		4	0.10	0.16	(30)
		6	0.12	0.21	
Threaded pipe fittings	Globe valve—wide open		$K_v = 10.0$		
	Angle valve—wide open		$K_v = 5.0$		
	Gate valve—wide open		$K_v = 0.2$		
	Gate valve—half open		$K_v = 5.6$		
	Return bend		$K_b = 2.2$		
	Tee		$K_t = 1.8$		
	90° elbow		$K_b = 0.9$		
	45° elbow		$K_b = 0.4$		

Resi Coefficients K for Valves and Fittings



$h = K \frac{V^2}{2g}$ FEET (METERS) OF FLUID

NOTE: D = nominal iron pipe size in inches (in × 25.4 = mm).

Pipe Friction Manual, 3d ed., Hydraulic Institute, Cleveland, 1961.

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GAS MANAGEMENT DESIGN

24 May 2002

TABLES

FIGURES

1. INTRODUCTION

1.1 Project Description

The Oak Hammock Disposal (OHD) landfill covers approximately 264 acres and will provide airspace of approximately 24 million cubic yards when build-out is completed. Due to the volume of solid waste to be disposed, landfill gas must be managed. This calculation package describes a gas management system that will be installed progressively as the landfill is developed.

1.2 Purpose of Analysis

Analysis was performed to estimate the maximum landfill gas generation rates for the OHD landfill and to assess the requirements for the gas collection system and the gas flare stations. The analysis and design for the gas collection system and the gas flare stations included evaluation of the horizontal radius of influence and spacing of the vertical gas extraction wells; size of the gas collection and transmission pipes; and the flares and blowers capacities.

1.3 Method of Analysis

The layout of required vertical gas extraction wells was based on the calculated horizontal radius of influence of the vertical gas extraction wells. The gas collection and transmission pipes were sized by computing the head loss in the system from the wells to the flare stations. Required capacities of flares and blowers were evaluated by computing the gas flow rates and head losses through the gas collection and transmission system.

The perforated length of the vertical gas extraction wells varied from 51 ft to 69 ft (i.e., a difference of 18 ft). The variability in gas extraction at any particular well due to the maximum difference in perforated well lengths is small relative to the variability of gas production at any location due to effects such as moisture level, waste content, temperature, air infiltration, nutrient level, and time since placement. Further, the actual waste amount contributing to a particular well's generation rate is highly variable (i.e., the actual areas of influence are very irregular rather than the idealized cylinders of 156 ft radius). An average gas collection rate was used for each extraction well obtained as the peak gas generation rate for the entire landfill divided by the total number of wells. The gas collection rate for the OHD facility was evaluated assuming 100 percent collection efficiency (i.e. all the landfill gas generated is collected and extracted) and was used to design the gas collection and transmission system.

The layout of vertical gas extraction wells, gas collection and transmission pipes, and the flare stations is presented in Figure 1. The head loss in the gas collection and transmission system was calculated for each of the 14 longest flow paths identified in

Tables 1 through 14. Fitting losses were found to be negligible compared to the length of transmission pipes.

2. ANALYSIS PARAMETERS

2.1 Waste Quantities and Properties

The OHD landfill contains a total of approximately 23.7 million yd^3 of space available for the placement of waste and initial cover. This results in a total waste volume of 19.0 million yd^3, assuming that the combination of waste and initial cover is 80 percent waste by volume. A conservative unit weight of 1,500 lb/yd^3 (55.56 lb/ft^3) was assumed for the waste to calculate a total weight of approximately 14.2 million tons (2.84×10^{10} lbs) of waste. Assuming a constant rate of fill for 30 years, this results in approximately 474,000 tons of waste per year. Note that the unit weight used of 1,500 lb/yd^3 (55.56 lb/ft^3) is nearly 1.3 times greater than the default value of 1160 lbs/yd^3 (42.96 lbs/ft^3) listed in USEPA AP-42 (1998), making estimation of the maximum gas generation rate and the radius of influence conservative.

Intrinsic permeability is the ability of a medium to transmit a fluid, and is a property of the medium only (independent of the fluid properties). The intrinsic permeability of the waste in the horizontal direction was conservatively assumed to be 1×10^{-10} ft^2 for calculation of the horizontal radius of influence. This is approximately equivalent to a hydraulic conductivity of 1×10^{-5} cm/sec assuming the fluid being transmitted is water.

2.2 Gas Generation Constants

A value of 0.04 /year was used for the methane generation rate constant (k). This is the default value from USEPA AP-42 (1998) for areas with more than 25 inches of rainfall per year, which is the case with OHD site. Note that this higher rainfall category results in a gas generation rate constant twice as high as the lower rainfall category. This value has been shown to be conservative and is typically used for regulatory compliance purposes. The methane generation potential (L_o) was also conservatively assumed as the EPA regulatory default value of 3,530 ft^3/ton (100 m^3/Mg) from USEPA AP-42 (1998).

3. GAS GENERATION RATE

The maximum landfill gas generation rate was calculated to be about 4,500 scf/min (standardized ft^3/minute) using a simple first order model presented in Equation 1 below, as specified in USEPA AP-42 (1998). The landfill gas is approximately 55% methane by volume i.e., the total gas generated is about twice the volume of methane generated. Thus, a factor of 2 appears in the following equation used to estimate the maximum landfill gas generation rate.

$$Q_m = 2\, L_o\, R\, (1\text{-}e^{-kt})$$ (Equation 1)

where: Q_m = Maximum landfill gas generation rate (ft^3/year)
L_o = Methane generation potential = 3,530 ft^3/ton
R = Annual waste placement rate = 474,000 tons/year
k = Methane generation rate constant = 0.04 $year^{-1}$
t = Maximum age of waste at closure = 30 years

4. HORIZONTAL RADIUS OF INFLUENCE FOR VERTICAL WELLS

The horizontal radius of influence for the vertical gas extraction wells was calculated to be equal to 156 ft using Equation 2 below, as presented in USEPA AP-42 (1998). Figure 2 presents the sensitivity of this calculation to the horizontal intrinsic permeability and to the suction pressure applied at the gas extraction well.

$$\frac{P^2{}_{landfill} - P^2{}_{vacuum}}{P^2{}_{vacuum}} = \frac{R_a^2 \mu_{gas} \rho_{waste} Q_m}{M_c k_{waste,horiz} L_{ratio}} \ln\left[\frac{R_a}{r}\right]$$ (Equation 2)

where: R_a = Radius of influence in ft.
$P_{landfill}$ = Internal pressure of landfill = 2,116.0 psf
P_{vacuum} = Pressure at the gas extraction well = 2,084.5 psf
μ_{gas} = Dynamic viscosity of landfill gas = 2.75 x 10^{-7} lb-sec/ft^2
ρ_{waste} = Waste density = 55.56 lbs/ft^3
Q_m = Gas generation rate = 75 ft^3/second
M_c = Total waste mass = 2.9 x 10^{10} lbs.
$k_{waste,horiz}$ = Horizontal intrinsic permeability = 1 x 10^{-10} ft^2
L_{ratio} = Ratio of well length to collection length = 0.7
r = Radius of well gravel pack = 1.5 ft

The internal pressure of the landfill ($P_{landfill}$) was assumed to be 1 atmosphere, which corresponds to 2,116 psf. The suction pressure at the gas extraction well (P_{vacuum}) corresponds to 6 inches of water column. Estimations of the dynamic viscosity of landfill gas (μ_g) were made assuming that the gas is 50% methane and 50% carbon dioxide. The waste density (ρ_{waste}), gas generation rate (Q_m), total waste mass (M_c), and the intrinsic permeability of waste in the horizontal direction ($k_{waste,horiz}$) were discussed earlier.

The spacing of the gas extraction wells was calculated to be 270 ft using Equation 3 below, from Tchobanollous (1993), assuming an equilateral triangular configuration for the wells. A spacing of approximately 300 ft was used, and the wells were laid out in a nearly equilateral triangular configuration within the limits of the irregularly shaped landfill footprint. The difference between the calculated spacing and that used represents very little error considering the sensitivity of the radius of influence calculations, previously presented in Figure 2, and the conservatism of the values used for calculation.

$$X = 2 \cdot R_a \cdot \cos(30°) \qquad \text{(Equation 3)}$$

where: X = Spacing of the gas extraction wells in ft.

R_a = Radius of influence in ft.

5. HEAD LOSSES, PIPE AND BLOWER SIZING

The landfill gas generation rate of 4,500 scf/min (75.0 scf/sec) was divided by the number of gas extraction wells (105 total) to yield an average gas generation rate per well of 49.2 scf/min (0.71 scf/sec). The same gas generation rate was used for each extraction well as previously discussed.

The layout of vertical gas extraction wells, gas collection and transmission pipes, and the flare stations is presented in Figure 1. The head loss in the gas collection and transmission system was calculated for each of the 14 longest flow paths identified and is presented in Tables 1 through 14. The flow paths were approximated by dividing the number of extraction wells along a transmission header pipe equally between the two flare stations at either end of the header pipe. The head loss in the gas collection and transmission pipes was computed from the furthest gas extraction well to the flare station along a flow path. A suction pressure corresponding to 6 inches of water column will be applied at each vertical gas extraction well for the purpose of gas extraction from the waste (see calculations in previous section for horizontal radius of influence). The head loss computations include this suction pressure (i.e., 6 inches of water column) at the vertical gas extraction wells. Fitting losses were found to be negligible compared to the length of transmission pipes.

The head loss (Δh_w) in the gas collection and transmission pipes was computed using the empirical Spitzglass equation, Crane Co. (1991), valid for gases at pressures less than 1 psig:

$$\Delta h_w = \frac{q_h^2 L S_g}{C_s^2 d^5} \quad \text{where} \quad C_s = \frac{3550}{\left(1 + 3.6/d + 0.03d\right)^{1/2}} \qquad \text{Equation 4}$$

where: Δh_w = Head loss in inches of water column (in-w.c.)

d = Pipe diameter (inches)

S_g = Specific gravity of gas relative to air = 1

q_h = Combined gas flow rate (cf/hr)

L = Pipe length (ft)

The pipe flow velocity (v_h) was computed using the following Equation 5:

$$v_h = \frac{q_h}{\frac{\pi}{4} d^2} \qquad \text{Equation 5}$$

The above Equations 4 and 5 were calculated in a spreadsheet and used in the estimation of the head loss in gas collection and transmission pipes and the pipe flow velocity. The results are presented in Tables 1 through 14 for the 14 longest flow paths. The pipe diameters were selected in order to limit the head losses to approximately 12 inches of water column (includes 6 inches of water column loss at the vertical gas extraction wells). Table 15 presents a summary of the diameters for the various pipe components of the gas extraction system. The blowers will be selected to generate a minimum suction pressure of 12 inches to account for the calculated line losses, and any additional pressure that may be needed for proper operation of the flare. Each of the four flare stations (with blowers) should be selected to have a minimum flow capacity of 1,125 scf/min (i.e. ¼ the maximum total landfill gas generation rate of 4,500 scf/min).

6. SUMMARY AND CONCLUSIONS

The computed maximum landfill gas generation rate (and collection rate assuming 100% collection efficiency) for the OHD landfill was 4,500 scf/min. The gas generation rate increases during active filling of the landfill with municipal solid waste, and reaches the peak generation rate near the end of the 30-year life of the landfill. Flare stations, and associated gas transmission system, are constructed and brought on-line in stages to accommodate the increase in gas generation rate during active filling of the landfill. A total of four flare stations are anticipated to accommodate the peak gas generation rate near the end of the 30-year life of the landfill.

The horizontal radius of influence for each vertical gas extraction well was calculated to be 156 ft, therefore a spacing of approximately 300 ft was used in the lay out of the gas extraction wells in a nearly equilateral triangular configuration. This was calculated for a vacuum pressure of 6-inch water column at the gas extraction wells (i.e., the suction pressure exerted upon the waste for the purpose of gas extraction). The lay out of the gas extraction system is shown as Figure 1.

The gas transmission pipes were sized such that the maximum head loss in the gas transmission system was limited to 12 inches of water column (includes 6 inches of water column loss at the vertical gas extraction wells. Table 14 summarizes the pipe sizes. The blowers will be selected to generate a minimum suction pressure of 12 inches to account for the line losses and any additional pressure that may be needed for proper operation of the flare. Each of the four flare stations (with blowers) should be selected to have a minimum flow capacity of 1,125 scf/min (i.e. ¼ the maximum total landfill gas generation rate of 4,500 scf/min).

REFERENCES

Crane Co. (1991). *Flow of Fluids Through Fittings and Pipe*, "Crane Technical Paper No. 410, 25th printing", Crane Co., 104 N. Chicago St., Joliet, Il 60434. pp. 3-3

Tchobanoglous, G., Theisen, H, and Vigil, S. A. (1993). *Integrated Solid Waste Management*, McGraw Hill, Inc., pp. 978.

USEPA, *Compilation of Air Pollutant Emission Factors,* "Section 2.4: Municipal Solid Waste Landfills", Document AP-42, Fifth Edition, Supplement E, November 1998.

Table 1. Head Loss for Flare 1: Header A, East Arm.

FLARE 1: Header A, East Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 1A	**Flare 1**	22	56571	320	11.50	**0.670**	0.0021	21.8
A1	**Main 1A**	13	33429	215	7.75	**1.157**	0.0054	28.3
A2	**A1**	12	30857	250	7.75	**1.146**	0.0046	26.2
A3	**A2**	11	28286	50	7.75	**0.193**	0.0039	24.0
A4	**A3**	10	25714	285	7.75	**0.908**	0.0032	21.8
A5	**A4**	9	23143	270	7.75	**0.696**	0.0026	19.6
A6	**A5**	8	20571	20	7.75	**0.041**	0.0020	17.4
A7	**A6**	7	18000	280	7.75	**0.437**	0.0016	15.3
A8	**A7**	6	15429	25	7.75	**0.029**	0.0011	13.1
A9	**A8**	5	12857	300	7.75	**0.239**	0.0008	10.9
A10	**A9**	4	10286	70	7.75	**0.036**	0.0005	8.7
A11	**A10**	3	7714	220	7.75	**0.063**	0.0003	6.5
A12	**A11**	2	5143	130	7.75	**0.017**	0.0001	4.4
A13	**A12**	1	2571	170	7.75	**0.005**	0.0000	2.2
Lat. A13	**A13**	1	2571	20	4.00	**0.021**	0.0010	8.2
W13A	**Lat. A13**	1	2571	10	2.00	**0.469**	0.0469	32.7
Waste	**W13A**	0			8.00	**6.000**		
					Total Head Loss =	**12.13**	**in. water column**	

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 2. Head Loss for Flare 1: Header A, West Arm.

FLARE 1: Header A, West Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 1A	**Flare 1**	22	56571	320	11.500	**0.670**	0.0021	21.8
A81	**Main 1A**	9	23143	230	7.750	**0.593**	0.0026	19.6
A80	**A81**	8	20571	260	7.750	**0.530**	0.0020	17.4
A79	**A80**	7	18000	270	7.750	**0.421**	0.0016	15.3
A78	**A79**	6	15429	30	7.750	**0.034**	0.0011	13.1
A77	**A78**	5	12857	290	7.750	**0.231**	0.0008	10.9
A76	**A77**	4	10286	10	7.750	**0.005**	0.0005	8.7
A75	**A76**	3	7714	300	7.750	**0.086**	0.0003	6.5
A74	**A75**	2	5143	5	7.750	**0.001**	0.0001	4.4
A73	**A74**	1	2571	290	7.750	**0.009**	0.0000	2.2
Lat.A73	**A73**	1	2571	430	4.000	**0.445**	0.0010	8.2
W73A	**Lat.73A**	1	2571	10	2.000	**0.469**	0.0469	32.7
Waste	**W73A**	0			8.000	**6.000**		

Total Head Loss = 9.49 in. water column

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 3. Head Loss for Flare 2: Header A, North Arm.

FLARE 2: Header A, North Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 2A	**Flare 2**	26	66857	240	11.50	**0.702**	0.0029	25.7
A64	**Main 2A**	9	23143	25	7.75	**0.064**	0.0026	19.6
A65	**A64**	8	20571	250	7.75	**0.510**	0.0020	17.4
A66	**A65**	7	18000	50	7.75	**0.078**	0.0016	15.3
A67	**A66**	6	15429	250	7.75	**0.287**	0.0011	13.1
A68	**A67**	5	12857	60	7.75	**0.048**	0.0008	10.9
A69	**A68**	4	10286	130	7.75	**0.066**	0.0005	8.7
A70	**A69**	3	7714	110	7.75	**0.032**	0.0003	6.5
A71	**A70**	2	5143	60	7.75	**0.008**	0.0001	4.4
A72	**A71**	1	2571	240	7.75	**0.008**	0.0000	2.2
Lat.72A	**A72**	1	2571	30	4.00	**0.031**	0.0010	8.2
W72A	**Lat.72A**	1	2571	10	2.00	**0.469**	0.0469	32.7
Waste	**W72A**	0			8.00	**6.000**		

Total Head Loss = 8.30 in. water column

NOTES: Inside diameter of pipe is approximate.

scf/hour = standardized cubic feet per hour.

Table 4. Head Loss for Flare 2: Header A, South Arm.

FLARE 2: Header A, South Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 2A	**Flare 2**	26	66857	240	11.50	**0.702**	0.0029	25.7
A63	**Main 2A**	10	25714	50	7.75	**0.159**	0.0032	21.8
A62	**A63**	9	23143	245	7.75	**0.632**	0.0026	19.6
A61	**A62**	8	20571	25	7.75	**0.051**	0.0020	17.4
A60	**A61**	7	18000	305	7.75	**0.476**	0.0016	15.3
A59	**A60**	6	15429	150	7.75	**0.172**	0.0011	13.1
A58	**A59**	5	12857	140	7.75	**0.111**	0.0008	10.9
A57	**A58**	4	10286	145	7.75	**0.074**	0.0005	8.7
A56	**A57**	3	7714	145	7.75	**0.042**	0.0003	6.5
A55	**A56**	2	5143	135	7.75	**0.017**	0.0001	4.4
A54	**A55**	1	2571	160	7.75	**0.005**	0.0000	2.2
Lat.54A	**A54**	1	2571	175	4.00	**0.181**	0.0010	8.2
W54A	**Lat.54A**	1	2571	10	2.00	**0.469**	0.0469	32.7
Waste	**WT54A**	0			8.00	**6.000**		
					Total Head Loss =	**9.09**	**in. water column**	

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 5. Head Loss for Flare 2: Header B, North Arm.

FLARE 2: Header B, North Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 2A	**Flare 2**	26	66857	240	11.50	**0.702**	0.0029	25.7
Main 2B	**Main 2A**	7	18000	565	7.75	**0.882**	0.0016	15.3
B1	**Main 2B**	3	7714	215	7.75	**0.062**	0.0003	6.5
B2	**B1**	2	5143	120	7.75	**0.015**	0.0001	4.4
B3	**B2**	1	2571	205	7.75	**0.007**	0.0000	2.2
Lat.3B	**B3**	1	2571	10	4.00	**0.010**	0.0010	8.2
W3B	**Lat.3B**	1	2571	10	2.00	**0.469**	0.0469	32.7
Waste	**W3B**	0			8.00	**6.000**		

Total Head Loss = 8.15 in. water column

NOTES: Inside diameter of pipe is approximate.

scf/hour = standardized cubic feet per hour.

Table 6. Head Loss for Flare 2: Header B, South Arm.

FLARE 2: Header B, South Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 2A	**Flare 2**	26	66857	240	11.50	**0.702**	0.0029	25.7
Main 2B	**Main 2A**	7	18000	565	7.75	**0.882**	0.0016	15.3
B24	**Main 2B**	4	10286	75	7.75	**0.038**	0.0005	8.7
B23	**B24**	3	7714	365	7.75	**0.105**	0.0003	6.5
B22	**B23**	2	5143	110	7.75	**0.014**	0.0001	4.4
B21	**B22**	1	2571	280	7.75	**0.009**	0.0000	2.2
Lat.21B	**B21**	1	2571	160	4.00	**0.166**	0.0010	8.2
W21B	**Lat.21B**	1	2571	10	2.00	**0.469**	0.0469	32.7
Waste	**W21B**	0			8.00	**6.000**		

Total Pressure Loss = 8.38 in. water column

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 7. Head Loss for Flare 3: Header A, North Arm.

FLARE 3: Header A, North Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 3A	**Flare 3**	29	74571	350	11.50	**1.273**	0.0036	28.7
A25	**Main 3A**	12	30857	140	7.75	**0.642**	0.0046	26.2
A24	**A25**	11	28286	215	7.75	**0.829**	0.0039	24.0
A23	**A24**	10	25714	60	7.75	**0.191**	0.0032	21.8
A22	**A23**	9	23143	265	7.75	**0.684**	0.0026	19.6
A21	**A22**	8	20571	30	7.75	**0.061**	0.0020	17.4
A20	**A21**	7	18000	270	7.75	**0.421**	0.0016	15.3
A19	**A20**	6	15429	30	7.75	**0.034**	0.0011	13.1
A18	**A19**	5	12857	290	7.75	**0.231**	0.0008	10.9
A17	**A18**	4	10286	20	7.75	**0.010**	0.0005	8.7
A16	**A17**	3	7714	180	7.75	**0.052**	0.0003	6.5
A15	**A16**	2	5143	110	7.75	**0.014**	0.0001	4.4
A14	**A15**	1	2571	170	7.75	**0.005**	0.0000	2.2
Lat.14	**A14**	1	2571	280	4.00	**0.290**	0.0010	8.2
W14A	**Lat.14**	1	2571	10	2.00	**0.469**	0.0469	32.7
Waste	**W14A**	0			8.00	**6.000**		

Total Head Loss = 11.21 in. water column

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 8. Head Loss for Flare 3: Header A, South Arm.

FLARE 3: Header A, South Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 3A	**Flare 3**	29	74571	350	11.50	**1.273**	0.00363743	28.7
A26	**Main 3A**	9	23143	205	7.75	**0.529**	0.00257961	19.6
A27	**A26**	8	20571	300	7.75	**0.611**	0.00203821	17.4
A28	**A27**	7	18000	30	7.75	**0.047**	0.00156051	15.3
A29	**A28**	6	15429	265	7.75	**0.304**	0.0011465	13.1
A30	**A29**	5	12857	60	7.75	**0.048**	0.00079618	10.9
A31	**A30**	4	10286	250	7.75	**0.127**	0.00050955	8.7
A32	**A31**	3	7714	125	7.75	**0.036**	0.00028662	6.5
A33	**A32**	2	5143	200	7.75	**0.025**	0.00012739	4.4
A34	**A33**	1	2571	255	7.75	**0.008**	3.1847E-05	2.2
Lat.34A	**A34**	1	2571	400	4.00	**0.414**	0.00103501	8.2
W34A	**Lat.34A**	1	2571	10	2.00	**0.469**	0.04689303	32.7
Waste	**W34A**	0			8.00	**6.000**		
					Total Head Loss =	**9.89**	**in. water column**	

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 9. Head Loss for Flare 3: Header B, North Arm.

FLARE 3: Header B, North Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 3A	**Flare 3**	29	74571	350	11.50	**1.273**	0.0036	28.7
Main 3B	**Main 3A**	8	20571	640	7.75	**1.304**	0.0020	17.4
B6	**Main 3B**	3	7714	40	7.75	**0.011**	0.0003	6.5
B5	**B6**	2	5143	300	7.75	**0.038**	0.0001	4.4
B4	**B5**	1	2571	240	7.75	**0.008**	0.0000	2.2
Lat.4B	**B4**	1	2571	215	4.00	**0.223**	0.0010	8.2
W4B	**Lat.4B**	1	2571	10	2.00	**0.469**	0.0469	32.7
Waste	**W4B**	0			8.00	**6.000**		

Total Pressure Loss = 9.33 in. water column

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 10. Head Loss for Flare 3: Header B, South Arm.

FLARE 3: Header B, South Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 3A	Flare 3	29	74571	350	11.50	1.273	0.0036	28.7
Main 3B	Main 3A	8	20571	640	7.75	1.304	0.0020	17.4
B7	Main 3B	5	12857	290	7.75	0.231	0.0008	10.9
B8	B7	4	10286	125	7.75	0.148	0.0005	8.7
B9	B8	3	7714	180	7.75	0.036	0.0003	6.5
B10	B9	2	5143	190	7.75	0.023	0.0001	4.4
B11	B10	1	2571	125	7.75	0.006	0.0000	2.2
Lat.11B	B11	1	2571	30	4.00	0.031	0.0010	8.2
W11B	Lat.11B	1	2571	10	2.00	0.469	0.0469	32.7
Waste	W11B	0			8.00	6.000		

Total Head Loss = 9.52 in. water column

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 11. Head Loss for Flare 4: Header A, East Arm.

FLARE 4: Header A, East Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 4A	**Flare 4**	28	72000	320	11.50	**1.085**	0.0034	27.7
A43	**Main 4A**	9	23143	190	7.75	**0.490**	0.0026	19.6
A42	**A43**	8	20571	65	7.75	**0.132**	0.0020	17.4
A41	**A42**	7	18000	300	7.75	**0.468**	0.0016	15.3
A40	**A41**	6	15429	285	7.75	**0.327**	0.0011	13.1
A39	**A40**	5	12857	230	7.75	**0.183**	0.0008	10.9
A38	**A39**	4	10286	70	7.75	**0.036**	0.0005	8.7
A37	**A38**	3	7714	300	7.75	**0.086**	0.0003	6.5
A36	**A37**	2	5143	195	7.75	**0.025**	0.0001	4.4
A35	**A36**	1	2571	170	7.75	**0.005**	0.0000	2.2
Lat.35A	**A35**	1	2571	105	4.00	**0.109**	0.0010	8.2
W35A	**Lat.35A**	1	2571	10	2.00	**0.469**	0.0469	32.7
Waste	**W35A**	0			8.00	**6.000**		

Total Head Loss = 9.42 in. water column

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 12. Head Loss for Flare 4: Header A, West Arm.

FLARE 4: Header A, West Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 4A	**Flare 4**	28	72000	320	11.50	1.085	0.0034	27.7
A44	**Main 4A**	10	25714	70	7.75	0.223	0.0032	21.8
A45	**A44**	9	23143	130	7.75	0.335	0.0026	19.6
A46	**A45**	8	20571	160	7.75	0.326	0.0020	17.4
A47	**A46**	7	18000	320	7.75	0.499	0.0016	15.3
A48	**A47**	6	15429	90	7.75	0.103	0.0011	13.1
A49	**A48**	5	12857	230	7.75	0.183	0.0008	10.9
A50	**A49**	4	10286	340	7.75	0.173	0.0005	8.7
A51	**A50**	3	7714	40	7.75	0.011	0.0003	6.5
A52	**A51**	2	5143	265	7.75	0.034	0.0001	4.4
A53	**A52**	1	2571	65	7.75	0.002	0.0000	2.2
Lat.53A	**A53**	1	2571	370	4.00	0.383	0.0010	8.2
W53A	**Lat.53A**	1	2571	10	2.00	0.469	0.0469	32.7
Waste	**W53A**	0			8.00	6.000		

Total Head Loss = 9.83 in. water column

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 13. Head Loss for Flare 4: Header B, East Arm.

FLARE 4: Header B, East Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 4A	**Flare 4**	28	72000.00	320	11.50	**1.085**	0.0034	27.73
Main 4B	**Main 4A**	9	23142.86	590	7.75	**1.522**	0.0026	19.62
B16	**Main 4B**	5	12857.14	160	7.75	**0.127**	0.0008	10.90
B15	**B16**	4	10285.71	375	7.75	**0.191**	0.0005	8.72
B14	**B15**	3	7714.29	280	7.75	**0.080**	0.0003	6.54
B13	**B14**	2	5142.86	230	7.75	**0.029**	0.0001	4.36
B12	**B13**	1	2571.43	260	7.75	**0.008**	0.0000	2.18
Lat.12B	**B12**	1	2571.43	315	4.00	**0.326**	0.0010	8.19
W12B	**Lat.12B**	1	2571.43	10	2.00	**0.469**	0.0469	32.74
Waste	**W12B**	0			8.00	**6.000**		
					Total Head Loss =	**9.84**	**in. water column**	

NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 14. Head Loss for Flare 4: Header B, West Arm.

FLARE 4: Header West Arm

Pipe Section Up Stream	Pipe Section Down Stream	No. of Wells Upstream	Gas Flow-Rate (scf/hour)	Pipe Section Length (ft)	Inside Diam. of Pipe (in.)	Head Loss in Section (in. of water)	Head Loss per ft (in. of water)	Pipe Flow Velocity (ft/sec)
Main 4A	**Flare 4**	28	72000.00	320	11.50	1.085	0.0034	27.73
Main 4B	**Main 4A**	9	23142.86	590	7.75	**1.522**	0.0026	19.62
B17	**Main 4B**	4	10285.71	180	7.75	**0.092**	0.0005	8.72
B18	**B17**	3	7714.29	300	7.75	**0.086**	0.0003	6.54
B19	**B18**	2	5142.86	310	7.75	**0.039**	0.0001	4.36
B20	**B19**	1	2571.43	390	7.75	**0.012**	0.0000	2.18
Lat.12B	**B12**	1	2571.43	160	4.00	**0.166**	0.0010	8.19
W12B	**Lat.12B**	1	2571.43	10	2.00	**0.469**	0.0469	32.74
Waste	**W12B**	0			8.00	**6.000**		

Total Head Loss = 9.47 in. water column

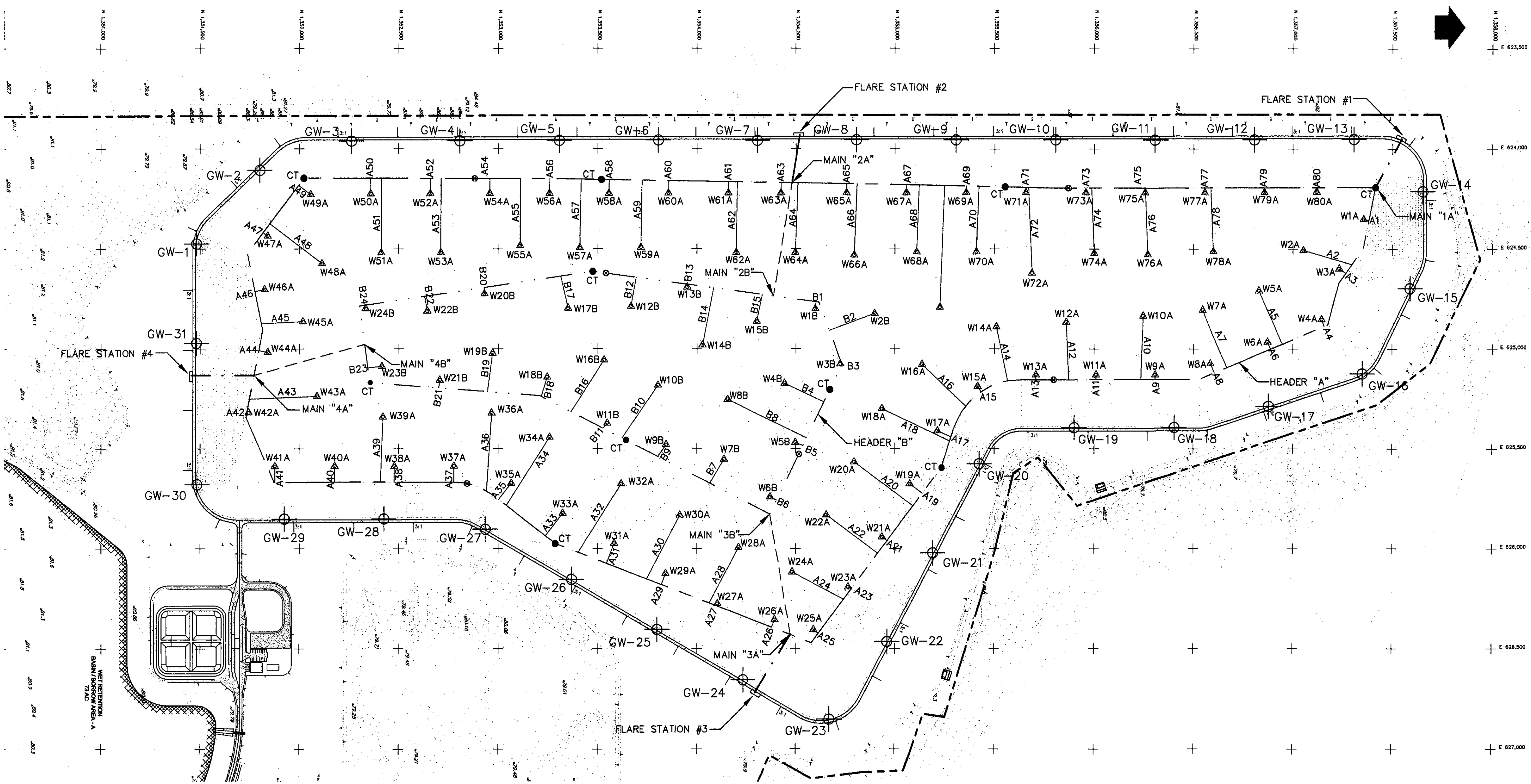
NOTES: Inside diameter of pipe is approximate.
scf/hour = standardized cubic feet per hour.

Table 15. Pipe Sizes for the Gas Extraction System

	Inside Diameter		Cross-Sectional Area	
	(in)	(ft)	(in^2)	(ft^2)
Gas Extraction Wells	8.000	0.667	50.265	0.349
Flexible lines to Laterals	2.000	0.167	3.142	0.022
Laterals to Headers	4.000	0.333	12.566	0.087
Header Line A	7.750	0.646	47.173	0.328
Header Line B	7.750	0.646	47.173	0.328
Main Line B (to Header A)	7.750	0.646	47.173	0.328
Main Line A (to Flare Station)	11.500	0.958	103.869	0.721

NOTE: Inside diameter of pipe is approximate.

025/026



LEGEND

	TOP OF INTERMEDIATE COVER (FEET)
— · — · —	12" MAIN HEADER LINE TO FLARE STATION
——— — ———	8" MAIN HEADER LINE – A
——— · · ———	8" MAIN HEADER LINE – B
— — — — —	8" HEADER LINE A TO B
————	4" HDPE SOLID LATERAL PIPE
△	PROPOSED VERTICAL GAS EXTRACTION WELL
• CT	CONDENSATE TRAP
⊗	CONTROL VALVE/MONITORING PORT
▭	FLARE STATION
⊕ GW-1	GAS MONITORING PROBE

0 500

SCALE IN FEET

Project: OAK HAMMOCK SOLID WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **CONCEPTUAL LANDFILL GAS EXTRACTION SYSTEM LAYOUT**			
Project Number	Date	File No.	Figure No.
FW0400	MARCH 02	0400FA038	**1**

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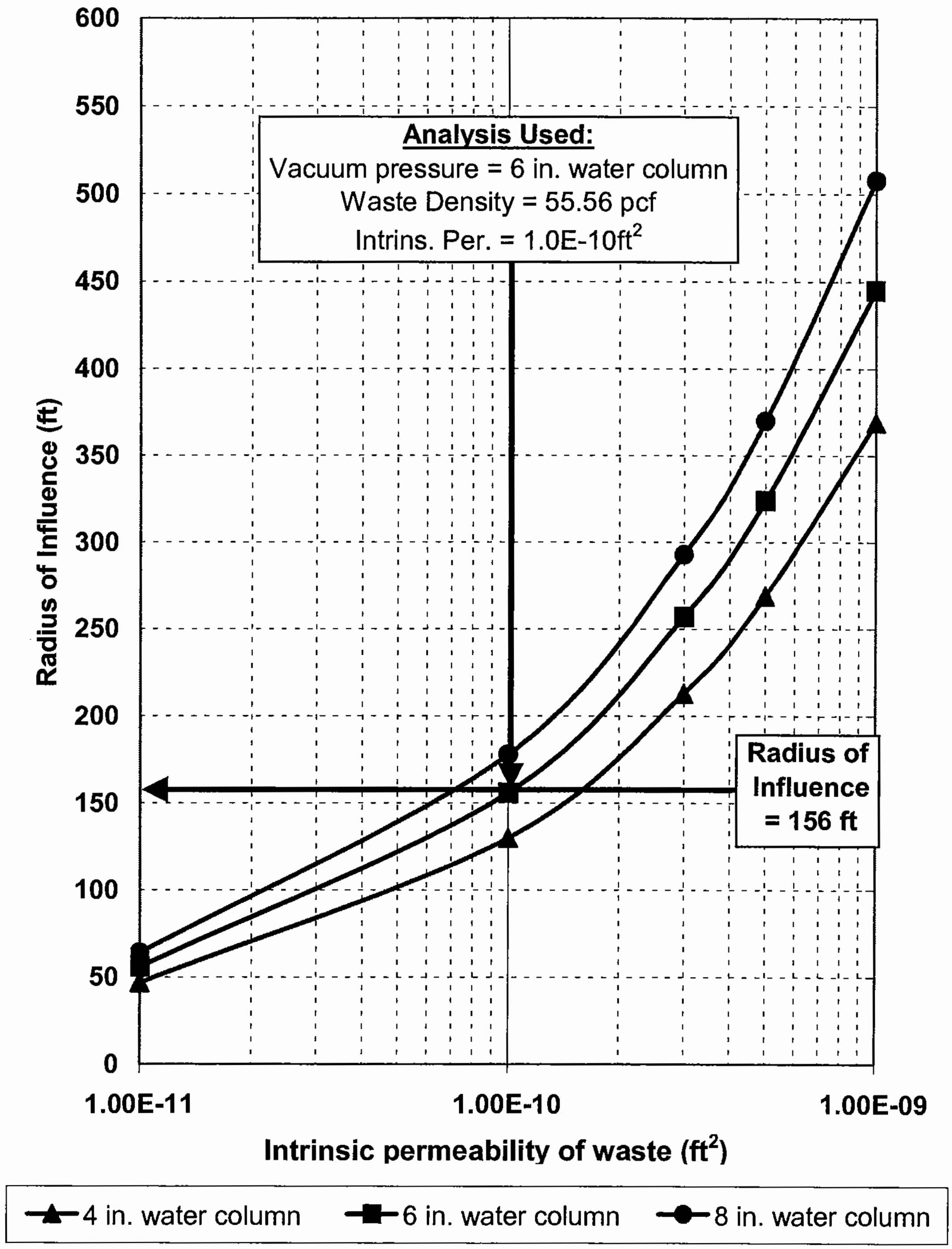

Figure 2. Horizontal Radius of Influence for the Gas Extraction Wells.

FINAL COVER SYSTEM PERFORMANCE EVALUATION

24 May 2002

TABLES

FIGURES

1. INTRODUCTION

The purpose of this calculation package is to evaluate the cover system performance for the Oak Hammock Disposal (OHD) landfill. The remainder of this calculation package presents the following:

- description of the final cover system;
- hydrologic evaluation of landfill performance (HELP) model analyses;
- final cover hydrologic efficiency;
- performance of the geocomposite drainage layer (retention criteria, hydraulic conductivity, clogging, hydraulic head); and
- final cover system erosion resistance.

2. DESCRIPTION OF FINAL COVER

Figure 1 shows the final cover system for the OHD landfill. Two types of cover systems are proposed, one on top of the landfill (minimum of 5 percent slopes), and another on the side slopes (4 horizontal:1 vertical). The top final cover system consists of the following components, from top to bottom, as shown in Figure 2:

- 6-inch thick vegetative layer;
- 18-inch thick cap protective layer;
- 40-mil PE smooth geomembrane liner; and
- 12-inch thick intermediate soil cover.

The side slope cover system consists of the following components, from top to bottom (Figure 2):

- 6-inch thick vegetative layer;
- 18-inch thick cap protective layer;
- geocomposite drainage layer consisting of a geonet with non-woven geotextile heat-bonded on both sides;
- 40-mil PE textured geomembrane liner; and
- 12-inch thick intermediate soil cover.

3. HELP MODEL ANALYSIS

The analysis of the cover system was performed using the HELP model, which is explained in detail in the calculation package entitled "*Leachate Management System*". A tabular summary of the input data used in the HELP model for the cover system is included below for the weather, geomembrane and soil layer properties.

Weather Data

Evapotranspiration Data

Nearby city	Orlando
State	Florida
Latitude	27.8 (HELP default value)
Evaporative zone depth	24 in (soil depth above geomembrane)
Maximum leaf area index	5 (excellent stand of grass)
Growing season start day	0 (HELP default value)
Growing season end day	367 (HELP default value)
Average wind speed	8.6 mph (HELP default value)
First quarter relative humidity	72 % (HELP default value)
Second quarter relative humidity	72 % (HELP default value)
Third quarter relative humidity	80 % (HELP default value)
Fourth quarter relative humidity	76 % (HELP default value)

Precipitation Data

Nearby city	Fort Drum
State	Florida
Years of data generation	30

Temperature Data

Nearby city	Orlando
State	Florida
Years of data generation	25

Normal mean monthly temperature (°F)

January	60.5
February	61.5
March	66.8
April	72.0
May	77.3
June	80.9
July	82.4
August	82.5
September	81.1
October	74.9
November	67.5
December	62.0

Solar Radiation

Nearby city	Orlando
State	Florida
Years of data generation	25

Geomembrane Data

Placement of geomembrane	Good
Manufacturer's Defect (Pinhole) Size Density/acre	 1 mm 2
Installation Defects Size Density/acre	 1 cm^2 2
Area assumed in program	1 acre

<u>Soil Layer</u>

Numbers given for layer, type, and texture are from defaults values provided by the HELP model.

5 percent surface slope

Layer	Type	Description	Thickness inches	Texture No.	Porosity vol/vol	Field cap. vol/vol	Wilting point vol/vol	k cm/sec
1	1	Vertical percolation (Vegetative Layer)	6	4	0.437	0.105	0.047	0.0017
2	1	Vertical percolation (Protective Layer)	18	3	0.457	0.083	0.033	0.0031
3	4	Geomembrane liner	0.040	35				2E-13
4	1	Vertical percolation (Intermediate Cover)	12	1	0.417	0.045	0.018	0.01
5	1	Vertical percolation (Waste)	1140	18	0.168	0.073	0.019	0.001

25 percent surface slope

Layer	Type	Description	Thicknes s inches	Texture No.	Porosity vol/vol	Field cap. vol/vol	Wilting point vol/vol	k cm/sec	Length Drain ft	Slope %
1	1	Vertical percolation (topsoil)	6	4	0.437	0.105	0.047	0.0017	N/A	N/A
2	1	Vertical percolation (protective soil)	18	3	0.457	0.083	0.033	0.0031	N/A	N/A
3	2	Lateral drainage (geocomposite)	0.306		0.85	0.01	0.005	14.14	236	25
4	4	Geomembrane liner	0.060	35				2E-13	N/A	N/A
5	1	Vertical percolation (compacted soil)	12	1	0.417	0.045	0.018	0.01	N/A	N/A
6	1	Vertical percolation (waste)	1140	18	0.168	0.073	0.019	0.001	N/A	N/A

Surface Data

Soil texture	4 (HELP default value used for Topsoil)
Vegetation	5 (HELP value for excellent grass)
Area of runoff	100 %
Surface slope	5 and 25 percent
Surface length	765 ft (5%) and 236 ft (25%)
Drainage path length	236 ft (25%), no drain path in 5%

4. FINAL COVER HYDROLOGIC EFFICIENCY

The purpose of this analysis is to evaluate the hydrologic efficiency with respect to minimizing infiltration (or leakage) of precipitation through the final cover. The final cover system efficiency was calculated using the following equation:

$$E = \frac{P_y - I}{P_y} \times 100\% \qquad \text{Equation 1}$$

Where:

E = efficiency of cover system (%);
P_y = average annual precipitation (in/year); and
I = average annual leakage through cover barrier layer.

Attachment 1 presents the output from the HELP Model evaluation performed for the final cover system for both the 5 and 25 percent surface slopes. The following table summarizes the results obtained for the efficiency of the cover system from the HELP Model.

Surface Slope (%)	I	P_y	E
5	0.00042 in/year	53.22 in/year	100 %
25	0.00000 in/year	53.22 in/year	100 %

5. PERFORMANCE OF GEOCOMPOSITE DRAINAGE LAYER

The purpose of this analysis is to verify the capacity of the geocomposite drainage layer to be used in the 25 percent side slope cover system for the OHD landfill. The geocomposite consists of three components: a geonet drainage layer, and two nonwoven geotextiles heat bonded on each side of the geonet.

The purpose of the geocomposite drainage layer is to prevent seepage forces and buoyancy effects from reducing the slope stability of the final cover soil. The geonet portion of the drainage layer conveys water infiltrating from the overlying soil to the surface-water management channels. The geotextile covering is to prevent the migration of particles from the overlying soil into the geonet.

The geotextile will be heat bonded to both sides of the geonet. The purpose of this is to prevent a plane of weakness between the geotextile and the geonet. The geotextile was designed such that the hydraulic conductivity, apparent opening size, and mechanical properties are compatible with the overlying soil material.

Based on Geosyntec's project experience and guidelines presented by FHWA [1990], the following design criteria must be satisfied:

- the geotextile must retain particles of the overlying soil;
- the geotextile must be permeable enough to allow free flow of any water that infiltrates through the overlying soil layer;

- the geotextile must not clog during the design life of the facility; and
- the geotextile must have sufficient mechanical properties for survivability and durability during the post-closure period.

5.1 Retention Criteria

There are many formulae available for soil-retention design, most of which use the soil particle size characteristics compared to the 95%-opening size of the geotextile, defined as O_{95} of the geotextile. A comprehensive approach to soil retention criteria is given by Luettich et al. [1992]. Attachment 2 illustrates the procedure for applying the soil retention criteria to geotextile filter design using steady-state flow conditions.

In order to use the matrix given by Luettich, the characteristics of the protective soil layer must be identified. The properties of the protective soil used in this analysis were taken from the soils identified in the borrow areas as discussed in the calculation package entitled *Geotechnical Investigation Report* with the following equation for O_{95} for this type of soil:

$$O_{95} < 2C'_u d'_{50} \qquad \text{Equation 2}$$

Where C'_u is equal to $(d'_{100}/d'_0)^{1/2}$ and d'_{100} and d'_0 are extremities of a straight line drawn through the particle-size distribution; (obtained from the particle-size distribution of the borrow material and included in Attachment 2); d'_{50} is the midpoint of this line.

According to the manufacturer's information, a typical 6 oz/yd^2 geotextile has an apparent opening size, O_{95}, of 0.21 mm. Applying equation 2 with C'_u and d'_{50} of the borrow materials, resulted in values larger than the O_{95} of the assumed geotextiles, thus meeting this retention criterion.

Client Sample ID (Attachment 2)	$O_{95}<$ (mm)
B	0.520
BR-A	0.608
BR-B	0.620
BR-C	0.672
BR-D	0.695
BR-E	0.980
BR-P	0.960

5.2 Hydraulic Conductivity Criteria

It is recommended that the minimum hydraulic conductivity of the geotextile be greater than or equal to ten times the maximum hydraulic conductivity of the overlying soil (i.e., protective cover soil) [FHWA, 1990].

$$k_{geotextile} > 10k_{soil} \quad \text{Equation 3}$$

The hydraulic conductivity used for the protective cover soil is 3 x 10^{-3} cm/sec, therefore, the minimum required hydraulic conductivity of the geotextile should be greater than 0.031 cm/sec. A typical 8 oz/yd^2 geotextile has a hydraulic conductivity of 0.2 cm/sec, meeting this criteria.

Additionally, the required geotextile permittivity is calculated as the minimum hydraulic conductivity divided by the geotextile thickness. From this, the required permittivity should be:

$$Permittivity_{geotextile} > \frac{0.031 cm/\sec}{t_{geotextile}} \quad \text{Equation 4}$$

Assuming 90-mil (0.2286 cm) for a typical 8 oz/yd^2 geotextile, the minimum required permittivity is 0.136 sec^{-1} (it is noted that manufacturer's literature indicates that this permittivity can be met by most needle-punched nonwoven geotextiles).

5.3 Clogging Criterion

The minimum porosity (η_g) recommended for geotextiles is η_g>30% [Giroud, 1982]. The porosity of the majority needle-punched nonwoven geotextiles is around 90 percent [Giroud, 1982], which is significantly greater than the required 30 percent.

5.4 Hydraulic Head

The purpose of this evaluation is to verify that the head on the geomembrane is less than the thickness of the geocomposite (0.306 in). This calculation was performed for the side slope of 25 percent since the surface slope of 5 percent does not have a drainage layer. Rainfall on that portion of the landfill with a surface slope of 5 percent is collected in surface swales and directed away from the landfill as shown in Figures 3.

Attachment 1 presents the HELP model results for the analysis of the 25 percent surface slope. The heads shown below were smaller than the thickness of the geocomposite.

Peak daily values for years 1 through 25

Average head on top of geomembrane	0.044 in
Maximum head on top of geomembrane	0.123 in

5.5 Upper Limit Flow Condition

The maximum possible flow in the geocomposite would be caused by saturated vertical flow through the protective cover soil on the side slopes. Vertical saturated flow is calculated by the following equation derived from Darcy's Law:

$$Q = kA \qquad \text{Equation 5}$$

Q is the volume per unit time of flow through a porous media sample with a cross section area (A) perpendicular to the flow direction; and k is the hydraulic conductivity of the sample in units of length/time. The vertical flow per unit area, or impingement rate (I) in units of length/time is:

$$I = \frac{Q}{A} = k \qquad \text{Equation 6}$$

The hydraulic conductivity assumed for the protective soil is $3.1\text{x}10^{-3}$ cm/sec and for the topsoil is $1.7 \text{ x } 10^{-3}$ cm/sec. An equivalent hydraulic conductivity from the soil on top of the drainage layer (topsoil and protective soil layer) can be calculated using Equation 7 (see Attachment 3 for derivation of this Equation) which gives a hydraulic conductivity of $4.8 \text{ x}10^{-3}$ cm/sec. This calculation is very conservative and corresponds to a rainfall intensity of 6.8 in/hr.

$$k_v = \frac{\Sigma t_i}{\Sigma \frac{t_i}{k_i}} \qquad \text{Equation 7}$$

Where:

Σt_i = summation of thickness; and
Σk_i = summation of hydraulic conductivities.

Therefore, the maximum flow into the geocomposite per unit width is calculated using Equation 8 with a maximum flow of $5.8\text{x}10^{-5}$ m^3/sec:

$$q = I \times L_s \times Width \qquad \text{Equation 8}$$

Where:

L_s = plan length of side slope (Table 1) taken as the maximum length for the critical scenario (400 ft);
I = impingement rate on side slope equal to 4.8 x10^{-3} cm/sec; and
Width = unit width of one.

The maximum flow capacity per unit width of the geocomposite (q_{cap}) is calculated as:

$$q_{cap} = \theta_{geocomposite} Width \qquad \text{Equation 9}$$

Where:

$\theta_{geocomposite}$ = transmissivity of the geocomposite with factors of safety and reduction factors equal to 1.1x10^{-3} m^2/sec (see Attachment 3 for specifications); and
Width= unit width of one.

Therefore the flow capacity of the geocomposite per unit width is 1.1x10^{-3} m^3/sec. This value is greater than the maximum calculated flow per unit width of 5.8x10^{-5} m^3/sec.

Additionally, the HELP Model was used to evaluate the head on the liner with respect to the length of the drainage path. The following table summarizes these results.

L_s ft	Head on top of geomembrane in
236	0.123
400	0.141
600	0.293
850	0.270

From the above results it can be concluded that drainage path lengths of 400 ft (and up to 850 ft) will result in heads above the geomembrane less than the thickness of the geocomposite (0.306 in).

6. EROSION RESISTANCE OF FINAL COVER SYSTEM

The purpose of this calculation is to estimate the average annual soil loss from the proposed landfill cover and evaluate the erosion resistance by comparing the calculated loss to the published acceptable range. Erosion of the final cover will be controlled by the cover swales, cover vegetation, and maintenance program.

The average annual soil loss on the cover can be estimated using the U.S. Department of Agriculture universal soil loss equation [USEPA, 1982]:

$$A = RK(LS)CP \quad \text{Equation 10}$$

A =	average annual soil loss (ton/acre/year);
R =	rainfall and runoff erosivity index (Attachment 4);
K =	soil erodibility factor, see Table 2 (ton/acre/year);
LS =	factor accounting for slope length and slope steepness (Table 3);
C =	cover management factor (Table 4); and
P =	practice factor (Table 5)

The parameters used with Equation 10 are:

- runoff erosivity index (R) equal to 400 (Attachment 4);
- soil erodibility factor (K) equal to 0.24 ton/acre/year for a fine sandy loam (soil similar to the silty sand used for the vegetated layer) with organic matter greater than 4 percent (from Table 2);
- LS factor equal to 12.0 (from Table 3);
- cover management factor (C) equal to 0.004 for vegetation a high productivity level (well maintained grass, Table 4); and
- practice factor (P) equal to 1 for no support practice (Table 5).

Using Equation 10 and the above parameter values:

A= (400) (0.24) (12.0) (0.004) (1)

A = 4.608 tons/acre/year

The average annual soil loss due to erosion was calculated to be 4.608 tons/acre/year for the side slopes of 25 percent of the final cover. This value is less than the maximum soil loss considered acceptable (5 tons/acre/year) for landfill covers [University of Wisconsin-Madison, 1988]. For a total soil unit weight of 100 pcf, this equates to approximately 0.025 inches per year.

REFERENCES

FHWA (by STS Consultants, Ltd. and GeoSyntec), "Geotextile Desing an Construction Guidelines", Washington, D.C., April 1990.

Goldman, S.J., Jackson, K, and Bursztynsky, T.A., "Erosion & Sediment Control Handbook", McGraw Hill Book Co., 1986.

Giroud, J. P., "Filter Criteria for Geotextiles", Proceedings, Second International Conference on Geotextiles, Vol. 1, Las Vegas, N.V., Aug. 1982, pp. 37-42.

Luettich, S. M., Giroud, J. P., and Bachus, R. C., "Geotextile Filter Design Guide", Journal of Geotextiles and Geomembranes, Vol. 11, No. 4-6, 1992, pp. 19-34.

USEPA, "Evaluating Cover Systems for Solid and Hazardous Waste", SW-867, U.S. Environmental Protection Agency, Washington, D.C., Sep 1982, Revised Edition, 58 p.

University of Wisconsin-Madison, "Sanitary Landfill Design", Short Course taught in the Department of Engineering Professional Development, Madison, Wisconsin, Feb 1988.

TABLES

Table 1. Slope lengths on surface

Cell	Drainage Path 5% surface slope ft	Drainage Path 25% surface slope ft	Total Drainage Path ft
1	710.60	320.16	1030.76
2	480.82	308.52	789.34
3	500.78	246.00	746.78
4	500.78	226.53	727.31
5	550.71	236.00	786.71
7	600.91	215.64	816.55
6	750.82	226.53	977.35
8	640.96	215.64	856.60
9	910.60	205.92	1116.52
10	1050.69	267.76	1318.45
11	550.06	398.53	948.59
12	1050.69	267.76	1318.45
14	990.73	206.15	1196.88
15	990.73	205.68	1196.41
13	1050.69	185.30	1235.99
16	760.95	175.60	936.55
17	931.81	175.60	1107.41
19	760.95	185.30	946.25
18	760.95	175.60	936.55
20	760.95	330.34	1091.29
21	760.95	175.60	936.55

Table 2. Approximate Values of the Soil Erodibility Factor, K, for USDA Textural Classes [USEPA, 1982]

APPROXIMATE VALUES OF FACTOR K FOR USDA TEXTURAL CLASSES (ton/acre/year)			
Texture Class	*Organic matter content*		
	0.5%	2%	4%
	K	K	K
Sand	0.05	0.03	0.02
Fine sand	.16	.14	.10
Very fine sand	.42	.16	.28
Loamy sand	.12	.10	.08
Loamy fine sand	.24	.20	.16
Loamy very fine sand	.44	.38	.30
Sandy loam	.27	.24	.19
Fine sandy loam	.35	.30	.24
Very fine sandy loam	.47	.41	.33
Loam	.38	.34	.29
Silt loam	.48	.42	.33
Silt	.60	.52	.42
Sandy clay loam	.27	.25	.21
Clay loam	.28	.25	.21
Silty clay loam	.37	.32	.26
Sandy clay	.14	.13	.12
Silty clay	.25	.23	.19
Clay		0.13-0.29	

Table 3. Values of the Factor LS for Specific Combinations of Slope Length and Slope Steepness [USEPA, 1982]

% Slope	Slope length (feet)											
	25	50	75	100	150	200	300	400	500	600	800	1000
0.5	0.07	0.08	0.09	0.10	0.11	0.12	0.14	0.15	0.16	0.17	0.19	0.20
1	0.09	0.10	0.12	0.13	0.15	0.16	0.18	0.20	0.21	0.22	0.24	0.26
2	0.13	0.16	0.19	0.20	0.23	0.25	0.28	0.31	0.33	0.34	0.38	0.40
3	0.19	0.23	0.26	0.29	0.33	0.35	0.40	0.44	0.47	0.49	0.54	0.57
4	0.23	0.30	0.36	0.40	0.47	0.53	0.62	0.70	0.76	0.82	0.92	1.0
5	0.27	0.38	0.46	0.54	0.66	0.76	0.93	1.1	1.2	1.3	1.5	1.7
6	0.34	0.48	0.58	0.67	0.82	0.95	1.2	1.4	1.5	1.7	1.9	2.1
8	0.50	0.70	0.86	0.99	1.2	1.4	1.7	2.0	2.2	2.4	2.8	3.1
10	0.69	0.97	1.2	1.4	1.7	1.9	2.4	2.7	3.1	3.4	3.9	4.3
12	0.90	1.3	1.6	1.8	2.2	2.6	3.1	3.6	4.0	4.4	5.1	5.7
14	1.2	1.6	2.0	2.3	2.8	3.3	4.0	4.6	5.1	5.6	6.5	7.3
16	1.4	2.0	2.5	2.8	3.5	4.0	4.9	5.7	6.4	7.0	8.0	9.0
18	1.7	2.4	3.0	3.4	4.2	4.9	6.0	6.9	7.7	8.4	9.7	11.0
20	2.0	2.9	3.5	4.1	5.0	5.8	7.1	8.2	9.1	10.0	12.0	13.0
25	3.0	4.2	5.1	5.9	7.2	8.3	10.0	12.0	13.0	14.0	17.0	19.0
30	4.0	5.6	6.9	8.0	9.7	11.0	14.0	16.0	18.0	20.0	23.0	25.0
40	6.3	9.0	11.0	13.0	16.0	18.0	22.0	25.0	28.0	31.0	--	--
50	8.9	13.0	15.0	18.0	22.0	25.0	31.0	--	--	--	--	--
60	12.0	16.0	20.0	23.0	28.0	--	--	--	--	--	--	--

Values given for slopes longer than 300 feet or steeper than 18% are extrapolations beyond the range of the research data and, therefore, less certain than the others.

Table 4. Generalized Values of the Cover Management Factor, C. [USEPA, 1982]

Crop, rotation, and management	Productivity level	
	High	Mod
	C Value	
Base value continuous fallow, tilled up and down slope	1.00	1.00
CORN		
C.RdR.fall TP.conv	0.54	0.62
C.RdR.spring TP.conv	0.50	0.59
C.RdL.fall TP.conv	0.42	0.52
C.RdR.wc seeding, spring TP.conv	0.40	0.49
C.RdL.standing, spring TP.conv	0.38	0.48
C-W-M-M RdL. TP for C.disk for W	0.039	0.074
C-W-M-M-M RdL.TP for C. disk for W	0.032	0.061
C.no-till pl in c-k sod, 95-80% rc	0.017	0.053
COTTON		
Cot. conv (Western Plains)	0.42	0.49
Cot. conv (South)	0.34	0.40
MEADOW		
Grass & Legume mix	0.004	0.01
Alfalfa, lespodeza or Serea	0.020	
Sweet clover	0.025	
SORGHUM, GRAIN (Western Plains)		
RdL. spring TP. conv	0.43	0.53
No-till pl in shredded 70-50% rc	0.11	0.18
SOYBEANS		
B.RdL. spring TP. conv	0.48	0.54
C-B, TP annually, cov	0.43	0.51
B, no-till pl	0.22	0.28
C-B, no-till pl, fall shred C stalks	0.18	0.22
WHEAT		
W-F, fall TP after W	0.38	
W-F, stubble mulch, 500 lbs rc	0.32	
W-F, stubble mulch, 1000 lbs rc	0.21	

Abbreviations Defined:

B	- soybeans	F	- fallow
C	- corn	M	- grass & legume hay
c-k	- chemically killed	pl	- plant
conv.	- conventional	W	- wheat
cot	- cotton	wc	- winter cover

lbs rc	- pounds of crop residue per acre remaining on surface after new crop seeding
% rc	- percentage of soil surface covered by residue mulch after new crop seeding
70-50% rc	- 70% cover for C values on last column: 50% for second column
RdR	- residues (corn stoves straw, etc.) removed or burned
RdL	- all residues left on field (on surface or incorporated)
TP	- turn plowed upper 5 or more inches of soil inverted, covering residues)

Table 5. Values of the Practice Factor, P. [USEPA, 1982]

Practice	Land slope (percent)				
	1.1-2	2.1-7	**7.1-12**	**12.1-18**	**18.1-24**
	(Factor P)				
Contouring (P_c)	0.60	0.50	0.60	0.80	0.90
Contour strip cropping (P_{sc})					
R-R-M-M (See Note 1)	0.30	0.25	0.30	0.40	0.45
R-R-M-M	0.30	0.25	0.30	0.40	0.45
R-R-W-M	0.45	0.38	0.45	0.60	0.68
R-W	0.52	0.44	0.52	0.70	0.90
R-O	0.60	0.50	0.60	0.80	0.90
Contour listing or ridge planting (P_{cl})	0.30	0.25	0.30	0.40	0.45
Contour terracing (P_1) (See Note 2)	$0.6/\sqrt{n}$ (See Note 3)	$0.5/\sqrt{n}$	$0.6/\sqrt{n}$	$0.8/\sqrt{n}$	$0.9/\sqrt{n}$
No support practice	1.0	1.0	1.0	1.0	1.0

Notes:

(1) R = rowcrop, W = fall-seeded grain, O = spring-seeded grain, M = meadow. The crops are grown in rotation and so arranged on the field that rowcrop strips are always separated by a meadow or winter grain strip.

(2) These P_1 values estimate the amount of soil eroded to the terrace channels and are used for conservation planning. For prediction of off-field sediment, the P_1 values are multiplied by 0.2.

(3) n = number of approximately equal-length intervals into which the field slope is divided by the terraces. Tillage operations must be parallel to the terraces.

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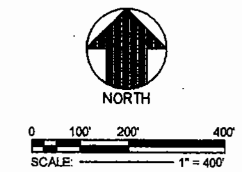
FIGURES

FINAL COVER SYSTEM PERFORMANCE EVALUATION



LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- 80 — TOP OF FINAL COVER SYSTEM ELEVATION (FEET)
- WETLAND BOUNADRY(SEE NOTE 5)
- 100 YEAR FLOODPLAIN (SEE NOTE 6)

NOTES:

1. NORTHING AND EASTING COORDINATES SHOWN REPRESENT FLORIDA STATE PLANE EAST ZONE NORTH AMERICAN DATUM OF 1983 (NAD83).
2. THE ELEVATIONS SHOWN REPRESENT NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29)(FEET).
3. THE PROPERTY BOUNDARY BASED ON A COMPOSITE BOUNDARY SURVEY PROVIDED BY JOHNSTON SURVEYING INC., KISSIMMEE FLORIDA, DATED AUGUST 12, 1999.
4. THE TOPOGRAPHIC INFORMATION SHOWN IN SECTION 11 AND THE NORTH HALF OF SECTION 14 WAS PROVIDED BY AERIAL CARTOGRAPHICS OF AMERICA, ORLANDO, FLORIDA BASED ON AN AERIAL PHOTOGRAPH FLOWN ON NOVEMBER 7, 2001. IN AREAS OUTSIDE THE LIMITS OF CONSTRUCTION, TOPOGRAPHIC INFORMATION WAS ADDED FROM USGS QUAD MAP FOR HOLOPAW SE, FLORIDA.
5. THE WETLAND BOUNDARY INFORMATION SHOWN IS BASED ON A FIELD SURVEY DATED MAY 15, 2002 BY JOHNSTON SURVEYING INC. OF WETLANDS BOUNDARIES FLAGGED BY BIOLOGICAL RESEARCH ASSOCIATES, INC., TAMPA, FLORIDA (BRA), AND JDS PENDING PERMIT, COMBINED WITH A PHOTO INTERPRETATION OF WETLAND BOUNDARIES BY BRA IN AREAS OF THE SITE OUTSIDE THE LIMITS OF CONSTRUCTION.
6. THE 100-YEAR FLOODPLAIN BOUNDARY SHOWN WAS PROVIDED BY THE OSCEOLA COUNTY GIS DEPARTMENT ON JANUARY 9, 2002.

Project			
OAK HAMMOCK DISPOSAL FACILITY			
Figure Title: **FINAL COVER SYSTEM GRADING PLAN I**			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA059	1

Consultant / Engineer

GEOSYNTEC CONSULTANTS
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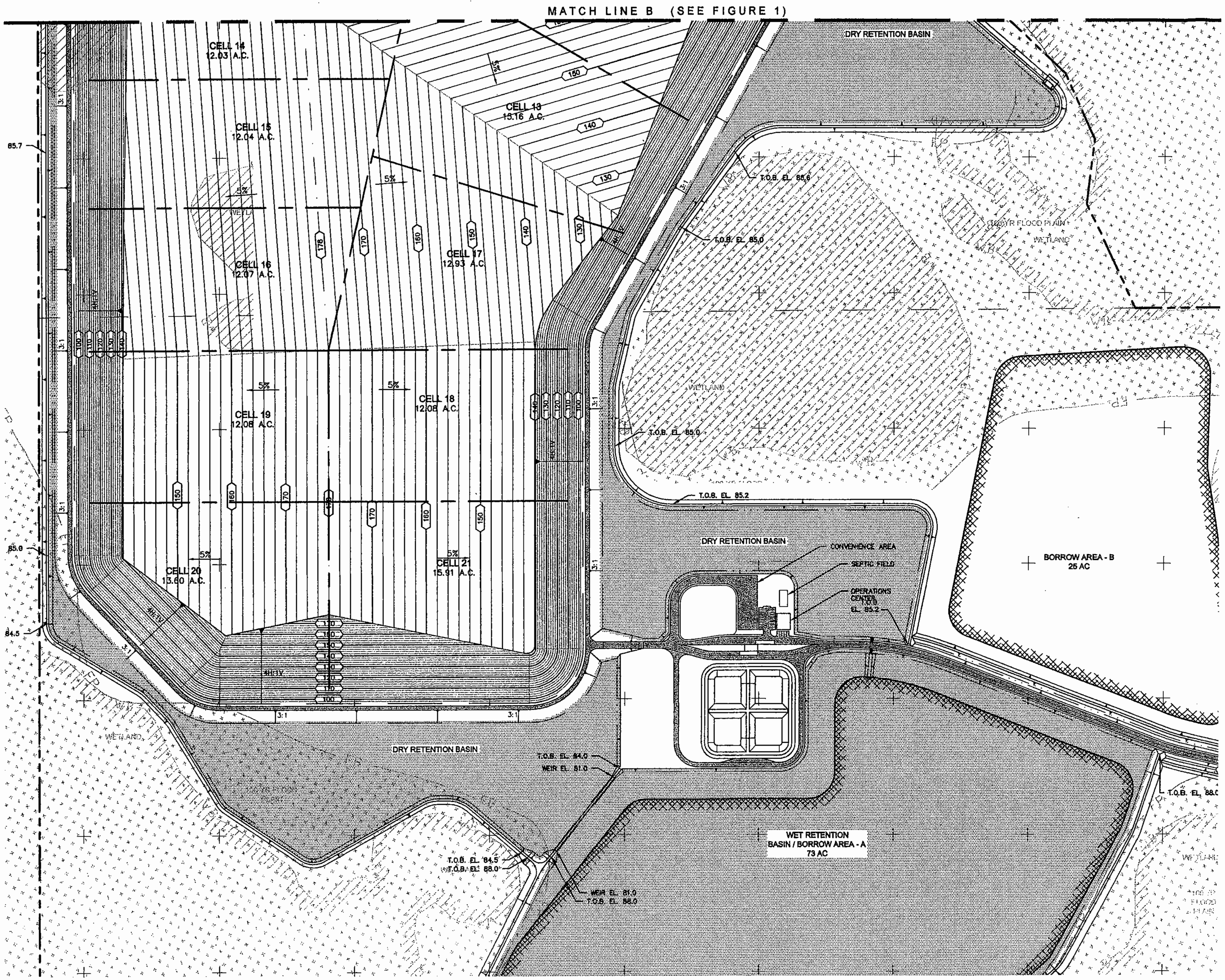
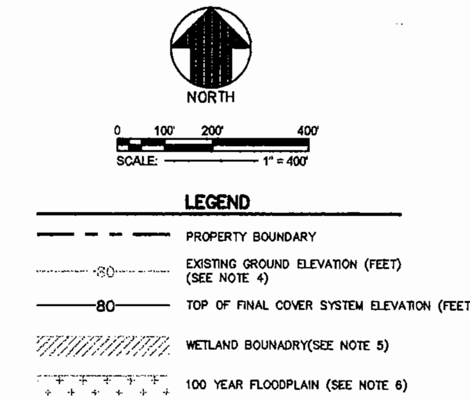
23/55





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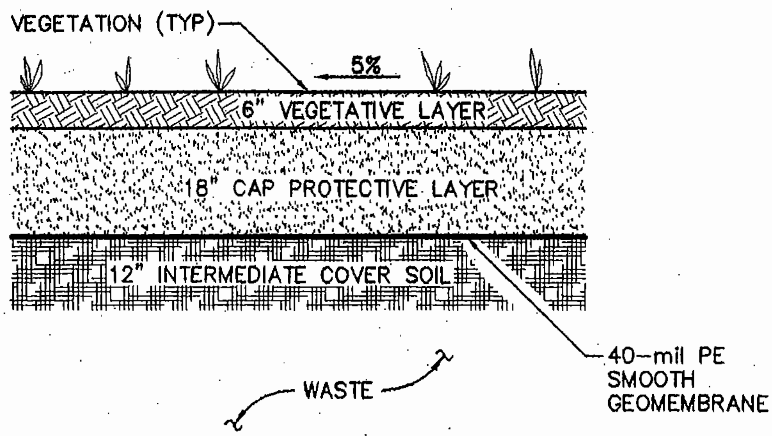
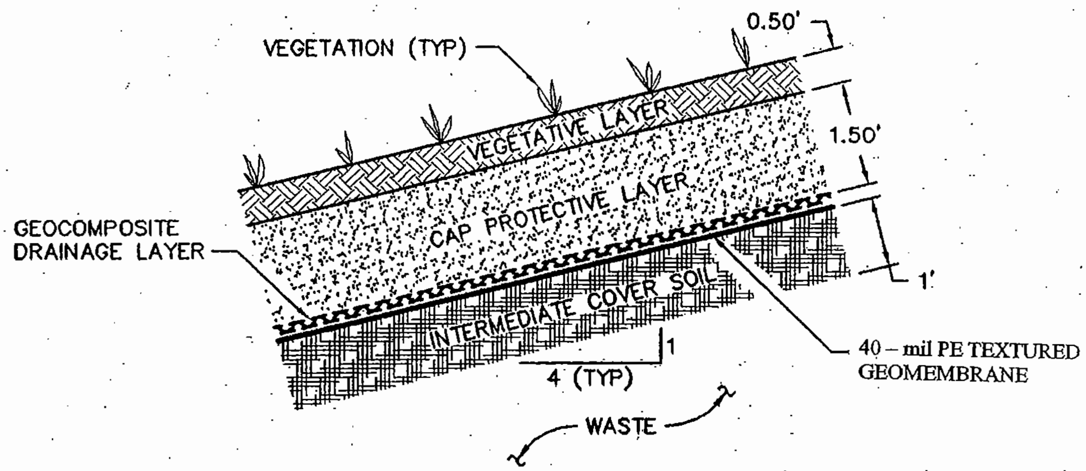
Project			
OAK HAMMOCK DISPOSAL FACILITY			
Figure Title: **FINAL COVER SYSTEM GRADING PLAN II**			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA059	**1 (cont)**
Consultant / Engineer: GEOSYNTEC CONSULTANTS, 14055 RIVERDGE DRIVE, SUITE 300 • TAMPA, FLORIDA 33637 USA, TEL: (813) 558-0990 • FAX: (813) 558-9726			



22/12 DETAIL (TYPICAL)
FINAL COVER SYSTEM ON TOPSLOPE

No Scale



20/12 DETAIL (TYPICAL)
FINAL COVER SYSTEM ON SIDESLOPE

No Scale

Project			
OAK HAMMOCK SOILD WASTE DISPOSAL FACILITY PERMIT APPLICATION			
Figure Title: **FINAL COVER SYSTEM DETAILS**			
Project Number	Date	File No.	Figure No.
FW0400	MARCH 02	0400FA025	2

Consultant / Engineer
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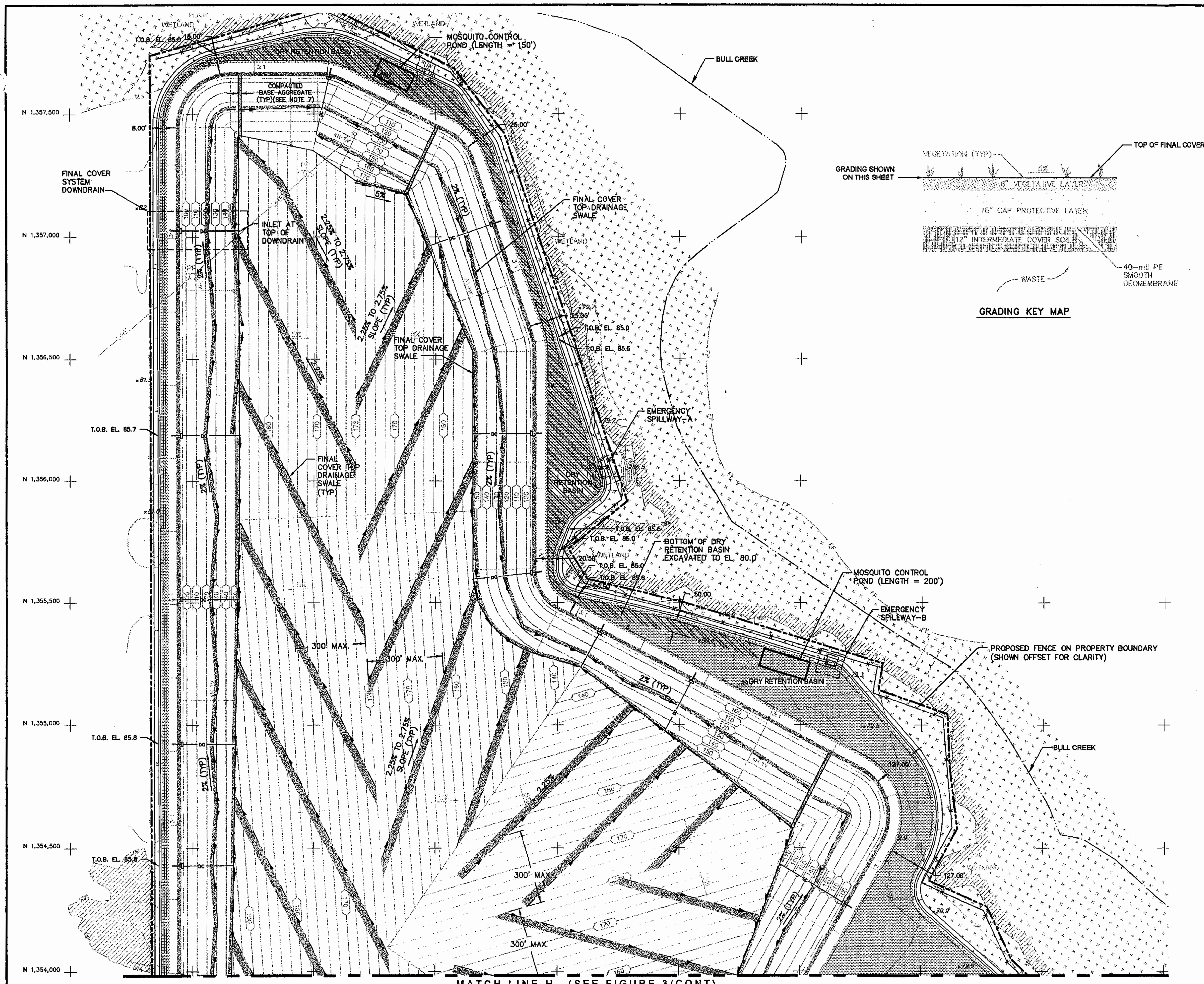
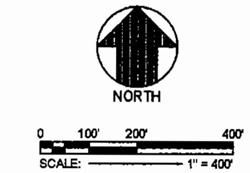


GRADING KEY MAP



LEGEND

- PROPERTY BOUNDARY
- APPROXIMATE LOCATION OF INTERMITTENT STREAM
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- TOP OF FINAL COVER ELEVATION (FEET)
- WETLAND BOUNDARY BY PHOTO INTERPRETATION BY BRA (SEE NOTE 5)
- WETLAND BOUNDARY PER BRA FLAGGING AND SURVEY BY JOHNSTON SURVEYING (SEE NOTE 5)
- 100-YEAR FLOODPLAIN (SEE NOTE 6)
- PROPOSED FENCE
- PROPOSED DOWNCHUTE
- PROPOSED TERRACES SLOPE RANGE FOR TOP = 2.25% TO 2.75% SLOPE RANGE FOR SIDESLOPE = 2% TO 3%

NOTES:

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6. THE 100-YEAR FLOODPLAIN BOUNDARY SHOWN WAS PROVIDED BY THE OSCEOLA COUNTY GIS DEPARTMENT ON JANUARY 9, 2002.
7. LANDFILL TOP ACCESS PROVIDED BY 10-FT WIDE GRAVEL ROADWAY ON 4H:1V SLOPES.

Project			
OAK HAMMOCK DISPOSAL FACILITY			
Figure Title			
STORMWATER MANAGEMENT PLAN I			
Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA026	3

Consultant / Engineer
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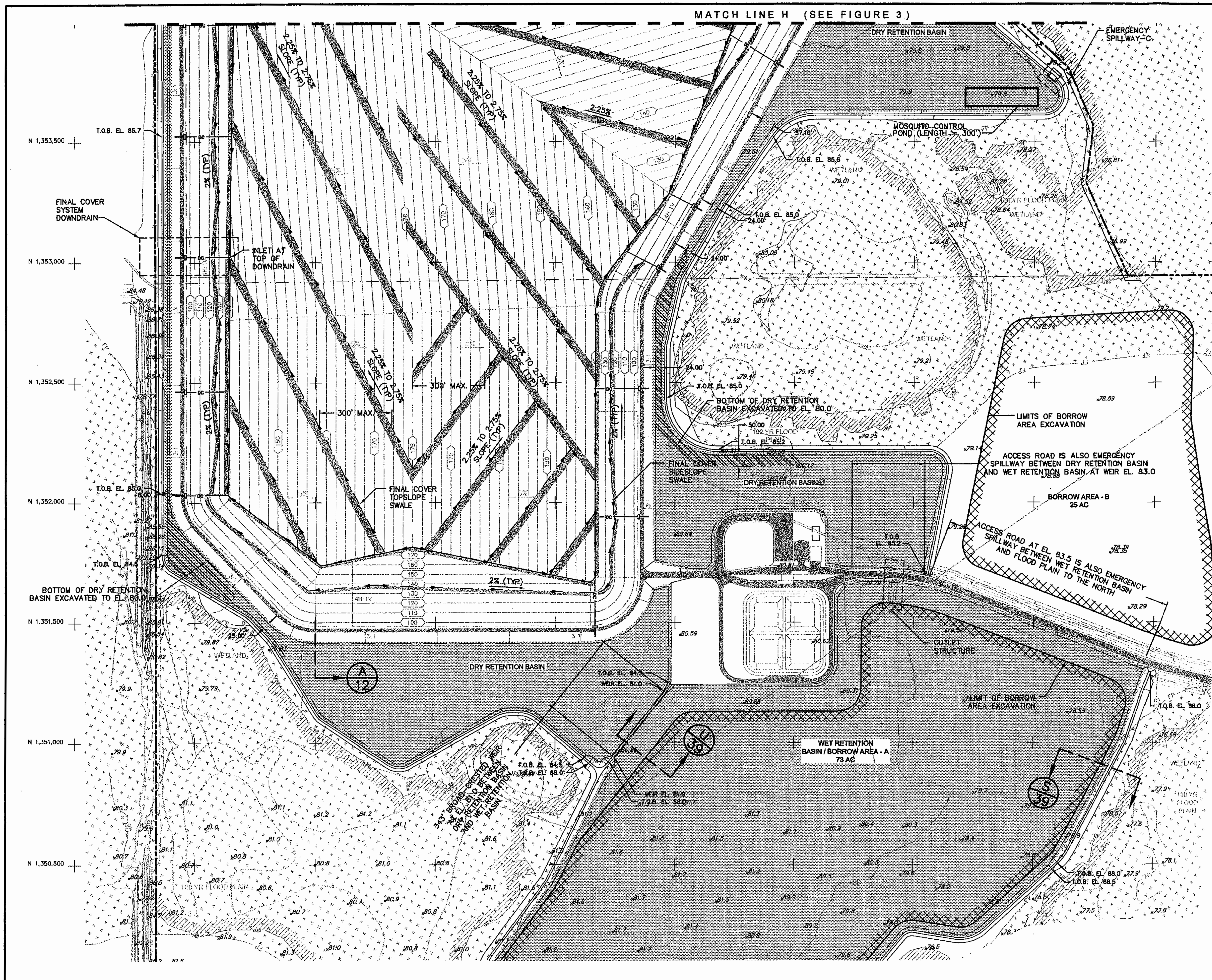

LEGEND

- PROPERTY BOUNDARY
- APPROXIMATE LOCATION OF INTERMITTENT STREAM
- EXISTING GROUND ELEVATION (FEET) (SEE NOTE 4)
- TOP OF FINAL COVER ELEVATION (FEET)
- WETLAND BOUNDARY BY PHOTO INTERPRETATION BY BRA (SEE NOTE 5)
- WETLAND BOUNDARY PER BRA FLAGGING AND SURVEY BY JOHNSTON SURVEYING (SEE NOTE 5)
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Project

OAK HAMMOCK DISPOSAL FACILITY

Figure Title

STORMWATER MANAGEMENT PLAN II

Project Number	Date	File No.	Figure No.
FW0400	MAY 2002	0400FA026	**3 (cont)**

Consultant / Engineer

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27/55

ATTACHMENT 1

Help Model Analysis

COVER SYSTEM 5% SLOPE

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**             HELP MODEL VERSION 3.07   (1 NOVEMBER 1997)                  **
**              DEVELOPED BY ENVIRONMENTAL LABORATORY                       **
**                USAE WATERWAYS EXPERIMENT STATION                         **
**            FOR USEPA RISK REDUCTION ENGINEERING LABORATORY               **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************
```

```
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TIME: 17:10 DATE: 3/20/2002

****

TITLE: Oak Hammock Disposal Facility

****

NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 4

```
THICKNESS                  =        6.00    INCHES
POROSITY                   =        0.4370 VOL/VOL
FIELD CAPACITY             =        0.1050 VOL/VOL
WILTING POINT              =        0.0470 VOL/VOL
INITIAL SOIL WATER CONTENT =        0.0493 VOL/VOL
EFFECTIVE SAT. HYD. COND.  =   0.170000002000E-02 CM/SEC
```

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 5.00
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

```
              TYPE 1 - VERTICAL PERCOLATION LAYER
                 MATERIAL TEXTURE NUMBER   3
THICKNESS                        =     18.00    INCHES
POROSITY                         =      0.4570 VOL/VOL
FIELD CAPACITY                   =      0.0830 VOL/VOL
WILTING POINT                    =      0.0330 VOL/VOL
INITIAL SOIL WATER CONTENT       =      0.3118 VOL/VOL
EFFECTIVE SAT. HYD. COND.        =  0.310000009000E-02 CM/SEC


                          LAYER  3
                          --------

               TYPE 4 - FLEXIBLE MEMBRANE LINER
                 MATERIAL TEXTURE NUMBER  35
THICKNESS                        =      0.04    INCHES
POROSITY                         =      0.0000 VOL/VOL
FIELD CAPACITY                   =      0.0000 VOL/VOL
WILTING POINT                    =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT       =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.        =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY              =      0.00    HOLES/ACRE
FML INSTALLATION DEFECTS         =      0:00    HOLES/ACRE
FML PLACEMENT QUALITY            =  4 - POOR


                          LAYER  4
                          --------

              TYPE 1 - VERTICAL PERCOLATION LAYER
                 MATERIAL TEXTURE NUMBER   1
THICKNESS                        =     12.00    INCHES
POROSITY                         =      0.4170 VOL/VOL
FIELD CAPACITY                   =      0.0450 VOL/VOL
WILTING POINT                    =      0.0180 VOL/VOL
INITIAL SOIL WATER CONTENT       =      0.0450 VOL/VOL
EFFECTIVE SAT. HYD. COND.        =  0.999999978000E-02 CM/SEC


                          LAYER  5
                          --------

              TYPE 1 - VERTICAL PERCOLATION LAYER
                 MATERIAL TEXTURE NUMBER  18
THICKNESS                        =   1140.00    INCHES
POROSITY                         =      0.6710 VOL/VOL
FIELD CAPACITY                   =      0.2920 VOL/VOL
WILTING POINT                    =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT       =      0.2920 VOL/VOL
EFFECTIVE SAT. HYD. COND.        =  0.100000005000E-02 CM/SEC
```

COVER5.OUT

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 4 WITH AN EXCELLENT STAND OF GRASS, A SURFACE SLOPE OF 5.% AND A SLOPE LENGTH OF 765. FEET.

SCS RUNOFF CURVE NUMBER	=	38.70	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	5.908	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.848	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.876	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	339.304	INCHES
TOTAL INITIAL WATER	=	339.304	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80 DEGREES
MAXIMUM LEAF AREA INDEX	=	5.00
START OF GROWING SEASON (JULIAN DATE)	=	0
END OF GROWING SEASON (JULIAN DATE)	=	367
EVAPORATIVE ZONE DEPTH	=	24.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00 %

NOTE: PRECIPITATION DATA FOR Fort Drum Florida WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR ORLANDO FLORIDA AND STATION LATITUDE = 27.80 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.212	0.063	0.000	0.000	0.008	0.518
	0.391	0.083	0.385	0.023	0.000	0.000
STD. DEVIATIONS	0.775	0.229	0.000	0.000	0.041	1.515
	1.804	0.231	1.067	0.113	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	1.873	3.193	4.188	4.485	4.772	6.188
	6.478	6.094	5.196	4.427	2.807	1.907
STD. DEVIATIONS	0.508	0.751	1.497	1.921	1.619	1.749
	1.085	0.774	0.725	0.434	0.490	0.511
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3						
AVERAGES	7.5444	8.2035	6.6064	4.3491	1.7567	3.7449
	5.9556	8.3677	9.9762	9.4254	7.7744	6.6892

STD. DEVIATIONS	6.3221	6.4945	5.5570	4.6941	3.8295	5.8443
	6.2705	7.0197	7.0882	6.8306	6.3946	5.9051

****

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.22	(8.197)	193201.7	100.00
RUNOFF	1.684	(3.7337)	6112.59	3.164
EVAPOTRANSPIRATION	51.607	(5.3044)	187333.84	96.963
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.00042	(0.00021)	1.509	0.00078
AVERAGE HEAD ON TOP OF LAYER 3	6.699	(3.301)		
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00000	(0.00000)	0.000	0.00000
CHANGE IN WATER STORAGE	-0.067	(2.9341)	-244.79	-0.127

Average annual Precipitation.

average annual infiltration.

****

****

PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	4.278	15529.3350
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.000004	0.01482
AVERAGE HEAD ON TOP OF LAYER 3	24.000	
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00000
SNOW WATER	0.00	0.0000
MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4520	
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0365	

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□
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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	0.3067	0.0511
2	3.9049	0.2169
3	0.0000	0.0000
4	0.5400	0.0450
5	332.8669	0.2920
SNOW WATER	0.000	

****
****

COVER25.OUT

FINAL COVER SYSTEM 25% SURFACE SLOPE

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**             HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                   **
**               DEVELOPED BY ENVIRONMENTAL LABORATORY                      **
**                 USAE WATERWAYS EXPERIMENT STATION                        **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\FORTDR~1.D4
TEMPERATURE DATA FILE:       C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95B.D7
SOLAR RADIATION DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95B.D13
EVAPOTRANSPIRATION DATA:     C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\CASE95B.D11
SOIL AND DESIGN DATA FILE:   C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\COVER25.D10
OUTPUT DATA FILE:            C:\DOCUME~1\ACIRA\DESKTOP\ZHELP3P\COVER25.OUT


TIME:  17:14      DATE:   3/20/2002


******************************************************************************

     TITLE:  Oak Hammock Disposal Facility

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   4
          THICKNESS                  =        6.00   INCHES
          POROSITY                   =        0.4370 VOL/VOL
          FIELD CAPACITY             =        0.1050 VOL/VOL
          WILTING POINT              =        0.0470 VOL/VOL
          INITIAL SOIL WATER CONTENT =        0.0447 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =    0.170000002000E-02 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                  LAYER  2
```

COVER25.OUT

```
           TYPE 1 - VERTICAL PERCOLATION LAYER
               MATERIAL TEXTURE NUMBER   3
THICKNESS                     =      18.00    INCHES
POROSITY                      =       0.4570 VOL/VOL
FIELD CAPACITY                =       0.0830 VOL/VOL
WILTING POINT                 =       0.0330 VOL/VOL
INITIAL SOIL WATER CONTENT    =       0.0569 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =   0.310000009000E-02 CM/SEC


                          LAYER  3
                          --------

             TYPE 2 - LATERAL DRAINAGE LAYER
               MATERIAL TEXTURE NUMBER   0
THICKNESS                     =       0.31    INCHES
POROSITY                      =       0.8500 VOL/VOL
FIELD CAPACITY                =       0.0100 VOL/VOL
WILTING POINT                 =       0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT    =       0.0103 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =    14.1400003000      CM/SEC
SLOPE                         =      25.00    PERCENT
DRAINAGE LENGTH               =     236.0     FEET


                          LAYER  4
                          --------

             TYPE 4 - FLEXIBLE MEMBRANE LINER
               MATERIAL TEXTURE NUMBER  35
THICKNESS                     =       0.04    INCHES
POROSITY                      =       0.0000 VOL/VOL
FIELD CAPACITY                =       0.0000 VOL/VOL
WILTING POINT                 =       0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT    =       0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =   0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY           =       0.00    HOLES/ACRE
FML INSTALLATION DEFECTS      =       0.00    HOLES/ACRE
FML PLACEMENT QUALITY         =   4 - POOR


                          LAYER  5
                          --------

           TYPE 1 - VERTICAL PERCOLATION LAYER
               MATERIAL TEXTURE NUMBER   1
THICKNESS                     =      12.00    INCHES
POROSITY                      =       0.4170 VOL/VOL
FIELD CAPACITY                =       0.0450 VOL/VOL
WILTING POINT                 =       0.0180 VOL/VOL
INITIAL SOIL WATER CONTENT    =       0.0450 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =   0.999999978000E-02 CM/SEC
```

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1140.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 4 WITH AN EXCELLENT STAND OF GRASS, A SURFACE SLOPE OF 25.% AND A SLOPE LENGTH OF 236. FEET.

SCS RUNOFF CURVE NUMBER	=	49.30	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	1.292	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.848	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.876	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	334.692	INCHES
TOTAL INITIAL WATER	=	334.692	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM ORLANDO FLORIDA

STATION LATITUDE	=	27.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	5.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	80.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Fort Drum Florida WAS CONVERTED FROM A HELP V.2 DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
60.50	61.50	66.80	72.00	77.30	80.90
82.40	82.50	81.10	74.90	67.50	62.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ORLANDO FLORIDA
AND STATION LATITUDE = 27.80 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 25

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.70	3.06	3.34	2.49	5.46	8.02
	8.05	6.43	6.14	3.62	1.66	2.24
STD. DEVIATIONS	2.07	1.83	2.03	1.59	3.34	4.07
	3.76	2.12	2.61	1.96	0.95	1.18
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.005	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.025	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.456	0.774	0.761	0.801	1.692	2.861
	2.636	2.324	2.303	1.430	0.481	0.359
STD. DEVIATIONS	0.228	0.891	0.391	0.678	1.242	1.712
	1.435	1.107	1.352	1.031	0.319	0.164
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	2.0442	2.4339	2.5704	1.7809	3.4724	4.8485
	5.6497	4.2265	3.5940	2.5771	1.3071	1.8511
STD. DEVIATIONS	1.2725	1.4534	1.6128	1.1493	1.9338	2.0010
	2.5275	1.4590	1.3856	1.0637	0.7346	1.0667

PERCOLATION/LEAKAGE THROUGH LAYER 4

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 6

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0008	0.0011	0.0010	0.0007	0.0014	0.0020
	0.0023	0.0017	0.0015	0.0010	0.0005	0.0007
STD. DEVIATIONS	0.0005	0.0006	0.0007	0.0005	0.0008	0.0008
	0.0010	0.0006	0.0006	0.0004	0.0003	0.0004

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 25

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.22	(8.197)	193201.7	100.00
RUNOFF	0.005	(0.0250)	18.30	0.009
EVAPOTRANSPIRATION	16.880	(4.1018)	61272.59	31.714
LATERAL DRAINAGE COLLECTED FROM LAYER 3	36.35572	(5.77861)	131971.250	68.30752
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00000	(0.00000)	0.005	0.00000
AVERAGE HEAD ON TOP OF LAYER 4	0.001	(0.000)		
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.00000	(0.00000)	0.000	0.00000
CHANGE IN WATER STORAGE	-0.017	(0.1685)	-60.47	-0.031

infiltration

****

PEAK DAILY VALUES FOR YEARS 1 THROUGH 25

	(INCHES)	(CU. FT.)
PRECIPITATION	5.78	20981.400
RUNOFF	0.125	453.5941
DRAINAGE COLLECTED FROM LAYER 3	3.52113	12781.70310
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000000	0.00003
AVERAGE HEAD ON TOP OF LAYER 4	0.044	
MAXIMUM HEAD ON TOP OF LAYER 4	0.123	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	0.0 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.000000	0.00000
SNOW WATER	0.00	0.0000

heads on top geomembrane

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.2995
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0365

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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□
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FINAL WATER STORAGE AT END OF YEAR 25

LAYER	(INCHES)	(VOL/VOL)
1	0.2680	0.0447
2	0.6080	0.0338
3	0.0031	0.0100
4	0.0000	0.0000
5	0.5400	0.0450
6	332.8561	0.2920

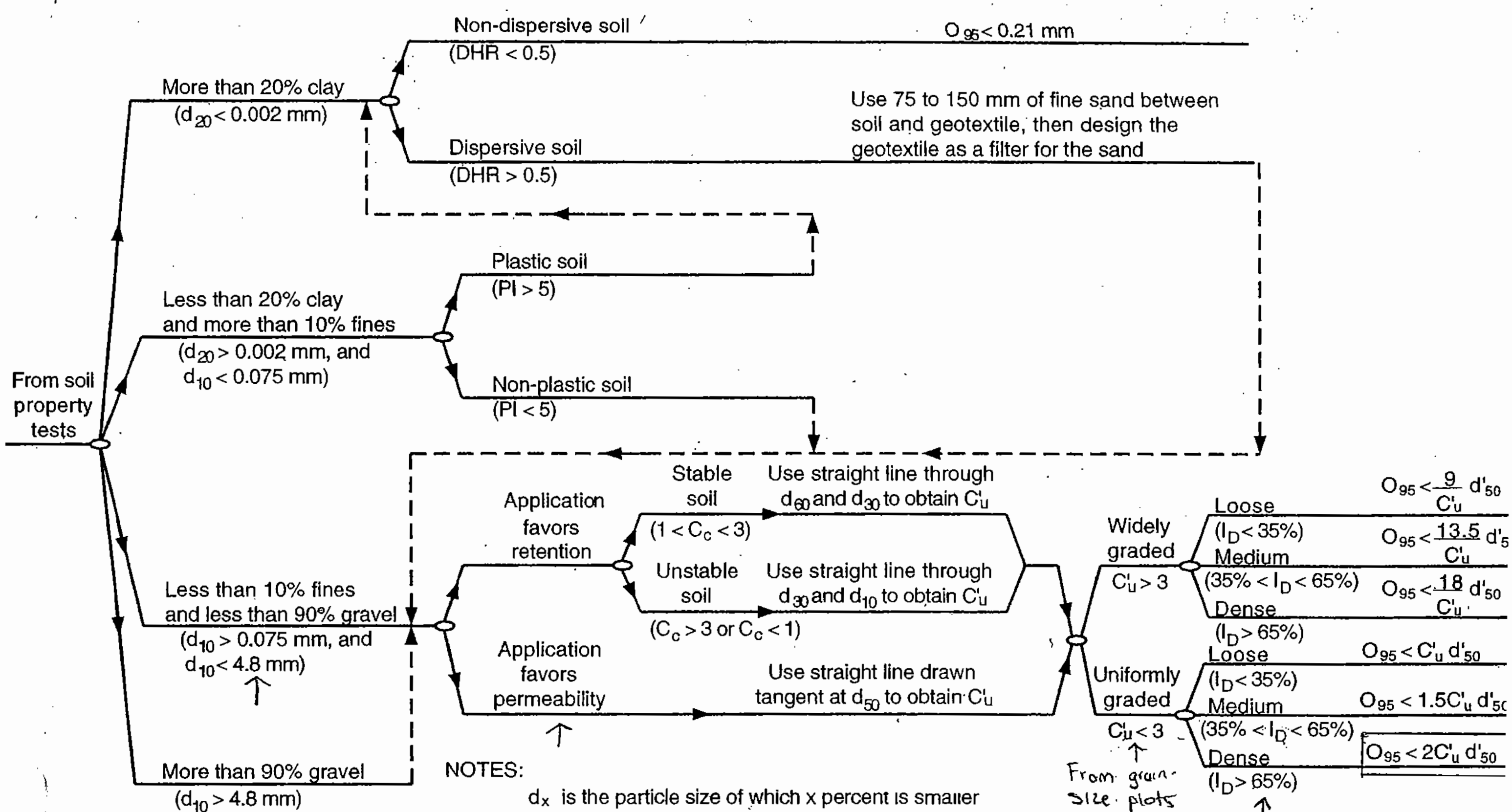
SNOW WATER 0.000

****
****

ATTACHMENT 2

Data for Calculation of Retention Criteria

42/55



NOTES:

d_x is the particle size of which x percent is smaller

$C'_u = \sqrt{\frac{d'_{100}}{d'_0}}$ where d'_{100} and d'_0 are the extremities of a straight line drawn through the particle-size distribution, as directed above; and d'_{50} is the midpoint of this line.

$C_c = \frac{(d_{30})^2}{d_{60} \times d_{10}}$

I_D = relative density of the soil
PI = plasticity index of the soil
DHR = double-hydrometer ratio of the soil

(a) Soil retention criteria for geotextile filter design using steady-state flow conditions. (After Luettich et al. [6])

From grain size distribution plots for borrow material, the O_{95} average obtained is 0.72 mm.

43/55

Excel Geotechnical Testing

"Excellence in Testing"

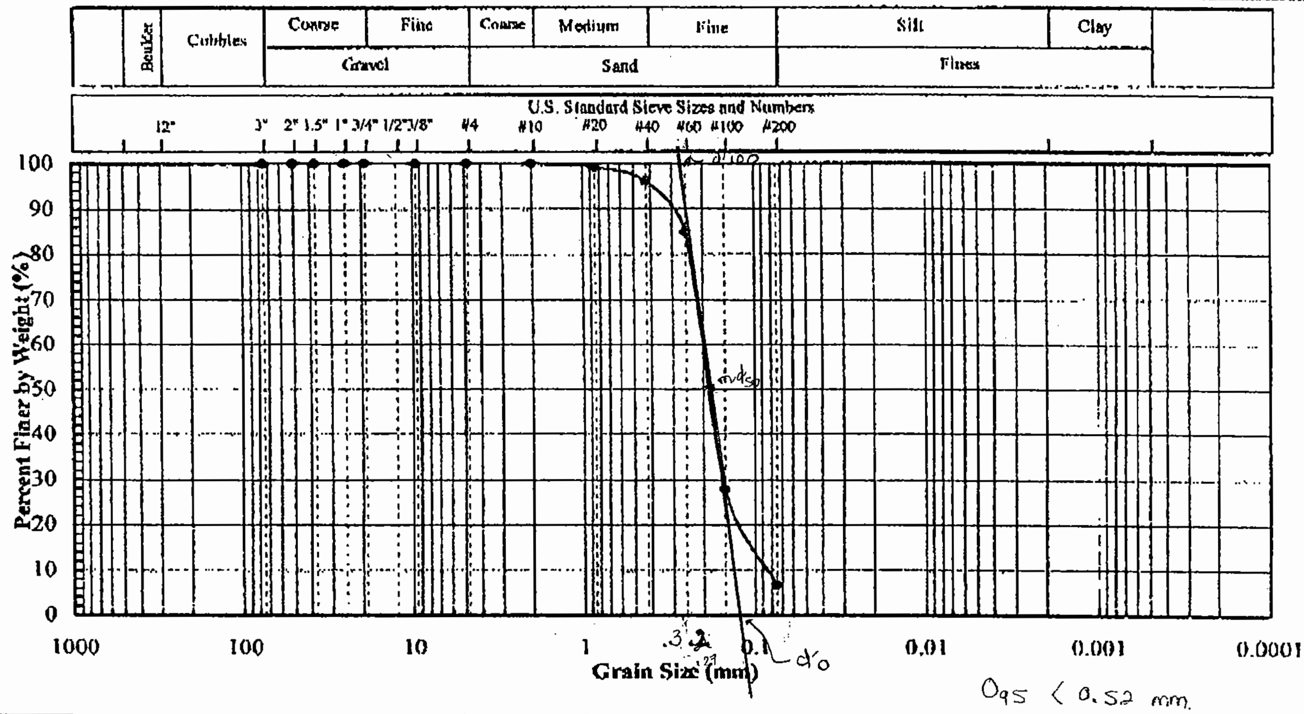
941 Forrest Street, Roswell, Georgia 30075
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Old Hammock SWD Facility
Project No:	33
Client Sample ID:	B
Lab Sample No:	A27

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification



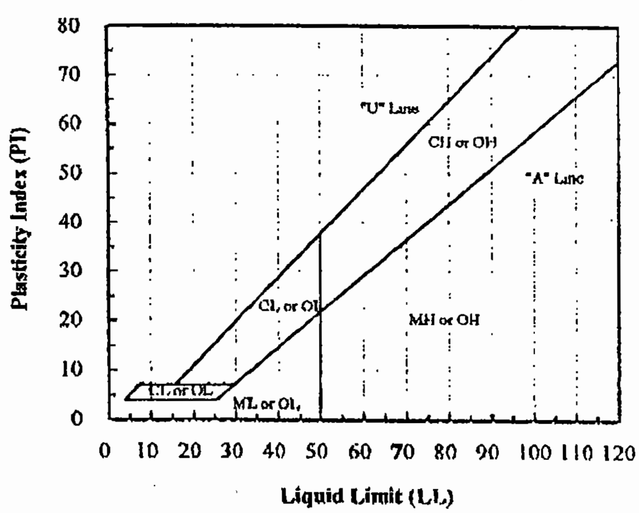
$O_{95} < 0.52$ mm

Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	99
#40	0.425	96
#60	0.250	85
#100	0.150	28
#200	0.075	7

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	93.3
Fines (%):	6.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	Atterberg Limits PL (%)	Atterberg Limits PI (-)	Engineering Classification
B	A27	19.6	6.7				

Note(s):

$C'_u = \left(\frac{d'_{100}}{d'_0}\right)^{1/2} = \left(\frac{0.27}{0.13}\right)^{1/2} = 1.44$

$O_{95} < 2C'_u d'_{50} < 0.52$

44/55

Excel Geotechnical Testing
"Excellence in Testing"
941 Forrest Street, Roswell, Georgia 30075
Tel: (770) 650 1666 Fax: (770) 650 1666

Test Results Summary

Project Name: Oak Hammock SWD Facility

Project No.: 33

Index Density Test Results

Sample Info.		Test Information								Remarks
Site ID (-)	Lab No. (-)	Moisture Content ASTM D 2216 (%)	Fines Content ASTM D 1140 (%)	Specific Gravity ASTM D 854 (%)	Min Index Density ASTM D 4254 (Method) (g/cm³) A	B	C	Max Index Density ASTM D 4253 (gr/cm³) Standard [1]	EGT [2]	
A	A26	0.1	6.4	2.693	1.47	1.45	1.47	1.76	1.75	Washed
A	A26	0.4	1.5	2.670	1.29	1.27	1.28	NA	1.58	Unwashed
B	A27	0.3	NA	2.678	1.25	1.22	1.21	1.59	1.54	Unwashed

Notes:

1 - Tests performed at Geotesting Express of Georgia.

2 - Tests performed at Excel Geotechnical Testing using a 4 in. Proctor Compaction mold tapped vigorously at the side with a 5.5 in. wide steel fork under a surcharge of 17.2 lb.

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Excel Geotechnical Testing

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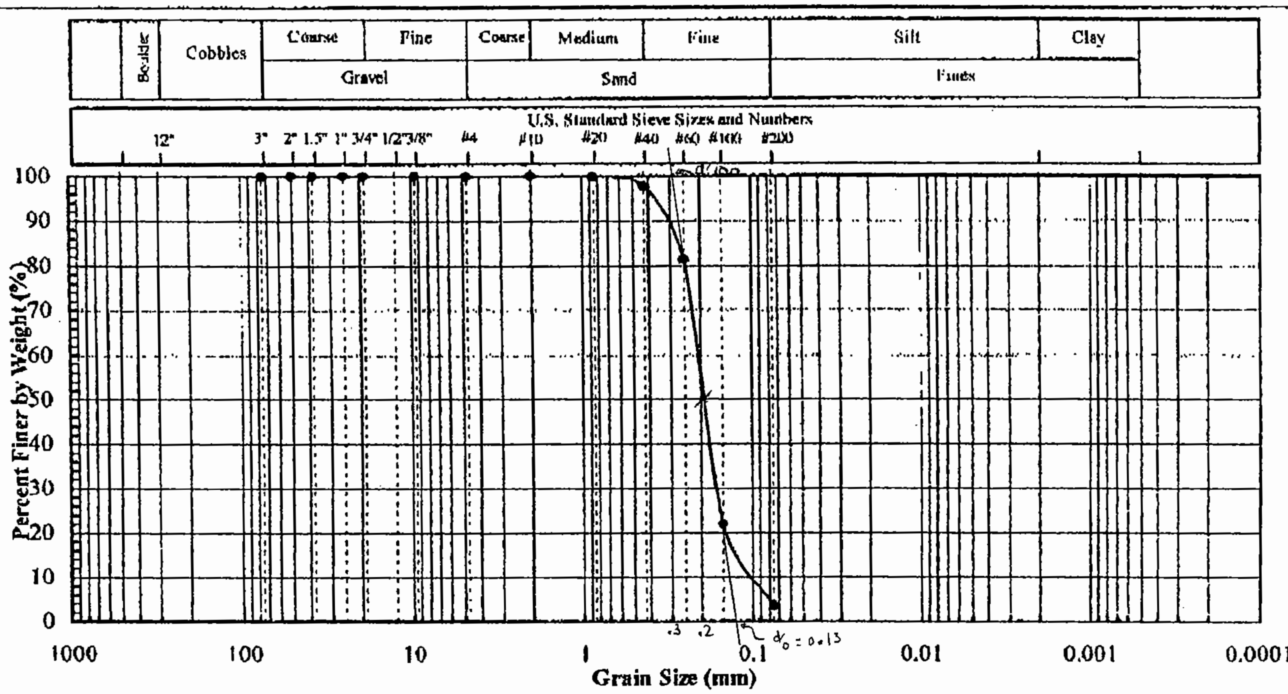
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Old Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-A
Lab Sample No:	A29

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

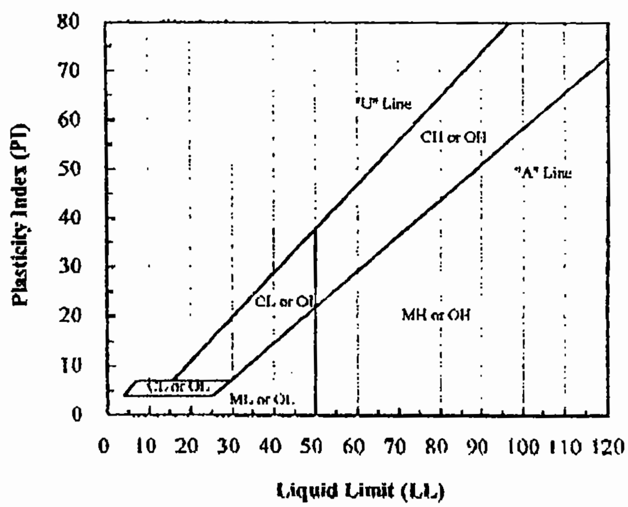


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	100
#40	0.425	98
#60	0.250	81
#100	0.150	22
#200	0.075	3

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	96.5
Fines (%):	3.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
BR-A	A29	19.7	3.5				

Note(s):

$C_u' = \left(\frac{d'_{100}}{d'_0}\right)^{1/2} = \left(\frac{0.3}{0.13}\right)^{1/2} = 1.52$ $D_{95} < 2 C_u' d'_{50} < 2(1.52)(.2) < 0.608$

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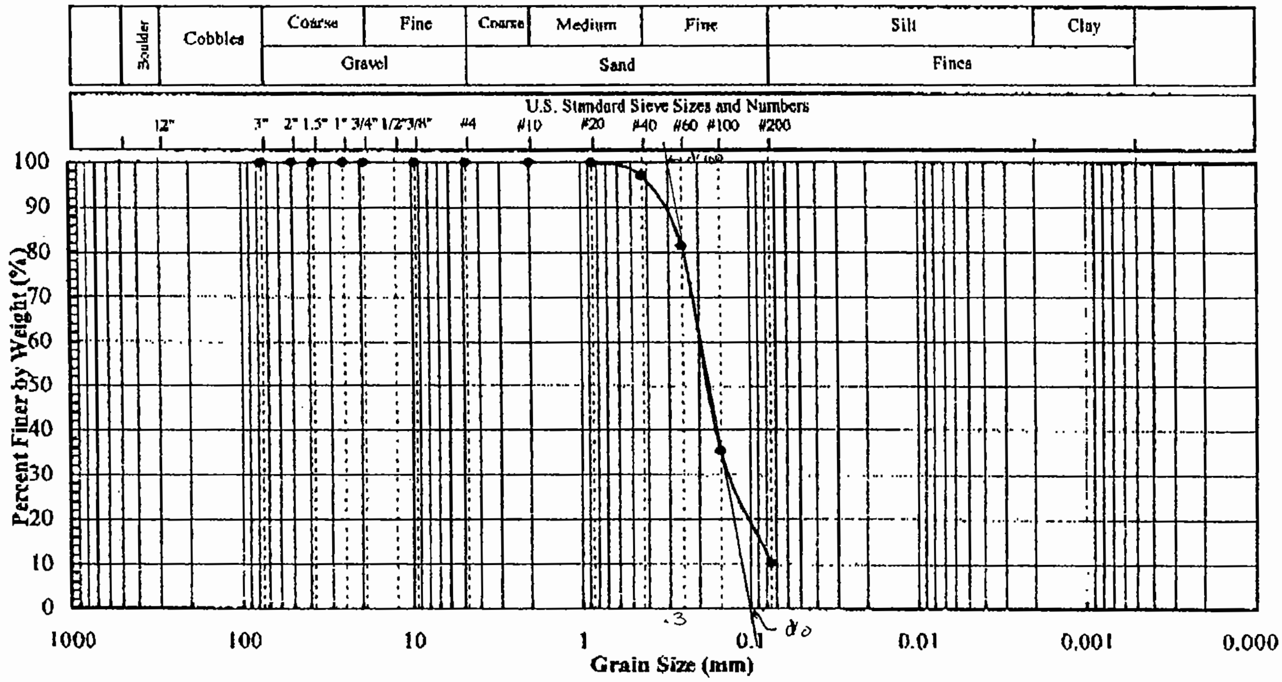
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Old Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-B
Lab Sample No:	A30

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

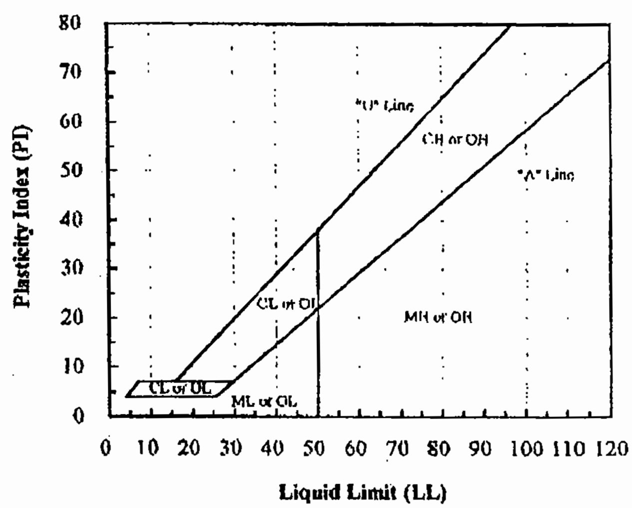


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	100
#40	0.425	97
#60	0.250	81
#100	0.150	35
#200	0.075	10

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	89.6
Fines (%):	10.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
BR-B	A30	22.7	10.4				

Note(s):

$C_c = \left(\frac{0.3}{0.1}\right)^{1/2} = 1.732$ $D_{95} < 2\, C_c\, d_{50} < 2(1.732)(.18) < 0.62$

4/7/55

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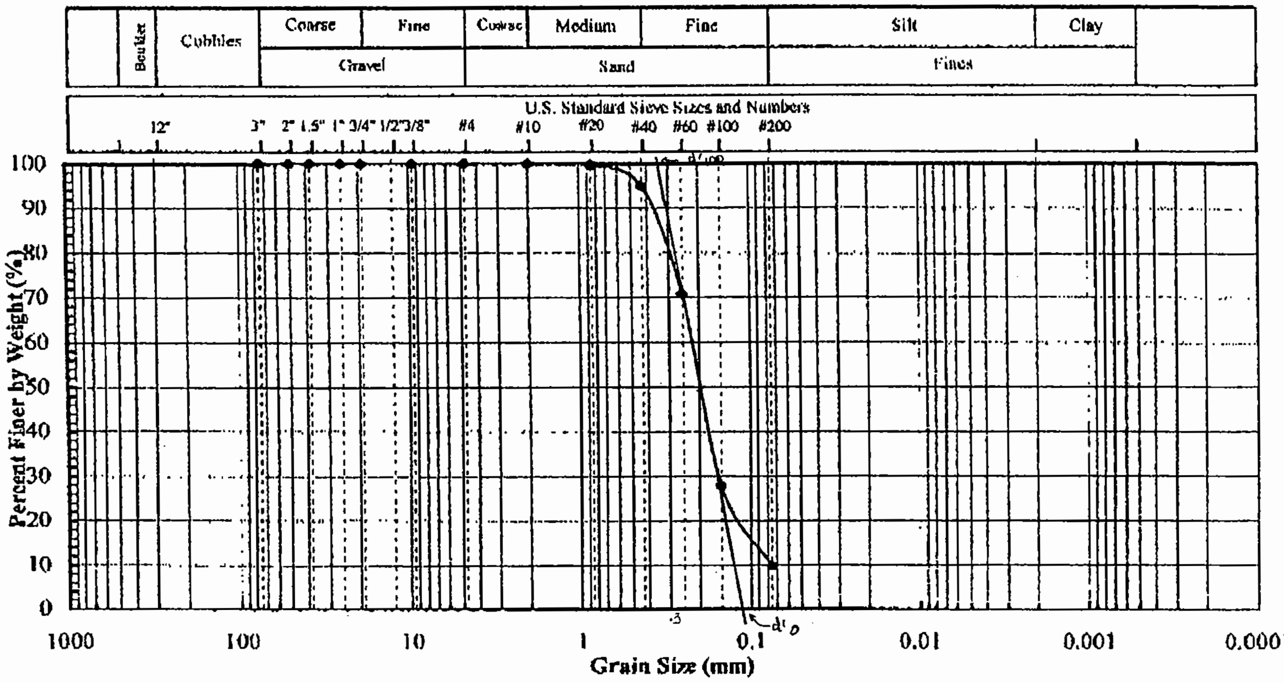
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Old Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-C
Lab Sample No:	A31

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

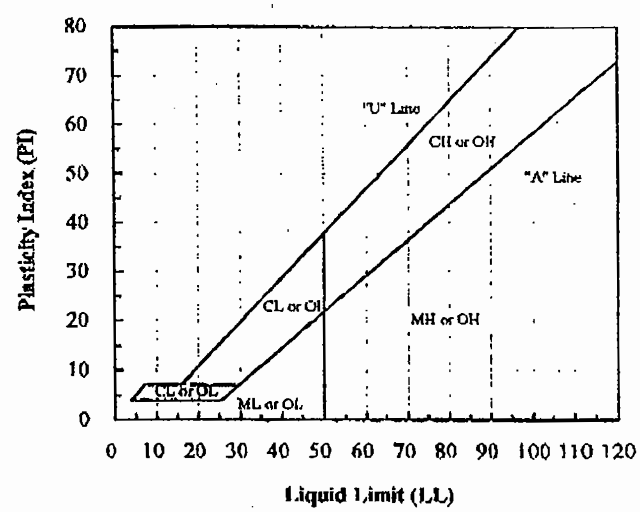


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	100
#40	0.425	95
#60	0.250	71
#100	0.150	28
#200	0.075	10

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	90.4
Fines (%):	9.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
BR-C	A31	21.7	9.6				

Note(s):

$C_c = \left(\frac{0.34}{0.12}\right)^{1/2} = 1.68$ $D_{95} < 2\,(1.68)(.2) < 0.672$

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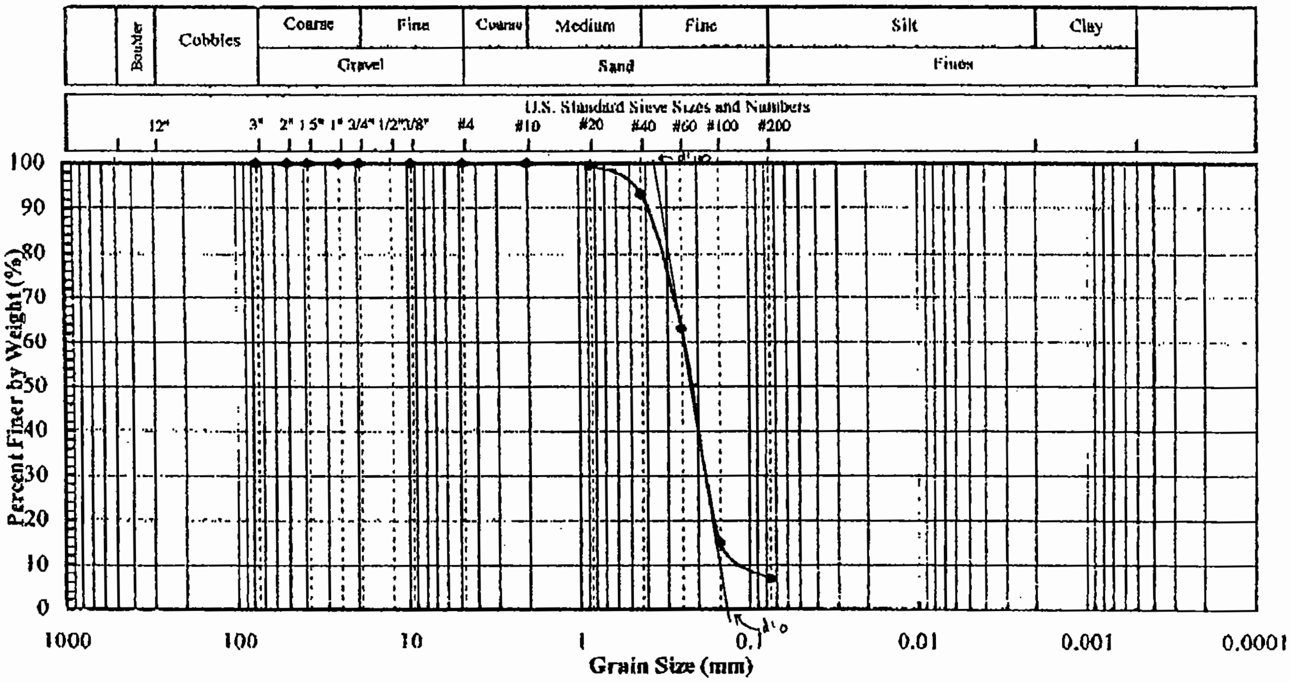
941 Forrest Street, Roswell, Georgia 30075
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Old Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-D
Lab Sample No:	A32

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

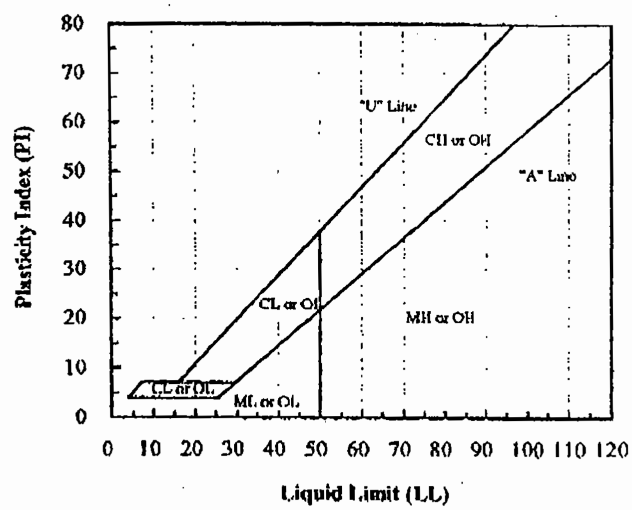


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	99
#40	0.425	93
#60	0.250	63
#100	0.150	15
#200	0.075	7

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	93.2
Fines (%):	6.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
BR-D	A32	22.0	6.8				

Note(s):

$C_u = \left(\frac{0.35}{0.14}\right)^{1/2} = 1.58$ $O_{95} < 2(1.58)(.22) < 0.695$

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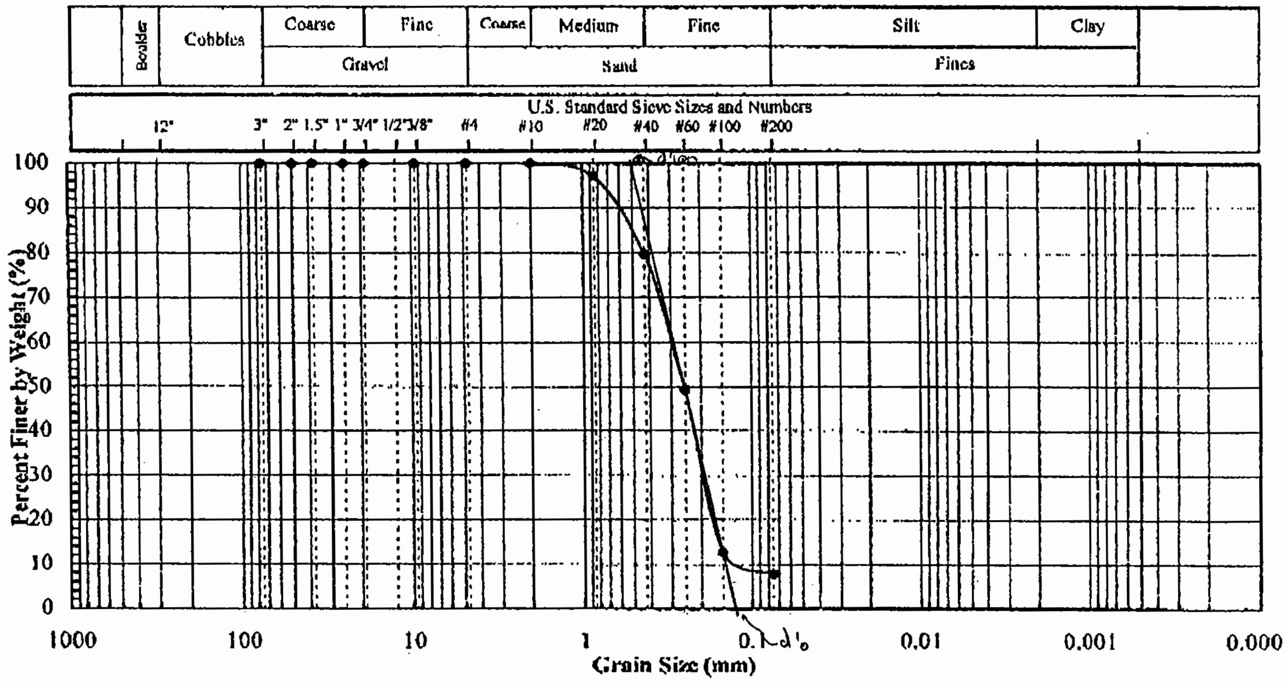
941 Forrest Street, Roswell, Georgia 30075
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Old Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-E
Lab Sample No:	A33

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

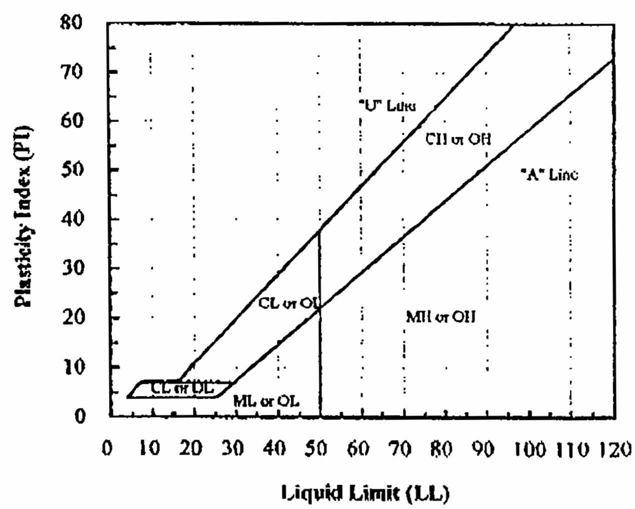


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	97
#40	0.425	80
#60	0.250	49
#100	0.150	13
#200	0.075	8

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	92.3
Fines (%):	7.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample I.D.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (%)	PL (%)	PI (-)	
BR-E	A33	21.4	7.7				

Note(s):

$C_u = \left(\frac{0.5}{0.13}\right)^{1/2} = 1.96$ $D_{95} < 2(1.96)(0.25) < 0.98$

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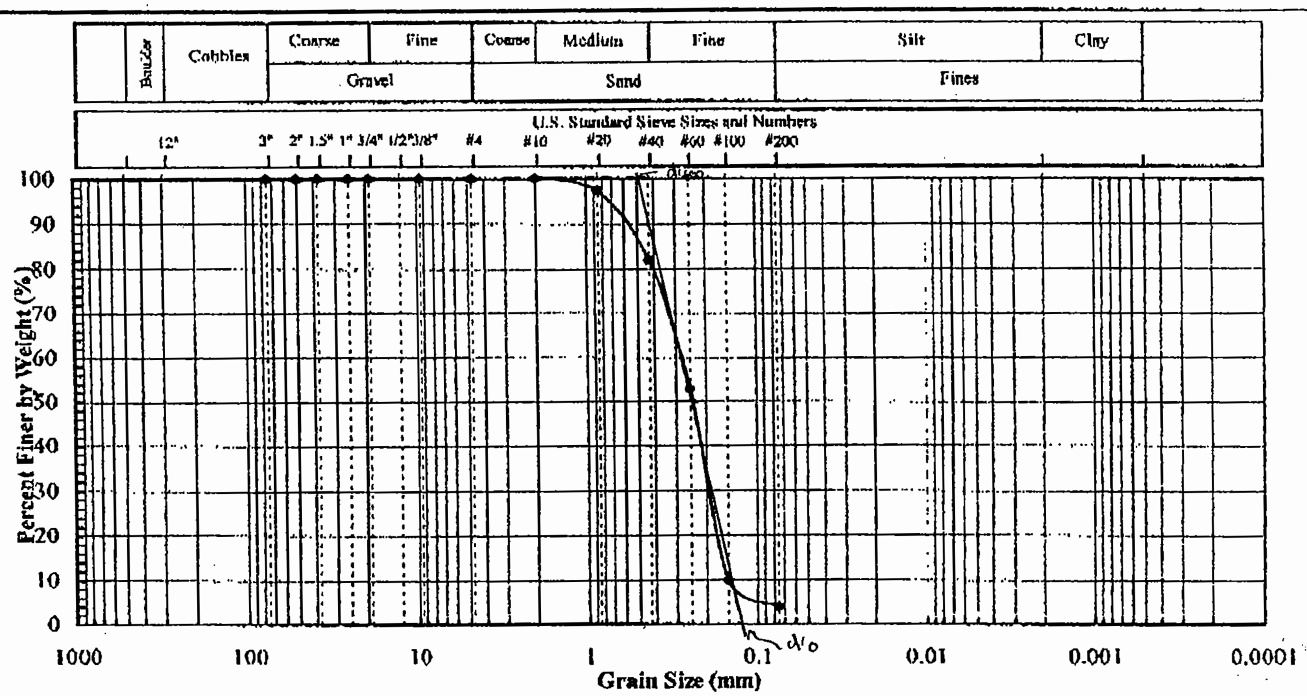
Tel: (770) 650 1666 Fax: (770) 650 1666

Project Name:	Old Hammock SWD Facility
Project No:	33
Client Sample ID:	BR-F
Lab Sample No:	A34

ASTM D 2216, D 1140, D 422, C 136, D 4318, D 2487

SOIL INDEX PROPERTIES

Moisture Content, Grain Size, Atterberg Limits, Classification

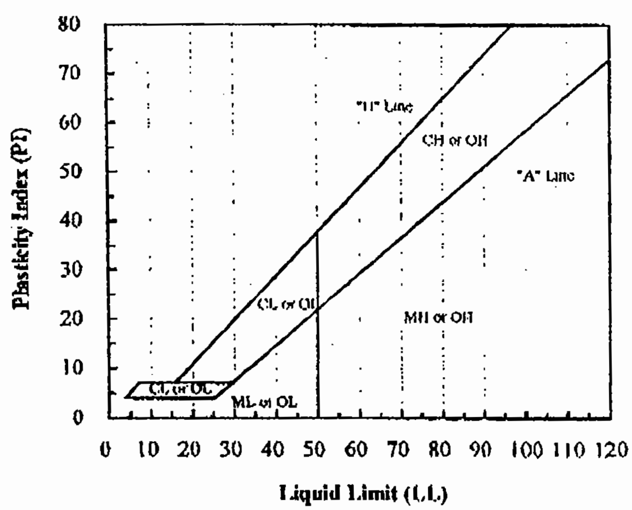


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	100
#4	4.75	100
#10	2.00	100
#20	0.850	97
#40	0.425	82
#60	0.250	53
#100	0.150	10
#200	0.075	4

Hydrometer Particle Diameter (mm)	% Finer
0.050	
0.020	
0.005	
0.002	
0.001	

Gravel (%):	
Sand (%):	96.1
Fines (%):	3.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (%)	PL (%)	PI (-)	Engineering Classification
BR-F	A34	20.7	3.9				

Note(s):

$C_c = \left(\frac{0.5}{.135}\right)^{1/2} = 1.92$ $D_{95} < 2(1.92)(.25) < 0.96$

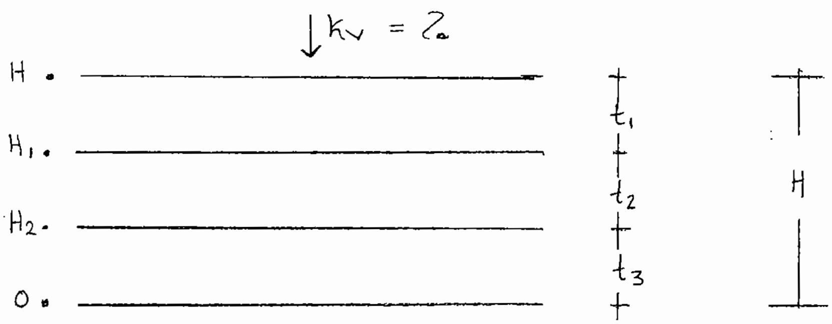
ATTACHMENT 3

Data for Calculation of Upper Limit Flow Condition

Written by: Aideé Cira Date: __/__/__ (YY/MM/DD) Reviewed by: Ruben Sosa Date: __/__/__ (YY/MM/DD)

Client: OMNI Project: FW0400 Project/Proposal No.: 03 Task No.: ____

Derivation of Equation to obtain a representative k_v for different soil layers.



$Q = k\,i\,A \longrightarrow$ Area (1×1)

$\therefore$ Q for every soil layer will be:

(1)

$$Q = \frac{k_1 (H - H_1)}{t_1} (1 \times 1)$$

$$Q = \frac{k_2 (H_1 - H_2)}{t_2} (1 \times 1)$$

$$Q = \frac{k_3 (H_2 - 0)}{t_3} (1 \times 1)$$

(2) From the above.

$$\frac{Q t_1}{k_1} = H - H_1$$

$$\frac{Q t_2}{k_2} = H_1 - H_2 \qquad \therefore \quad H = Q\left(\frac{t_1}{k_1} + \frac{t_2}{k_2} + \frac{t_3}{k_3}\right) \longrightarrow (A)$$

$$\frac{Q t_3}{k_3} = H_2 - 0$$

(3) Also:

$$Q = \frac{k_v (H - 0)(1 \times 1)}{(t_1 + t_2 + t_3)}$$

$$k_v = \frac{Q}{H} \cdot (t_1 + t_2 + t_3) \longrightarrow (B)$$

(4) From (A) and (B)

$$k_v = \frac{\Sigma t_i}{\Sigma \frac{t_i}{k_i}}$$

PROPERTIES OF CANDIDATE FINAL COVER GEOCOMPOSITE

Thickness of geonet=	8	mm

Note: The reduction thickness at a normal pressure of 1000 psf is assumed to be 97%

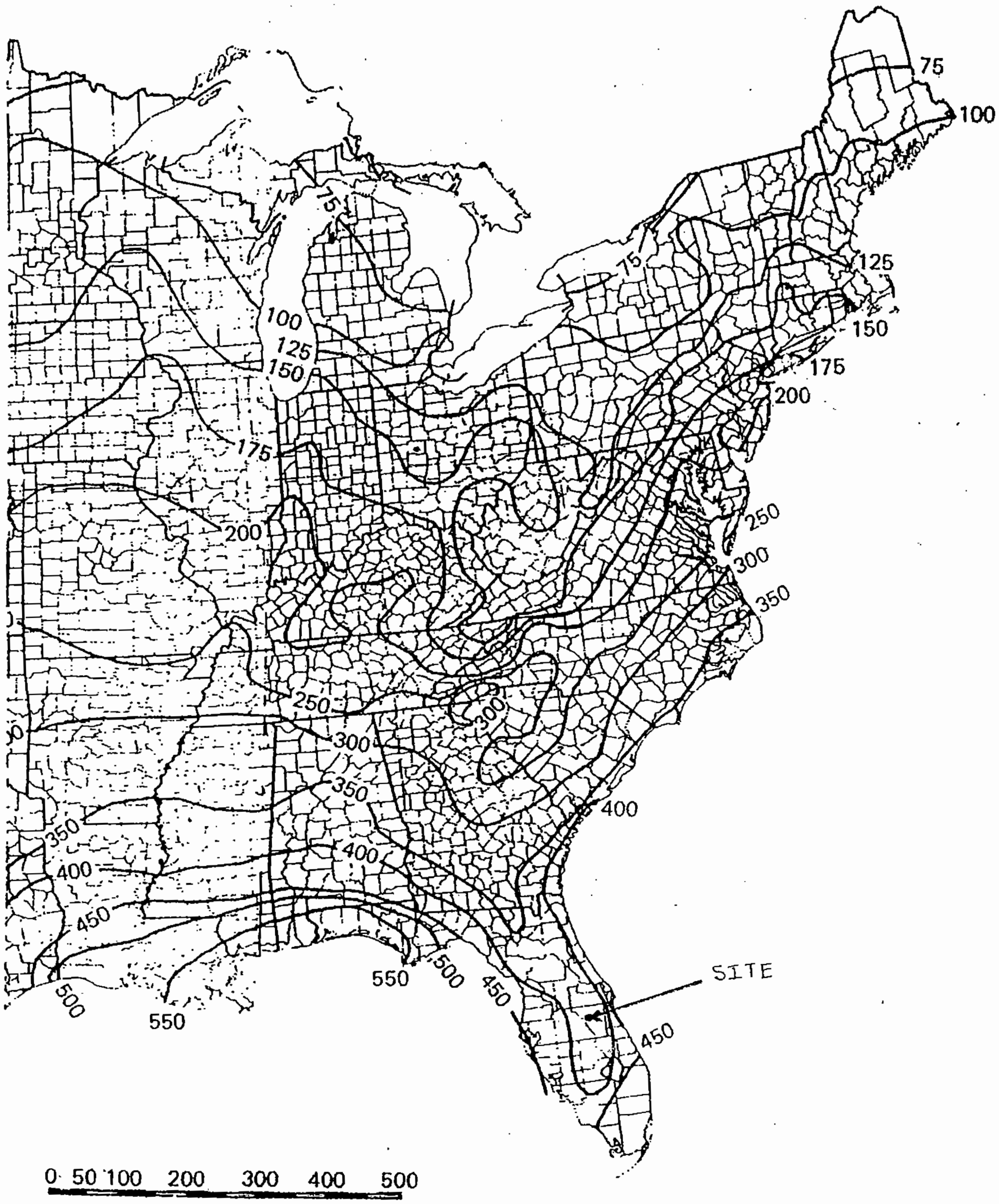
TENFLOW, Data from Manufacturer

Transmiss m^2/sec	gradient	%reduction thickness
5.50E-03	0.10	97.00
4.50E-03	0.20	97.00
4.00E-03	0.33	97.00
3.50E-03	0.50	97.00

ATTACHMENT 4

Data for Calculation of Erosion Resistance of Final Cover System

55/55



Rainfall and Runoff Erosivity Index, R (Goldman, et al., 1986)

Prepared for

Omni Waste

of Osceola County, LLC

100 Church Street
Kissimmee, FL, 34741

LEACHATE MONITORING PLAN

OAK HAMMOCK DISPOSAL LANDFILL

Prepared by

GeoSyntec Consultants

14055 Riveredge Drive, Suite 300
Tampa, FL 33637
(813) 558-0990

Project Number: FW0400

May 2002

TABLE OF CONTENTS

TABLES

ATTACHMENTS

1. LEACHATE MONITORING PLAN

1.1 Monitoring Locations

Representative samples of leachate from the Oak Hammock Disposal (OHD) landfill will be collected and analyzed on an annual basis in accordance with Section 62-701.510(6)(c), F.A.C. The leachate samples will be grab samples obtained from the primary leachate collection riser (as shown on sheet 17 of 50 of the Permit Drawings of this permit application). The leachate is collected from each cell of the landfill prior to pumping to the leachate storage containers.

1.2 Sampling Protocol

A representative leachate sample from each cell will be collected on an annual basis and analyzed for the parameters described in Section 62-701.510(8)(c), F.A.C, which are presented in Table 1 of this plan. In addition the leachate sample will also be analyzed for the constituents listed in Appendix II of 40 Code Federal Regulations (CFR) Part 258. These parameters are referenced in Section 62-701.510(8)(d) and are presented in Appendix A.

Leachate concentrations found during annual sample analysis will be evaluated for constituents in excess of the toxicity characteristic regulatory levels for hazardous waste, as described in 40 CFR 261.24. A list of these contaminants and the associated regulatory levels are presented in Appendix B. If such excesses are apparent, then a monthly sampling and analysis program will be initiated in accordance with Section 62-701(6)(c)2 and the Florida Department of Environmental Protection (FDEP) will be notified in writing. If in any three consecutive months, no listed contaminant is found to exceed the regulatory level, the monthly sampling and analysis program will be discontinued and annual monitoring will be resumed.

1.3 Sample Collection

Leachate sampling will be performed by individuals who are working under an FDEP-approved Comprehensive Quality Assurance Plan (CQAP) for the purpose of sampling activities, as mandated by Section 62-160.300(7)(d), F.A.C. Sampling procedures used at the landfill for leachate monitoring will follow procedures outlined in the FDEP-approved CQAP. The FDEP will be notified at least fourteen days before any sampling event will occur so that split samples may be collected, if desired.

1.4 Sample Containers and Preservation

The types of containers, cleaning procedures, and preservation procedures to be used for leachate sampling will be in accordance with requirements of the FDEP-approved CQAP.

1.5 Packaging and Shipping

Leachate sample storage, packaging, and shipping procedures will follow procedures presented in the FDEP-approved CQAP in order to protect the sample container from accidental breakage or spillage during shipment.

1.6 Chain-of-Custody Control Procedures

Chain-of-custody procedures for the transfer of leachate samples will follow procedures specified in the FDEP-approved CQAP.

1.7 Leachate Sample Analysis

Leachate samples from the landfill will be submitted to a laboratory that is certified in the State of Florida by the FDEP. Certificates of a candidate laboratory are included in Attachment 1 to this plan. If other laboratories are used, similar certificates will be provided to FDEP. Additionally, the laboratory will possess an FDEP-approved CQAP updated in accordance with requirements of Chapter 62-160, F.A.C. Analytical procedures specified in the FDEP-approved CQAP will be followed during the analysis of leachate samples. As mentioned previously, leachate samples will be analyzed for the parameters listed in Table 1 and in Appendix A.

2. LEACHATE MONITORING REPORTING

2.1 Overview

Leachate monitoring results will be reported to the FDEP annually. The report will address the requirements of Section 62-701.510(9)(a), F.A.C. Every two years, a technical report, prepared, signed, and sealed by a professional geologist or professional engineer will be submitted to FDEP. Copies of field and laboratory records specified in Rules 62-160.600-.630, F.A.C will be included in reports submitted to FDEP and the originals retained by OMNI for the design period of the landfill.

2.2 Leachate Monitoring Report Contents

The monitoring report to the FDEP will contain the following information:

- facility name;
- facility identification number;
- sample collection date;

- analysis date;
- all analytical results, including all identified peaks even if below maximum contaminant levels;
- identification number and designation of each leachate monitoring location;
- measured field parameter data;
- quality assurance/quality control notations;
- method detection limits;
- STORET code numbers for all parameters;
- leachate level recorded prior to sample collection; and
- a summary of leachate monitoring parameters, analytical results and evaluation of any constituents exceeding the toxicity characteristic levels.

2.3 Technical Report Contents

The technical report will be submitted to the FDEP biannually from the date when waste is first placed in the OHD landfill. This report will summarize and interpret the leachate monitoring results collected during the past two years. The technical report submitted to the FDEP will contain the following information:

- tabular display of any data which shows that a monitoring parameter (contaminant) has been detected and graphical displays of leachate key indicator parameters (i.e., pH, specific conductance, TDS, TOC, etc…);
- trend analyses of any monitoring parameters consistently detected;
- as deemed applicable, correlations between related parameters such as total dissolved solids and specific conductance; and
- discussion of erratic and/or poorly correlated data.

Table 1. OMNI Class I Landfill, Annual Leachate Monitoring Parameters

Field Parameters	Laboratory Parameters
Specific Conductivity	Total Ammonia – N
PH	Bicarbonate
Dissolved Oxygen	Chlorides
Colors, Sheens (by observation)	Iron
	Mercury
	Nitrate
	Sodium
	Total Dissolved Solids (TDS)
	Those parameters listed in 40 CFR Part 258, Appendix II (see Appendix A)

ATTACHMENT 1

40 CFR Part 258, Appendix II Parameters

THIS DATA CURRENT AS OF THE FEDERAL REGISTER DATED MARCH 4, 2002

40 CFR - CHAPTER I - PART 258

View Part

Appendix II to Part 258 -- List of Hazardous Inorganic and Organic Constituents 1

Common Name\2\	CAS RN\3\	Chemical abstracts service index name\4\	Suggest methods
Acenaphthene.........................	83-32-9	Acenaphthylene, 1,2-dihydro-.	81 82
Acenaphthylene.......................	208-96-8	Acenaphthylene...............	81 82
Acetone..............................	67-64-1	2-Propanone..................	82
Acetonitrile; Methyl cyanide.........	75-05-8	Acetonitrile.................	80
Acetophenone.........................	98-86-2	Ethanone, 1-phenyl-..........	82
2-Acetylaminofluorene; 2-AAF.........	53-96-3	Acetamide, N-9H-fluoren-2-yl-	82
Acrolein.............................	107-02-8	2-Propenal...................	80 82
Acrylonitrile........................	107-13-1	2-Propenenitrile.............	80 82
Aldrin...............................	309-00-2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro- 1,4,4a,5,8,8a-hexahydro- (1α,4α,4aβ, 5α,8α,8aβ)-	80 82
Allyl chloride.......................	107-05-1	1-Propene, 3-chloro-.........	80 82
4-Aminobiphenyl......................	92-67-1	[1,1\1\-Biphenyl]-4-amine....	82
Anthracene...........................	120-12-7	Anthracene...................	81 82
Antimony.............................	(Total)	Antimony.....................	60 70 70
Arsenic..............................	(Total)	Arsenic......................	60 70 70
Barium...............................	(Total)	Barium.......................	60 70
Benzene..............................	71-43-2	Benzene......................	80 80 82
Benzo[a]anthracene; Benzanthracene...	56-55-3	Benz[a]anthracene............	81 82
Benzo[b]fluoranthene.................	205-99-2	Benz[e]acephenanthrylene.....	81 82
Benzo[k]fluoranthene.................	207-08-9	Benzo[k]fluoranthene.........	81 82
Benzo[ghi]perylene...................	191-24-2	Benzo[ghi]perylene...........	81

			82
Benzo[a]pyrene......................	50-32-8	Benzo[a]pyrene..............	81 82
Benzyl alcohol......................	100-51-6	Benzenemethanol.............	82
Beryllium...........................	(Total)	Beryllium...................	60 70 70
alpha-BHC...........................	319-84-6	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4&,5β,6β)-.	80 82
beta-BHC............................	319-85-7	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2β,3α,4&,5α,6β)-.	80 82
delta-BHC...........................	319-86-8	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3α,4β,5α,6β)-.	80 82
gamma-BHC; Lindane..................	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4&,5α,6β)-.	80 82
Bis(2-chloroethoxy)methane..........	111-91-1	Ethane, 1,1\1\-[methylenebis(oxy)]bis[2-chloro-.	81 82
Bis(2-chloroethyl) ether; Dichloroethyl ether.	111-44-4	Ethane, 1,1\1\-oxybis[2-chloro-.	81 82
Bis-(2-chloro-1-methylethyl) ether; 2,2\1\-Dichlorodiisopropyl ether; DCIP, See note 7	108-60-1	Propane, 2,2\1\-oxybis[1-chloro-.	81 82
Bis(2-ethylhexyl) phthalate.........	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester.	80
Bromochloromethane; Chlorobromomethane.	74-97-5	Methane, bromochloro-........	80 82
Bromodichloromethane; Dibromochloromethane.	75-27-4	Methane, bromodichloro-......	80 80 82
Bromoform; Tribromomethane..........	75-25-2	Methane, tribromo-...........	80 80 82
4-Bromophenyl phenyl ether..........	101-55-3	Benzene, 1-bromo-4-phenoxy-..	81 82
Butyl benzyl phthalate; Benzyl butyl phthalate.	85-68-7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester.	80 82
Cadmium.............................	(Total)	Cadmium.....................	60 71 71
Carbon disulfide....................	75-15-0	Carbon disulfide............	82
Carbon tetrachloride................	56-23-5	Methane, tetrachloro-........	80 80 82
Chlordane...........................	See Note 8	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.	80 82
p-Chloroaniline.....................	106-47-8	Benzenamine, 4-chloro-.......	82
Chlorobenzene.......................	108-90-7	Benzene, chloro-.............	80 80 80 80 82
Chlorobenzilate.....................	510-15-6	Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester.	82
p-Chloro-m-cresol; 4-Chloro-3-methylphenol.	59-50-7	Phenol, 4-chloro-3-methyl-...	80 82
Chloroethane; Ethyl chloride........	75-00-3	Ethane, chloro-..............	80

			80 82
Chloroform; Trichloromethane	67-66-3	Methane, trichloro-	80 80 82
2-Chloronaphthalene	91-58-7	Naphthalene, 2-chloro-	81 82
-Chlorophenol	95-57-8	Phenol, 2-chloro-	80 82
4-Chlorophenyl phenyl ether	7005-72-3	Benzene, 1-chloro-4-phenoxy-.	81 82
Chloroprene	126-99-8	1,3-Butadiene, 2-chloro-	80 82
Chromium	(Total)	Chromium	60 71 71
Chrysene	218-01-9	Chrysene	81 82
Cobalt	(Total)	Cobalt	60 72 72
Copper	(Total)	Copper	60 72 72
m-Cresol; 3-methylphenol	108-39-4	Phenol, 3-methyl-	82
o-Cresol; 2-methylphenol	95-48-7	Phenol, 2-methyl-	82
p-Cresol; 4-methylphenol	106-44-5	Phenol, 4-methyl-	82
Cyanide	57-12-5	Cyanide	90
2,4-D; 2,4-Dichlorophenoxyacetic acid	94-75-7	Acetic acid, (2,4-dichlorophenoxy)-.	81
4,4\1\-DDD	72-54-8	Benzene 1,1\1\-(2,2-dichloroethylidene)bis[4-chloro-.	80 82
4\1\-DDE	72-55-9	Benzene, 1,1\1\-(dichloroethyenylidene)bis[4-chloro-.	80 82
4,4\1\-DDT	50-29-3	Benzene, 1,1\1\-(2,2,2-trichloroethylidene)bis[4-chloro-.	80 82
Diallate	2303-16-4	Carbamothioic acid, bis(1-methylethyl)-,S-(2,3-dichloro-2-propenyl) ester.	82
Dibenz[a,h]anthracene	53-70-3	Dibenz[a,h]anthracene	81 82
Dibenzofuran	132-64-9	Dibenzofuran	82
Dibromochloromethane; Chlorodibromomethane.	124-48-1	Methane, dibromochloro-	80 80 82
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	Propane, 1,2-dibrome-3-chloro-.	80 80 82
1,2-Dibromoethane; Ethylene dribromide; EDB.	106-93-4	Ethane, 1,2-dibromo-	80 80 82
Di-n-butyl phthalate	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester.	80 82
o-Dichlorobenzene; 1,2-Dichlorobenzene.	95-50-1	Benzene, 1,2-dichloro-	80 80 80 81 82 82
m-Dichlorobenzene; 1,3-Dichlorobenzene.	541-73-1	Benzene, 1,3-Dichloro-	80 80 80 81 82

			82
p-Dichlorobenzene; 1,4-Dichlorobenzene.	106-46-7	Benzene, 1,4-dichloro-.......	80 80 80 81 82 82
;3\1\-Dichlorobenzidine............	91-94-1	[1,1\1\-Biphenyl]-4,4\1\-diamine, 3,3\1\-dichloro-.	82
trans-1,4-Dichloro-2-butene..........	110-57-6	2-Butene, 1,4-dichloro-, (E)-	82
Dichlorodifluoromethane; CFC 12;.....	75-71-8	Methane, dichlorodifluoro-...	80 82
1,1-Dichloroethane; Ethyldidene chloride.	75-34-3	Ethane, 1,1-dichloro-........	80 80 82
1,2-Dichloroethane; Ethylene dichloride.	107-06-2	Ethane, 1,1-dichloro-........	80 80 82
1,1-Dichloroethylene; 1,1-Dichloroethene; Vinylidene chloride.	75-35-4	Ethene, 1,1-dichloro-........	80 80 82
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene.	156-59-2	Ethene, 1,2-dichloro-, (Z)-..	80 82
trans-1,2-Dichloroethylene trans-1,2-Dichloroethene.	156-60-5	Ethene, 1,2-dichloro-, (E)-..	80 80 82
2,4-Dichlorophenol..................	120-83-2	Phenol, 2,4-dichloro-........	80 82
2,6-Dichlorophenol..................	87-65-0	Phenol, 2,6-dichloro-........	82
1,2-Dichloropropane; Propylene dichloride.	78-87-5	Propane, 1,2-dichloro-.......	80 80 82
1,3-Dichloropropane; Trimethylene \ichloride.	142-28-9	Propane, 1,3-dichloro-.......	80 82
;2-Dichloropropane; Isopropylidene chloride.	594-20-7	Propane, 2,2-dichloro-.......	80 82
1,1-Dichloropropene.................	563-58-6	1-Propene, 1,1-dichloro-.....	80 82
cis-1,3-Dichloropropene.............	10061-01-5	1-Propene, 1,3-dichloro-, (Z)-.	80 82
trans-1,3-Dichloropropene...........	10061-02-6	1-Propene, 1,3-dichloro-, (E)-.	80 82
Dieldrin............................	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexa, chloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2aα,3β,6β,6aα,7&,7aα)-.	80 82
Diethyl phthalate...................	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester.	80 82
0,0-Diethyl 0-2-pyrazinyl phosphorothioate; Thionazin.	297-97-2	Phosphorothioic acid, 0,0-diethyl 0-pyrazinyl ester.	81 82
Dimethoate..........................	60-51-5	Phosphorodithioic acid, 0,0-dimethyl S-[2-(methylamino)-2-oxoethyl] ester.	81 82
p-(Dimethylamino)azobenzene..........	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-.	82
7,12-Dimethylbenz[a]anthracene.......	57-97-6	Benz[a]anthracene, 7,12-dimethyl-.	82
3\1\-Dimethylbenzidine............	119-93-7	[1,1\1\-Biphenyl]-4,4\1\-diamine, 3,3\1\-dimethyl-.	82
2,4-Dimethylphenol; m-Xylenol........	105-67-9	Phenol, 2,4-dimethyl-........	80 82
Dimethyl phthalate..................	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester.	80 82
m-Dinitrobenzene....................	99-65-0	Benzene, 1,3-dinitro-........	82

4,6-Dinitro-o-cresol 4,6-Dinitro-2-methylphenol.	534-52-1	Phenol, 2-methyl-4,6-dinitro.	80 82
2,4-Dinitrophenol;..................	51-28-5	Phenol, 2,4-dinitro-.........	80 82 82
2,4-Dinitrotoluene..................	121-14-2	Benzene, 1-methyl-2,4-dinitro-.	80 82
6-Dinitrotoluene..................	606-20-2	Benzene, 2-methyl-1,3-dinitro-.	80 82
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol.	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-.	81 82
Di-n-octyl phthalate................	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester.	80 82
Diphenylamine.......................	122-39-4	Benzenamine, N-phenyl-.......	82
Disulfoton..........................	298-04-4	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester.	81 81 82
Endosulfan I........................	959-98-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexa- chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide,	80 82
Endosulfan II.......................	33213-65-9	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexa- chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide, (3α,5aα,6β, 9β,9aα)-.	80 82
Endosulfan sulfate..................	1031-07-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexa- chloro-1,5,5a,6,9,9a-hexahydro-,3-3-dioxide.	80 82
ndrin............................	72-20-8	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα, 2β,2aβ,3α,6& a,6aβ,7β,7aα)-.	80 82
Endrin aldehyde.....................	7421-93-4	1,2,4-Methenocyclopenta[cd]pentalene-5-carboxaldehyde, 2,2a,3,3,4,7-hexachlorodecahydro-, (1α,2β,2aβ,4 &,4aβ,5β,6aβ, 6bβ,7R*)-.	80 82
Ethylbenzene........................	100-41-4	Benzene, ethyl-.............	80 82 82
Ethyl methacrylate..................	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester.	80 82 82
Ethyl methanesulfonate..............	62-50-0	Methanesulfonic acid, ethyl ester.	82
Famphur.............................	52-85-7	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl]phenyl] O,O-dimethyl ester.	82
luoranthene........................	206-44-0	Fluoranthene................	81 82
Fluorene............................	86-73-7	9H-Fluorene.................	81 82
Heptachlor..........................	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.	80 82

Heptachlor epoxide..................	1024-57-3	2,5-Methano-2H-indeno[1,2-b]oxirene, 2,3,4,5,6,7,7-heptachloro-1a,1b,5,5a,6,6a-hexahydro-, (1aα, 1bβ, 2α, 5α, 5aβ, 6β, 6aα).	80 82
exachlorobenzene....................	118-74-1	Benzene, hexachloro-.........	81 82
Hexachlorobutadiene.................	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-.	80 81 82 82
Hexachlorocyclopentadiene...........	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-.	81 82
Hexachloroethane....................	67-72-1	Ethane, hexachloro-..........	81 82 82
Hexachloropropene...................	1888-71-7	1-Propene, 1,1,2,3,3,3-hexachloro-.	82
2-Hexanone; Methyl butyl ketone......	591-78-6	2-Hexanone..................	82
Indeno(1,2,3-cd)pyrene..............	193-39-5	Indeno(1,2,3-cd)pyrene.......	81 82
Isobutyl alcohol....................	78-83-1	1-Propanol, 2-methyl-........	80 82
Isodrin.............................	465-73-6	1,4,5,8-Dimethanonaphthalene,1,2,3,4,10,10- hexachloro-1,4,4a,5,8,8a hexahydro-(1α,4α,4aβ, 5β,8β,8aβ)-.	82 82
Isophorone..........................	78-59-1	2-Cyclohexen-1-one, 3,5,5-trimethyl-.	80 82
sosafrole..........................	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-.	82
Kepone..............................	143-50-0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-.	82
Lead................................	(Total)	Lead........................	60 74 74
Mercury.............................	(Total)	Mercury.....................	74
Methacrylonitrile...................	126-98-7	2-Propenenitrile, 2-methyl-..	80 82
Methapyrilene.......................	91-80-5	1,2-Ethanediamine, N.N-dimethyl-N\1\-2-pyridinyl-N1/2-thienylmethyl)-.	82
Methoxychlor........................	72-43-5	Benzene,1,1\1\-(2,2,2,trichloroethylidene)bis[4-methoxy-.	80 82
Methyl bromide; Bromomethane.........	74-83-9	Methane, bromo-.............	80 80
Methyl chloride; Chloromethane.......	74-87-3	Methane, chloro-............	80 80
3-Methylcholanthrene................	56-49-5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-.	82
Methyl ethyl ketone; MEK; 2-Butanone.	78-93-3	2-Butanone..................	80 82
Methyl iodide; Iodomethane..........	74-88-4	Methane, iodo-..............	80 82
thyl methacrylate................	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester.	80 82
Methyl methanesulfonate.............	66-27-3	Methanesulfonic acid, methyl ester.	82
2-Methylnaphthalene.................	91-57-6	Naphthalene, 2-methyl-.......	82
Methyl parathion; Parathion methyl...	298-00-0	Phosphorothioic acid, 0,0-	81

		dimethyl.	81 82
4-Methyl-2-pentanone; Methyl isobutyl ketone.	108-10-1	2-Pentanone, 4-methyl-.......	80 82
Methylene bromide; Dibromomethane....	74-95-3	Methane, dibromo-...........	80 80 82
Methylene chloride; Dichloromethane..	75-09-2	Methane, dichloro-..........	80 80 82
Naphthalene.........................	91-20-3	Naphthalene.................	80 81 82 82
1,4-Naphthoquinone..................	130-15-4	1,4-Naphthalenedione.........	82
1-Naphthylamine.....................	134-32-7	1-Naphthalenamine...........	82
2-Naphthylamine.....................	91-59-8	2-Naphthalenamine...........	82
Nickel..............................	(Total)	Nickel......................	60 75
o-Nitroaniline; 2-Nitroaniline.......	88-74-4	Benzenamine, 2-nitro-........	82
m-Nitroaniline; 3-Nitroanile.........	99-09-2	Benzenamine, 3-nitro-........	82
p-Nitroaniline; 4-Nitroaniline.......	100-01-6	Benzenamine, 4-nitro.........	82
Nitrobenzene........................	98-95-3	Benzene, nitro-.............	80 82
o-Nitrophenol; 2-Nitrophenol.........	88-75-5	Phenol, 2-nitro-............	80 82
p-Nitrophenol; 4-Nitrophenol.........	100-02-7	Phenol, 4-nitro-............	80 82
N-Nitrosodi-n-butylamine............	924-16-3	1-Butanamine, N-butyl-N-nitroso-.	82
N-Nitrosodiethylamine...............	55-18-5	Ethanamine, N-ethyl-N-nitroso-.	82
N-Nitrosodimethylamine..............	62-75-9	Methanamine, N-methyl-N-nitroso-.	80
N-Nitrosodiphenylamine..............	86-30-6	Benzenamine, N-nitroso-N-phenyl-.	80
N-Nitrosodipropylamine; N-Nitroso-N-dipropylamine; Di-n-propylnitrosamine.	621-64-7	1-Propanamine, N-nitroso-N-propyl-.	80
N-Nitrosomethylethalamine...........	10595-95-6	Ethanamine, N-methyl-N-nitroso-.	82
N-Nitrosopiperidine.................	100-75-4	Piperidine, 1-nitroso-.......	82
N-Nitrosopyrrolidine................	930-55-2	Pyrrolidine, 1-nitroso-......	82
5-Nitro-o-toluidine.................	99-55-8	Benzenamine, 2-methyl-5-nitro-.	82
Parathion...........................	56-38-2	Phosphorothioic acid, 0,0-diethyl 0-(4-nitrophenyl) ester.	81 82
Pentachlorobenzene..................	608-93-5	Benzene, pentachloro-........	82
Pentachloronitrobenzene.............	82-68-8	Benzene, pentachloronitro-...	82
Pentachlorophenol...................	87-86-5	Phenol, pentachloro-.........	80 82
Phenacetin..........................	62-44-2	Acetamide, N-(4-ethoxyphenl).	82
Phenanthrene........................	85-01-8	Phenanthrene................	81 82
Phenol..............................	108-95-2	Phenol......................	80
p-Phenylenediamine..................	106-50-3	1,4-Benzenediamine..........	82
Phorate.............................	298-02-2	Phosphorodithioic acid, 0,0-diethyl S-[(ethylthio)methyl] ester.	81 81 82
Polychlorinated biphenyls; PCBs; Aroclors.	See Note 9	1,1'-Biphenyl, chloro derivatives.	80 82
Pronamide...........................	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-.	82
Propionitrile; Ethyl cyanide.........	107-12-0	Propanenitrile..............	80 82
Pyrene..............................	129-00-0	Pyrene......................	81

			82
Safrole	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-.	82
Selenium	(Total)	Selenium	60
			77
			77
Silver	(Total)	Silver	60
			77
			77
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-.	81
Styrene	100-42-5	Benzene, ethenyl-	80
			80
			82
Sulfide	18496-25-8	Sulfide	90
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid.	93-76-5	Acetic acid, (2,4,5-trichlorophenoxy)-.	81
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene, 1,2,4,5-tetrachloro-	82
1,1,1,2-Tetrachloroethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-.	80
			80
			82
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-tetrachloro-.	80
			80
			82
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene.	127-18-4	Ethene, tetrachloro-	80
			80
			82
2,3,4,6-Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6-tetrachloro-.	82
Thallium	(Total)	Thallium	60
			78
			78
Tin	(Total)	Tin	60
Toluene	108-88-3	Benzene, methyl-	80
			80
			82
o-Toluidine	95-53-4	Benzenamine, 2-methyl-	82
Toxaphene	See Note 10	Toxaphene	80
1,2,4-Trichlorobenzene	120-82-1	Benzene, 1,2,4-trichloro-	80
			81
			82
			82
1,1,1-Trichloroethane; Methylchloroform.	71-55-6	Ethane, 1,1,1-trichloro-	80
			80
			82
1,1,2-Trichloroethane	79-00-5	Ethane, 1,1,2-trichloro-	80
			82
Trichloroethylene; Trichloroethene	79-01-6	Ethene, trichloro-	80
			80
			82
Trichlorofluoromethane; CFC-11	75-69-4	Methane, trichlorofluoro-	80
			80
			82
2,4,5-Trichlorophenol	95-95-4	Phenol, 2,4,5-trichloro-	82
2,4,6-Trichlorophenol	88-06-2	Phenol, 2,4,6-trichloro-	80
			82
1,2,3-Trichloropropane	96-18-4	Propane, 1,2,3-trichloro-	80
			80
			82
O,O,O-Triethyl phosphorothioate	126-68-1	Phosphorothioic acid, O,O,O-triethylester.	82
m-Trinitrobenzene	99-35-4	Benzene, 1,3,5-trinitro-	82
Vanadium	(Total)	Vanadium	60
			79
			79
Vinyl acetate	108-05-4	Acetic acid, ethenyl ester	82
Vinyl chloride; Chloroethene	75-01-4	Ethene, chloro-	80
			80

			82
Xylene (total)......................	See Note 11	Benzene, dimethyl-...........	80 80 82
Zinc................................	(Total)	Zinc.........................	60 79 79

Notes

\1\The regulatory requirements pertain only to the list of substances; the right hand columns are given for informational purposes only. See also footnotes 5 and 6.

\2\Common names are those widely used in government regulations, scientific publications, and exist for many chemicals.

\3\Chemical Abstracts Service registry number. Where ``Total'' is entered, all species in the contain this element are included.

\4\CAS index are those used in the 9th Collective Index.

\5\Suggested Methods refer to analytical procedure numbers used in EPA Report SW-846 ``Test Me Evaluating Solid Waste'', third edition, November 1986, as revised, December 1987. Analytica found in SW-846 and in documentation on file at the agency. CAUTION: The methods listed are 846 procedures and may not always be the most suitable method(s) for monitoring an analyte u regulations.

\6\Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in ground wa realiably determined within specified limits of precision and accuracy by the indicated meth laboratory operating conditions. The PQLs listed are generally stated to one significant fig based on 5 mL samples for volatile organics and 1 L samples for semivolatile organics. CAUTI in many cases are based only on a general estimate for the method and not on a determination compounds; PQLs are not a part of the regulation.

\7\This substance is often called Bis(2-chloroisopropyl) ether, the name Chemical Abstracts Se its noncommercial isomer, Propane, 2,2"-oxybis[2-chloro- (CAS RN 39638-32-9).

\8\Chlordane: This entry includes alpha-chlordane (CAS RN 5103-71-9), beta-chlordane (CAS RN 5 chlordane (CAS RN 5566-34-7), and constituents of chlordane (CAS RN 57-74-9 and CAS RN 12789 is for technical chlordane. PQLs of specific isomers are about 20 µg/L by method 8270.

\9\Polychlorinated biphenyls (CAS RN 1336-36-3); this category contains congener chemicals, in constituents of Aroclor 1016 (CAS RN 12674-11-2), Aroclor 1221 (CAS RN 11104-28-2), Aroclor 16-5), Aroclor 1242 (CAS RN 53469-21-9), Aroclor 1248 (CAS RN 12672-29-6), Aroclor 1254 (CAS and Aroclor 1260 (CAS RN 11096-82-5). The PQL shown is an average value for PCB congeners.

\10\Toxaphene: This entry includes congener chemicals contained in technical toxaphene (CAS RN chlorinated camphene.

\11\Xylene (total): This entry includes o-xylene (CAS RN 96-47-6), m-xylene (CAS RN 108-38-3), 106-42-3), and unspecified xylenes (dimethylbenzenes) (CAS RN 1330-20-7). PQLs for method 80 xylene and 0.1 for m- or p-xylene. The PQL for m-xylene is 2.0 µg/L by method 8020 or 8260.

ATTACHMENT 2

40 CFR Part 261.24, Contaminant Toxicity Characteristics

THIS DATA CURRENT AS OF THE FEDERAL REGISTER DATED MARCH 4, 2002

40 CFR - CHAPTER I - PART 261

View Part

§ 261.24 Toxicity characteristic.

(a) A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in § 260.11 of this chapter, the extract from a representative sample of the waste contains any of the contaminants listed in table 1 at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract for the purpose of this section.

(b) A solid waste that exhibits the characteristic of toxicity has the EPA Hazardous Waste Number specified in Table I which corresponds to the toxic contaminant causing it to be hazardous.

Table 1--Maximum Concentration of Contaminants for the Toxicity Characteristic

EPA HW No.\1\	Contaminant	CAS No.\2\	Regulatory Level (mg/L)
D004	Arsenic....................	7440-38-2	5.0
D005	Barium....................	7440-39-3	100.0
D018	Benzene....................	71-43-2	0.5
D006	Cadmium....................	7440-43-9	1.0
D019	Carbon tetrachloride......	56-23-5	0.5
D020	Chlordane.................	57-74-9	0.03
D021	Chlorobenzene.............	108-90-7	100.0
D022	Chloroform................	67-66-3	6.0
D007	Chromium..................	7440-47-3	5.0
D023	o-Cresol..................	95-48-7	\4\200.0
D024	m-Cresol..................	108-39-4	\4\200.0
D025	p-Cresol..................	106-44-5	\4\200.0
D026	Cresol....................	....	\4\200.0
D016	2,4-D.....................	94-75-7	10.0
D027	1,4-Dichlorobenzene.......	106-46-7	7.5
D028	1,2-Dichloroethane........	107-06-2	0.5
D029	1,1-Dichloroethylene......	75-35-4	0.7
D030	2,4-Dinitrotoluene........	121-14-2	\3\0.13
D012	Endrin....................	72-20-8	0.02
D031	Heptachlor (and its epoxide).	76-44-8	0.008
D032	Hexachlorobenzene.........	118-74-1	\3\0.13
D033	Hexachlorobutadiene.......	87-68-3	0.5
D034	Hexachloroethane..........	67-72-1	3.0
D008	Lead......................	7439-92-1	5.0
D013	Lindane...................	58-89-9	0.4

D009	Mercury..................	7439-97-6	0.2
D014	Methoxychlor.............	72-43-5	10.0
D035	Methyl ethyl ketone......	78-93-3	200.0
D036	Nitrobenzene.............	98-95-3	2.0
D037	Pentrachlorophenol........	87-86-5	100.0
D038	Pyridine.................	110-86-1	\3\5.0
D010	Selenium.................	7782-49-2	1.0
D011	Silver...................	7440-22-4	5.0
D039	Tetrachloroethylene.......	127-18-4	0.7
D015	Toxaphene................	8001-35-2	0.5
D040	Trichloroethylene.........	79-01-6	0.5
D041	2,4,5-Trichlorophenol.....	95-95-4	400.0
D042	2,4,6-Trichlorophenol.....	88-06-2	2.0
D017	2,4,5-TP (Silvex).........	93-72-1	1.0
D043	Vinyl chloride...........	75-01-4	0.2

\1\Hazardous waste number.
\2\Chemical abstracts service number.
\3\Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.
\4\If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/l.

[55 FR 11862, Mar. 29, 1990, as amended at 55 FR 22684, June 1, 1990; 55 FR 26987, June 29, 1990; 58 FR 46049, Aug. 31, 1993]

ATTACHMENT 3

Laboratory Certifications

ACCREDITED IN ACCORDANCE WITH nelac

FLORIDA DEPARTMENT OF HEALTH

State of Florida, Department of Health
Bureau of Laboratories

This is to certify that

E84282

STL Tampa West
6712 Benjamin Road - Suite 100
Tampa, FL 33634

has complied with Florida Administrative Code 64E-1, for the examination of Environmental samples in the following categories:

SDWA - Microbiology, Primary Inorganic, Secondary Inorganic, Synthetic Organic Contaminants, Other Regulated Contaminants, Group I Unregulated Contaminants, Group II Unregulated Contaminants, Group III Unregulated Contaminants;
CWA - Microbiology, Metals, General Chemistry, Volatile Organics, Extractable Organics, Pesticides-Herbicides-PCB's;
RCRA/CERCLA - Metals, General Chemistry, Volatile Organics, Extractable Organics, Pesticides-Herbicides-PCB's************

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

EFFECTIVE JULY 1, 2001 THROUGH JUNE 30, 2002

GREAT SEAL OF THE STATE OF FLORIDA
IN GOD WE TRUST

Ming S. Chan, Ph.D.
Bureau Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 3/98
NON - TRANSFERABLE - N 20 282

ACCREDITED IN ACCORDANCE WITH nelac

FLORIDA DEPARTMENT OF HEALTH

State of Florida, Department of Health
Bureau of Laboratories

This is to certify that

E81005

STL Tallahassee
2846 Industrial Plaza Drive
Tallahassee, FL 32301

has complied with Florida Administrative Code 64E-1, for the examination of Environmental samples in the following categories:

SDWA - Microbiology, Primary Inorganic, Secondary Inorganic, Synthetic Organic Contaminants, Other Regulated Contaminants, Group I Unregulated Contaminants, Group II Unregulated Contaminants, Group III Unregulated Contaminants; CWA - Microbiology, Metals, General Chemistry, Volatile Organics, Extractable Organics, Pesticides-Herbicides-PCB's; RCRA/CERCLA - General Chemistry, Volatile Organics, Extractable Organics, Pesticides-Herbicides-PCB's

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

EFFECTIVE JULY 1, 2001 THROUGH JUNE 30, 2002

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Ming S. Chan, Ph.D.
Bureau Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 3/98
NON - TRANSFERABLE - N 15 005

ACCREDITED IN ACCORDANCE WITH nelac

FLORIDA DEPARTMENT OF HEALTH

State of Florida, Department of Health
Bureau of Laboratories

This is to certify that

E87052

STL Savannah
5102 LaRoche Avenue
Savannah, GA 31404

has complied with Florida Administrative Code 64E-1, for the examination of Environmental samples in the following categories:

SDWA - Microbiology, Primary Inorganic, Secondary Inorganic, Synthetic Organic Contaminants, Other Regulated Contaminants, Group I Unregulated Contaminants, Group II Unregulated Contaminants, Group III Unregulated Contaminants; CWA - Microbiology, Metals, General Chemistry, Volatile Organics, Extractable Organics, Pesticides-Herbicides-PCB's; RCRA/CERCLA - Microbiology, Metals, General Chemistry, Volatile Organics, Extractable Organics, Pesticides-Herbicides-PCB's; CAA - Extractable Organics**********************************

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

EFFECTIVE JULY 1, 2001 THROUGH JUNE 30, 2002

Ming S. Chan, Ph.D.
Bureau Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 3/98

NON - TRANSFERABLE - N 32 052

FLORIDA DEPARTMENT OF HEALTH

State of Florida, Department of Health
Bureau of Laboratories

This is to certify that

E87089

STL Mobile
900 Lakeside Drive
Mobile, AL 36693-5118

has complied with Florida Administrative Code 64E-1, for the examination of Environmental samples in the following categories:

SDWA - Microbiology***

Continued certification is contingent upon successful on-going compliance with FAC Rule 64E-1 regulations. Specific methods and analytes certified are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

EFFECTIVE JULY 1, 2001 THROUGH JUNE 30, 2002

Ming S. Chan, Ph.D.
Bureau Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1629, 3/98

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APPENDICES

1. INTRODUCTION

1.1 Terms of Reference

This Operation Plan has been prepared by GeoSyntec Consultants (GeoSyntec) on behalf of Omni Waste of Osceola County, LLC (Omni) for a Class I landfill known as the Oak Hammock Disposal (OHD) facility. The Operation Plan for the OHD facility has been prepared to comply with the requirements of Chapter 62-701 of the Florida Administrative Code (FAC).

1.2 Purpose and Scope of the Operation Plan

The Operation Plan provides a detailed description of the daily operations of the Class I landfill at the OHD facility, including contingency operations as required by Sections 62-701.320(7)(e)(1,2), and 62-701.500 of the FAC. The primary purpose of the Operation Plan is to describe the framework to operate and manage the OHD Class I landfill so that the landfill is operated and maintained in a condition that protects the public health and the environment. This Operation Plan also provides a description of borrow area operations for obtaining fill material during both the construction and operation phases of the landfill.

1.3 Operation Plan Organization

The organization of the Operation Plan is described below:

- Section 2 describes personnel requirements, landfill entrance procedures, traffic routing, and facilities for the Class I landfill;

- Section 3 discusses landfill operations including basic landfilling procedures, waste handling, waste relocation, equipment, on-site roads, and general maintenance procedures for drainage swales;

- Section 4 discusses environmental controls including leachate containment and control, surface-water control, facility inspection, maintenance, monitoring, landfill active area controls, and record keeping;

- Section 5 describes the contingency plan for emergencies at the site;

- Section 6 describes the safety plan for the site;

- Section 7 discusses final closure of the OHD landfill;
- Section 8 describes operation of the borrow area.

2. LANDFILL PERSONNEL AND FACILITIES

2.1 <u>Personnel Requirements</u>

2.1.1 Numbers and Types

The positions and number of personnel anticipated to be employed for each position are presented in Table 1. Omni will have at least one trained operator at the landfill during active operations and at least one trained spotter at each working face. The operator and the spotter may be the same person. The staffing levels presented in Table 1 provide for absences due to vacation, illness, holidays, or other reasons. Peak solid waste receipt periods, or other emergency conditions may require additional personnel and/or staff working overtime. These staffing levels are based on the assumption that work activities will generally take place 10 hours per day, 5 days per week and a half day on Saturday.

If the daily volume at the landfill increases enough to require additional equipment, the staff will be increased as required to supply the personnel to operate and maintain the additional equipment. The minimum crew required to operate the landfill for receipt of waste is also presented in Table 1. In addition to the permanent staff, casual labor may be hired for area clean-up, ground maintenance, and other intermittent activities as required.

2.1.2 Employee Training

Employees of the landfill will receive initial training courses, approved by FDEP, and on-the-job training in the safe and environmentally secure operation of the landfill. The various phases of training will be conducted by a trained landfill operator, spotter, senior equipment operator or a qualified independent third party, and will include written documentation of instruction activities. The requirements of the training program will also be documented in writing. Every employee will also receive the appropriate continuing education training every three years. Omni will maintain training records for current employees at the facility. Examples of subjects to be covered in the employee training program include the following:

- overview of this Operation Plan;
- review of permits and regulations for operators and other key personnel;
- general landfill safety procedures pertaining to work around solid waste, landfill gases, and leachate;

- instruction in the operation and maintenance of equipment, machinery, and systems which the employee must operate, service, or monitor during his/her daily job duties;

- instruction in emergency response procedures for landfill fires or explosions, leachate pumping system failure or leaks, or other emergency situations;

- instruction in emergency shutdown procedures; and

- appropriate procedures for spotters and equipment operators, scale masters and other key personnel including recognition of hazardous wastes and reporting procedures for discovery of unauthorized wastes.

A list and schedule of those classes offered to the public, which may be attended by the OHD facility's operators and spotters, is presented in Appendix A.

2.2 Landfill Entrance Procedures

2.2.1 Hours and Days of Operation

The landfill may be open to accept and dispose of solid waste from dawn to dusk, or 10 hours per day, whichever is greater. Typical landfill hours for acceptance of waste are:

Monday through Friday: 7:00 am to 6:00 pm
Saturday: 8:00 am to 12:00 Noon

Construction, daily cell preparation, hauling/excavating, road building, leachate management, or all non-disposal waste acceptance can be performed both within and outside of the posted operating hours. The actual hours of operation will be posted at the main entrance to the landfill. The landfill may be closed on Sundays and the following holidays:

Thanksgiving Christmas New Year's Day

2.2.2 Processing Customers

Upon entering the site, all landfill users entering the disposal area will be required to stop at the weigh station. The scale master will record the weight and type of waste for each waste load brought to the landfill. All waste loads will be visually inspected for hazardous or other unauthorized wastes in accordance with the waste inspection plan, which is presented in Appendix B. A load-checking program will be used at the landfill to detect and discourage attempts to dispose of unauthorized wastes at the landfill. The load checking program consists of the following:

- The Landfill Site Manager is to examine at least three random loads each week. The selected waste hauling vehicles are to be directed to discharge their loads at a designated location within the landfill for a detailed inspection of the discharged material for any hazardous waste.

- If any regulated hazardous wastes are identified by the random load inspection or otherwise discovered to be improperly deposited at the landfill, the Landfill Site Manager will promptly notify FDEP, and if known the person responsible for shipping the wastes to the landfill, and the generator of the wastes. The area where the hazardous wastes are found will be immediately cordoned off from public access and properly removed from the designated location/work face. If the generator or hauler cannot be identified, the landfill operator will assure the cleanup, transportation, and disposal of the waste at a permitted hazardous waste management facility.

- A record of information and observations gathered during each random waste load inspection will be maintained. This documentation will include: the date and time of inspection; load weight; names of the hauling firm and driver of the vehicle; vehicle license plate number; source of waste as indicated by the driver; and observations made by the inspector during the detailed inspection. The responsible inspector will sign each waste inspection record. The random waste load inspection documentation will be maintained at the landfill for a period of at least three years.

Vehicles will be directed to the appropriate disposal area by signs or other means. Verbal instructions will be given by facility personnel when necessary. The appropriate area depends on whether the waste is typical municipal solid waste, yard waste, white goods, used tires, or waste that should be placed in a particular location for special handling.

2.2.3 Public Use

Small, private vehicles will be directed to place their load in the appropriate disposal area as directed by the scale master.

2.2.4 Vehicle Inspection

A plan will be implemented by the Landfill Site Manager to prevent the on-site disposal of unauthorized wastes. A copy of the Waste Inspection Plan prepared for the Class I landfill is presented in Appendix A. This plan will be implemented by the Landfill Site Manager or designee to prevent the on-site disposal of unauthorized wastes.

The Landfill Site Manager or designee (Inspector) will be in charge of inspecting waste vehicles arriving at the site. The Inspectors will receive training in unauthorized waste identification. The training provides the opportunity to improve the inspector's knowledge and ability to effectively screen incoming waste.

2.3 Traffic Routing

2.3.1 Access Points/Signs

Access by all vehicles shall be via a single secured site entrance located on highway US 441. The entrance will allow for safe and orderly traffic flow into and out of the facility. The site entrance gate will be locked outside of operation hours.

Signs will be posted at the site entrance indicating the name of the facility, name of the operating authority, and hours and days of operation. In addition, a sign which clearly states "NO HAZARDOUS WASTES ACCEPTED" will be located at the entrance to the landfill. Traffic control and safety requirement signs will be located at and near the entrance to the facility as required.

2.3.2 On-Site Traffic Flow

Once vehicles delivering wastes have been weighed, they will follow directions or signs posted along the haul road(s) to the current active work areas of the landfill. Trucks will then proceed to deposit their loads at the appropriate working face. Signs or the scale master will direct small public vehicles to deposit their loads in the appropriate disposal area.

2.4 On-Site Structures

The site includes the following structures:

- office building/ticket office/weigh station;
- scales; and
- storage area.

2.5 Communication Facilities

The following communication facilities will be provided for routine communication and for use in emergencies at the site:

- cellular and/or conventional telephone in the office building; and
- on-site two-way radios.

3. LANDFILL OPERATIONS

3.1 Basic Landfilling Procedures

This section describes the procedures that constitute the daily landfill operations, the sequence of landfilling, working face practices, and control of the first and subsequent lifts. The landfill will be operated in accordance with these procedures and filled in the general sequence as indicated on the Permit Drawings.

3.1.1 Method of Operations

Landfilling areas will generally progress from north to south and from west to east. When a cell is opened, waste lifts will be placed to cover all areas to a depth of 10 feet to reduce leachate generation prior to placement to higher elevations in a cell.

Controlling truck routes and properly spotting loads will facilitate the spreading, compaction, and covering of refuse. During construction of the first lift, trucks will be positioned on a lift of previously compacted waste adjacent to the first lift being placed. In subsequent lifts, unloading at the toe of the working face and pushing uphill may be the preferred method. Lateral confinement or small work faces will be maintained to avoid wasting soil cover material. Temporary barricades or flags may be used as daily width markers for guiding equipment operators and for traffic control.

Vehicles transporting refuse and cover material to the working face will be routed over previously filled areas, whenever possible, for additional compaction of refuse and soil. Vehicles will not be routed over areas of the final cover system unless on a road specifically designed for hauling waste. Disposal vehicles will not be routed over a lined area before a lift of waste has been placed, in order to prevent damage to the liner.

Signs will also be posted in the operational areas if and when required. These signs will direct traffic, identify buildings, and specify types of material to be deposited in particular areas. Safety signs will also be posted to identify certain safety requirements such as no smoking, speed limits, and stop signs.

The refuse may consist of household and commercial wastes, construction, demolition debris, and other similar materials, as allowed by regulations for Class I landfills. These readily compactable wastes lend themselves to the typical operations described in Sections 3.1.2 and 3.1.3.

3.1.2 Working Face Practices

3.1.2.1 Start-Up and First Lift

To assure protection of the landfill liner system, no disposal vehicles will be operated directly on the liner protective cover. Soil platforms or similar protective measures will be placed adjacent to the working face to keep vehicles off the liner protective cover. Landfill personnel will be positioned at the working face for the start-up of each new area to direct vehicles to their unloading points.

The first lift of waste on the liner protective cover will be placed with great care, using special methods to protect the liner from damage. The first lift of waste will be a minimum of 4 feet in compacted thickness and consist of select wastes containing no large rigid objects that may damage the liner or leachate collection system. Equipment will not be allowed on the liner protective cover and equipment will not spread waste in a manner that displaces the liner protective cover soil. Landfill personnel will closely monitor the placement, compaction, and covering of the first layer of waste. Landfill personnel will maintain grade control and inspect the filling techniques. Inadvertent damage or suspected damage to the liner system will be reported to the Landfill Site Manager and restored prior to filling in the damaged area.

To protect the liner system, the bulldozer will normally be used as the primary spreading and compacting machine for the first lift. The compactor will only be operated on top of the waste and not on the landfill base or on the waste sideslopes. The equipment operators will also make sure that no bulky waste or other material, which could damage the liner system is placed within the first lift.

3.1.2.2 Subsequent Lifts

After the first lift is properly in place, normal operating procedures will be used for the second lift and all subsequent lifts. Trucks and compactors are permitted to operate on these lifts. Bulky wastes delivered to the facility and any stockpiled bulky wastes received during construction of the first lift will be placed in subsequent lifts. The daily operating procedures including routing of traffic, placement, spreading and compaction of refuse, and application of initial and/or intermediate cover will be followed for the subsequent lifts of waste. Soil erosion control and site maintenance tasks will be implemented throughout the development of all lifts. Once the final landfill elevations have been reached over a suitably sized area, final cover will be applied to the landfill during the next construction season and vegetated during the customary planting season.

At the end of each working day, initial cover material (e.g., soil or alternate material) will be applied. A loader and truck or a scraper can be used to load and haul soil from the stockpile area to the working face where it will be temporarily stockpiled or spread directly over the waste. Intermediate cover will be applied on areas that will be exposed for more than 180 days (i.e., outside sideslopes and the top of the final lift or portions of other lifts not soon to be covered by additional refuse.) An alternative to the soil, which is used as initial cover may consist of foundry sand, foam, a fabric blanket, or other approved material.

Material from on-site stockpile or borrow areas will be used to supply initial and intermediate cover requirements. To conserve soils and landfill space, the initial and intermediate cover will be scraped back immediately before placement of additional solid waste on top of the lift, and then reused as cover material if appropriate, or will be incorporated into the working face. Initial and intermediate cover will be graded to drain away from the active work area.

3.1.3 Filling Procedures

After the first lift, waste materials will be placed in 2-ft thick horizontal layers when possible and compacted to approximately 1-ft thickness or as thin a layer as practical before the next lift is applied.

The refuse cell is the basic building block of a landfill. It is composed of multiple compacted layers of waste and enclosed by cover material (i.e., initial, intermediate and/or final cover). Basic instructions for constructing the refuse cell are outlined below.

3.1.3.1 Width of Working Face

The working face is the portion of the uncompleted cell on which additional waste is spread and compacted. To maintain sanitary operation, the working face will be kept as narrow as possible. By keeping the working face narrow, equipment movement, cover material requirements, and the area of exposed waste is minimized. In order to facilitate proper unloading and waste placement operations, two working faces may be required from time to time.

The optimal daily working face width will vary depending on the number of vehicles bringing waste to the site. The working face will be wide enough to prevent a large backlog of trucks. It is expected that a working face 150 to 200 ft (46 to 61 m) in width will be sufficient for operation of the OHD landfill.

3.1.3.2 Unloading

When unloading waste from top of the refuse cell, the waste will be discharged as close to the edge of the active working face as safe operations permit and pushed down slope. For safety reasons, a minimum 8 to 10 ft separation will be maintained between the refuse trucks and the landfill equipment.

When unloading waste from the bottom of the refuse cell, the waste will be discharged approximately 10 ft from the toe of the working face and pushed up the slope. Truck and landfill equipment separation, as discussed above, will be maintained. In order to prevent loads of waste from being discharged too far away from the toe, refuse trucks can be backed toward the toe, following a path created by the equipment pushing refuse into the working face.

3.1.3.3 Pushing, Spreading, and Compacting

Proper refuse cell construction involves pushing, spreading, and compacting the waste. These functions will be accomplished with a bulldozer and/or a compactor.

Pushing the waste is the action of moving the waste from the discharge location into the working face. This function will be accomplished with a bulldozer and/or compactor.

Spreading of the waste can be done by either a bulldozer or compactor. The purpose of the spreading action is to distribute the waste over the working face in a thin layer (approximately 2 ft thick). High in-place compacted unit weight of the waste is achieved by compacting in thin layers (i.e., 2 ft thick).

Good compaction is achieved by operating the landfill compactor up and down the working face after the refuse has been spread into a thin layer. Proper compaction of the waste will extend landfill life, while reducing litter and vector problems. To maximize compaction of the waste, the working face and inside temporary slopes will not exceed a maximum slope of 3H:1V. The Landfill Site Manager will periodically verify the compaction procedures and make corrections as necessary.

3.1.3.4 Daily Clean-Up

The area receiving wastes will be policed daily for loose waste and litter. Such waste, as well as litter along the litter fences, will be removed. The litter may be stored in trash bags until it can be deposited in the landfill.

3.1.4 Cover

3.1.4.1 Stockpiling

Cover soil stockpile locations, if needed, will change throughout the life of the landfill depending on site conditions and the location of the active working face. Landfill equipment will begin pushing or spreading the cover over the active cell area when and where it has reached its limit for the day.

A minimum of a three-week supply of acceptable initial cover will be maintained at the landfill and be available at all times. All stockpiles will be graded to minimize erosion potential. Silt fences or diversion berms will be utilized to control erosion.

3.1.4.2 Application and Phasing of Cover Materials

A 6 in. (150 mm) thick initial earth cover will be placed on top of all exposed waste on the working face, at the end of each day's operation. Alternative materials and layer thickness may be submitted for FDEP approval. If additional waste is to be deposited on the working face within 18 hours, the initial cover may consist of a temporary cover, such as a tarpaulin, that may be removed prior to the placement of additional waste

A 12-in. (300-mm) thick intermediate earth cover will be placed over the initial cover within 7 days of completion of an area if no additional solid waste will be deposited within 180 days.

Final cover will be placed over the areas of the landfill that have reached final design elevations. Final cover will be placed within 180 days of reaching the final design elevations. The final cover system will be as described in Section 7 of this Operation Plan. Vegetation will be maintained over the final cover areas throughout the life of the landfill and the post closure care period. Maintenance of the final cover swales, and access roads will also be performed throughout the life of the landfill and the post closure care period.

3.2 Equipment

3.2.1 Primary Equipment

Based on the available range of handling capacities and the initial projected waste receipts, the allocation of heavy, primary equipment presented in Table 2 will be sufficient to handle the wastes received at the landfill. The primary functions of heavy landfill equipment are spreading and compacting solid waste, and excavating, hauling, and spreading cover material. Equipment similarities allow different equipment to perform functions as necessary.

For example, when a compactor breaks down, a bulldozer can perform the compaction operation.

3.2.2 Back-Up Equipment

The equipment selection guide indicated in Table 2 will be adequate even if one of the pieces of equipment is temporarily out of service. If a piece of equipment is out of service for an extended period or if additional equipment is required on a temporary basis, this equipment is available for rental from several heavy equipment rental companies listed in Table 3.

3.2.3 Support Equipment

In addition to the heavy equipment used for operating and maintaining the landfill, other support equipment may be used to perform work not essential to the operations. This equipment will be present at the site most of the time, but some may be off-site, temporarily out of service, or rented for a specific occasion.

One 3,000 gallon or larger portable water storage tank will remain on site at all times and will be used for dust control and fire protection. The storage tank will be truck-mounted on either a tilt frame or roll-off container hoist, depending on vehicle availability. The storage tank will normally be positioned close to the working face for fire protection. However, it will also be equipped with spray bars so it can be used for dust control.

A utility tractor will be used to perform site maintenance activities. It will be fitted with attachments for mowing grassed areas. A backhoe or small excavator will assist the small dozer in maintaining drainage courses and ditches and for other site maintenance activities.

Pumps will be used for filling the portable water storage tank. These pumps will also be used to dewater any ponded water that forms in low areas around the site, including roads and lined landfill areas not in use.

3.2.4 Equipment Care

Routine preventive maintenance will minimize equipment downtime and increase equipment service life.

Preventive maintenance varies with each piece of equipment. Therefore, the operation and maintenance (owner's) manual for each should be consulted. However, three applicable maintenance activities, which will be implemented at the site are:

- establish a routine equipment inspection program;

- lubricate according to manufacturer's recommendations; and

- keep maintenance records.

3.3 Roads

3.3.1 Road Construction

The main access road from the site entrance area to the scale house will initially be an improved, all weather, rock/recycled concrete surfaced road. The main access road will paved within the next construction season after the site reaches and maintains 1,000 tons/day average for 30 consecutive working days. Haul roads will be constructed from the scale house to the active work area in the landfill. The haul roads will be improved, all weather, rock/recycled concrete surfaced. A perimeter maintenance road will provide all weather access to leachate management systems, groundwater monitoring wells, landfill gas monitoring wells, and storm water management structures. The perimeter maintenance road will be surfaced with limerock or recycled crushed concrete. In the active work area, the roads will be surfaced with construction/demolition waste or other acceptable waste.

3.3.2 Maintenance of Roads

3.3.2.1 Filling of Potholes

Potholes will be filled with materials compatible with the road construction material. Potholes will be filled on a routine basis so that they are not allowed to remain open for extended periods. Before placing patches in holes, all loose material will be removed from the hole. New material will then be placed in the hole and compacted so that it will be approximately as dense as the materials originally used in the road.

3.3.2.2 Grading

As unpaved, all-weather roads become uneven due to traffic-caused rutting or displacement of stone, fresh rock or recycled crushed concrete will be applied to the surface and smoothed to an evenly sloped grade to promote drainage.

3.3.2.3 Restoring Settlement

When all-weather roads are built on fill areas, settlement of the filled area may cause cracks to appear in a road or cause the slope of a road to change. Cracks will be filled with material that is compatible with the roadbed. Areas of a sloped road, where the slope has changed drastically, will be built up with material compatible with the roadway. The buildup will be made by placing a 6 in. thick layer of the material, compacting it, then placing another 6 in. thick layer of material and compacting again. This process will be repeated until the desired elevation is achieved or the road section will be rebuilt.

3.3.2.4 Cleaning of Public Access Roads

Proper operation of the landfill will result in little or no debris being found on public roads. The public roads adjacent to the site entrance area will be inspected daily. If debris from the wheels of vehicles departing the landfill reaches the public access road at the entrance to the landfill, that road will be cleaned to a distance of 0.25 mi (0.4 km) or as required in both directions, if necessary, from the entry point onto the road.

3.3.2.5 Removal of Materials from Landfill Roadways

Any significant accumulation of dirt, brush, and other debris will be removed from the landfill roadways. Dirt left on asphalt roadbeds may cause dust problems during dry weather or mud problems during wet weather. A program of road cleaning will be implemented to prevent any buildup. Unpaved roads will be watered as needed to minimize dust.

3.3.2.6 Maintenance of Drainage Swales

Drainage swales along road beds will be kept free of obstructions. During the wet weather seasons, inspection of all drainage ditches and structures will be made at least once each week, or more frequently as required, and debris removed as required.

3.4 Drainage Features

- Routine Inspections: Inspection procedures are outlined in Section 4.2.3.

- Channels, Pipes, and Inlet Structures: Drainage structures will be cleaned of debris as soon as practical after problems are identified to prevent ponding. When unlined channels silt up, routine cleaning will be performed to restore the original capacity of the channels.

- Repair of Structures: Damaged structures will be permanently repaired during dry weather periods. During rainy periods, temporary repairs may be made to prevent further damage to the structure or erosion of soil.

- Sediment Barriers: Sediment barriers will be visually inspected periodically for damage, and to determine if sediment has accumulated behind them. Sediment will not be allowed to accumulate to a height exceeding half that of the barrier.

Barriers will be replaced when visibly damaged. Barrier footings will also be inspected to ensure that drainage is not flowing beneath the barrier unless designed to do so.

3.5 Salvaging/Recycling

No scavenging will be permitted at the landfill. However, if the volume of recyclable goods is sufficient, as determined by the Landfill Site Manager, those items may be separated from the waste which is to be disposed.

4. ENVIRONMENTAL CONTROLS

This section presents the basic components of the environmental controls at the OHD Class I landfill. The major components of this section are the Facility Inspection Plan, Facility Maintenance Plan, and the Facility Monitoring Plan. In this section, a discussion of each of these components is presented, including a discussion of groundwater and surface-water protection controls, leachate collection system (LCS), and surface water controls, where appropriate. The discussion also includes general facility controls, including initial, intermediate and final cover, and access roads.

4.1 Environmental Control Systems

The purpose and function of each of the major environmental control systems are described below. Specific construction and design details are presented in the construction documents, the closure plan, post-closure plan, and the design report with attached plans.

4.1.1 Leachate Containment and Control

The Class I landfill is equipped with a double-composite liner system, which directs any liquid entering the landfill that may have contacted refuse to an LCS. The LCS drains liquid collected on the primary liner into a sump. Leachate in the sump is pumped into an on-site storage facility and trucked to a wastewater treatment plant (WWTP) periodically. Quantities of leachate collected by the LCS will be recorded in gallons per day and maintained as part of the landfill operating record.

A recording rain gauge will be installed, operated, and maintained to record precipitation at the landfill. Precipitation records will be maintained as part of the landfill operating record and used to compare with leachate generation rates.

4.1.2 Surface Water Controls

The surface-water management system for the OHD facility consists of a system of drainage swales to move storm water to either permanent dry retention basins or interim dry retention basin, depending on the stage of landfill construction. All dry retention basins are surrounded by an earth berm designed to contain all runoff from a 100-year storm event. Where runoff must pass through a roadway, appropriately sized culverts will be installed.

4.2 Facility Inspection Plan

4.2.1 Leachate Collection System (LCS)

The LCS will be water pressure cleaned or inspected using a video camera after construction but prior to placement of any waste. The pump(s) will be tested in the sump to assure that the system operates properly. Deficiencies will be repaired prior to initial deposition of waste.

The LCS includes manholes, pumps, a leachate wet well and a force main. The LCS pumps will be removed and inspected every 2 years. This 2-year inspection will consist of pressure testing of the pump. Pumps located in active areas, or areas without final cover, will be inspected on a monthly basis to confirm normal operation. Additional inspection, preventative maintenance, and checking of the electrical components will be performed in a manner and frequency in accordance with manufacturer's recommendations. The leachate transmission manholes will be inspected weekly for accumulation of leachate in the manhole and to verify integrity of the force main.

4.2.2 Leachate Storage Facility

The exposed exterior of the polyethylene leachate storage containers or steel tanks will be inspected weekly for leaks, deterioration, and maintenance deficiencies. The overfill control equipment will also be inspected weekly to ensure it is in good working order.

If inspection reveals a storage container or equipment deficiency, leak, or any other deficiency that could result in failure of the storage system to contain the leachate, remedial measures will be taken immediately to eliminate the leak or correct the deficiency. Inspection reports will be maintained and made available to FDEP upon request for the lifetime of the leachate storage facility.

4.2.3 Surface Water Control System

Surface-water culverts may contain landfill gas. Prior to accessing piping, protective measures will be taken to avoid explosion(s), fire(s), and asphyxiation(s).

Drainage swales, inlets, structures, and the surface-water management areas will be visually inspected monthly or following storm events. The frequency of dry inspections may be modified as appropriate based on progressive experience with the landfill drainage system, however, in no case will inspections be less frequent than quarterly. Regardless of the inspection frequency, the system will be inspected following each twenty-five year storm event (i.e., 9 inches of rain in 24 hour period) or greater storm event.

Drainage swales, inlets, and structures will be cleared of obstructing debris as soon as practical after a problem is identified. If channels become filled with an accumulation of debris or soil, cleaning may be required to restore original flow capacity.

4.2.4 Landfill Cover System

Areas that have received intermediate or final cover will be visually inspected periodically for signs of erosion, cracks and depressions due to settlement, and leachate seeps. Areas where waste or geosynthetics have been exposed by erosion will be filled and regraded to minimize any subsequent erosion. Significant depressions (1 ft or more) will be filled with soil, compacted, and regraded to promote positive drainage. If leachate seeps appear in the uncapped area of the landfill, the seep area will be excavated and backfilled with highly permeable material to promote seepage through the landfill. The intermediate cover will be reworked to seal the area.

4.2.5 Facility Inspection Schedule

Weekly	Exterior of HDPE leachate storage containers and overfill control equipment
Monthly (Visual)	Leachate collection pumps Surface-water management system Cover in completed areas Leachate force main
Quarterly	Surface-water control system (or after a 25 year storm event)
Annually	Surface-water control system pipes and structures Topographic survey of landfill
Bi-Annually (every 2 years)	LCS pumps and pipelines Leachate collection and detection flow meters, valves, and risers

4.3 Facility Maintenance Plan

In conjunction with the inspection plan, a regular schedule of maintenance will be prepared and implemented. This section refers specifically to the maintenance of the environmental controls installed at the landfill. It does not include the regularly scheduled maintenance of landfill roads or equipment such as vehicles, scales, or buildings. Maintenance requirements in this section refer primarily to the mechanical equipment associated with environmental controls. In addition, each piece of equipment will be inspected and maintained in accordance with all manufacturers recommendations.

4.3.1 Leachate Collection System

The electrical controls, pumps, flow meters, valves, and couplings will be maintained on at least a bi-annual basis (i.e., every two years). In addition, parts that tend to wear out on a regular basis, including bearings on pumps, seals, and gaskets, will be replaced during regular maintenance. After replacing maintained parts, the equipment will be tested to assure proper performance.

4.3.2 Surface-Water Control System

The surface-water control system does not include mechanical systems that require regular maintenance, however, the system is to be inspected on a monthly basis or following storm events. The swales, drainage structures, inlets, and pipelines will be repaired and maintained as soon as practical following identification of any damage or deficiencies. This includes repair of lined and unlined ditches in the active landfilling areas, on intermediate and final cover and diversion ditches around the landfill.

4.3.3 Final Cover Maintenance

Maintenance of the final cover includes all the components of the cap, i.e., the geomembrane, drainage geocomposite, protective soil layer and vegetation. The periodic inspections will help in assessing the final cover condition to verify the integrity of the cap (e.g., check for cracking of protective cover layer due to differential settlement or erosion and exposure of cover geomembrane/geocomposite), and the condition of the vegetation.

Areas of ponding or substantial differential settlement (1ft or more) will be checked to determine the cause. If a significant problem with the cover, vegetation, perimeter berms, erosion, or drainage structures is identified, work orders will be issued to correct the problems. Repair work should be initiated as quickly as possible.

The timing of the repairs will be dependent on the nature of the repair. Minor filling to eliminate ponding, and the reseeding and fertilizing disturbed or problem areas will be accomplished with little delay. Major repairs, such as extreme erosion, significant local instability of slopes, or substantial settlement, might require geotechnical evaluation and design prior to implementing final repairs. In some cases, the need for analysis and design of the severely damaged areas will delay repair activities.

If repairs are necessary to the cover system swales, inlets, or downdrains to correct the runoff containment system deficiencies, the repairs will be undertaken prior to start of the wet weather season.

Repair of damages to the cover system resulting from erosion and differential settlement may include locally removing geosynthetics and backfilling depressions beneath the geomembrane, repairing geosynthetics, backfilling soil layers, and revegetating disturbed areas. Additional drainage facilities may be provided to prevent future erosion.

4.4 Water Quality Monitoring Plan

The groundwater and surface water quality monitoring plan for the OHD landfill is presented in Appendix E of the permit application. The leachate monitoring plan for the OHD landfill is presented in Appendix N of the permit application.

4.5 Landfill Active Area Controls

4.5.1 Litter Control

Maintaining proper litter control is essential to the operation of a landfill. When working in areas below natural grade, litter is less likely to escape than when working above natural grade. Litter control procedures for the landfill are discussed below.

4.5.1.1 Prevention of Litter on the Working Face

Litter will be minimized as follows:

- Following proper techniques at the working face may prevent a considerable amount of potential litter by reducing the amount of refuse exposed to the wind. Where possible, the exposed face of the cell will be oriented into the wind. This will cause the wind to blow any loose litter back into the working face and helps keep waste away from the undercarriages of unloading vehicles, which may track the waste along the public roadway as they exit the facility. The compacted waste already on the face helps trap litter.

- When top discharging, refuse will be placed as usual and spread downward. When possible, the exposed face of the fill will be oriented away from the wind for the same reasons bottom discharging is oriented into the wind.

- Compacted waste will be covered as soon as practical to minimize blowing litter.

4.5.1.2 Control of Litter with Litter Fences

Litter that escapes from the working face of the fill area may be controlled by litter fences. Movable/permanent fences may be positioned near the working face as wind and fill operations change. Permanent litter fences may also be placed around the perimeter of the fill areas for additional litter control.

4.5.2 Buffer Maintenance

Litter may occur even with proper litter controls. The following clean-up and maintenance procedures will be followed on a routine basis to maintain the buffer areas:

- Litter clean-up from along fences and buffer vegetation: Litter will be removed from and along litter fences and vegetation as necessary. Litter will not be allowed to accumulate in buffer vegetation.

- Clean-up along on-site roads and buffer areas: Litter occurring along on-site roads and in buffers will not be allowed to accumulate. This litter will be cleaned up as necessary.

- Clean-up at entrance area and entrance road: The site entrance and the road leading to the entrance (¼ mile each direction) will be inspected daily. These locations will be cleared of litter as necessary.

- Vegetation will be maintained and supplemented as necessary in order to provide an adequate visual screen.

4.5.3 Dust Control

Dust control will be practiced during operation of the landfill by the application of water sprays from a water tank truck. The frequency of application of water for dust control will depend on site conditions and specific operation being performed. When necessary, water will be sprinkled on all heavily used roads. The main access road will be regularly sprayed to control dust when required.

4.5.4 Vector Control

Vectors, animals, or insects will be minimized. Maintaining the working face as narrow as possible, providing initial cover on exposed areas, and eliminating water ponding are the primary safeguards against vector problems. Well-compacted wastes and cover material effectively prevent vectors emerging from or burrowing into wastes.

If problems with rodents or insects occur, monitoring and surveys for vectors will be conducted to verify the effectiveness or identify and implement improved vector control practices.

4.5.5 Noise Control

All equipment powered by internal combustion engines will have mufflers installed and maintained in good repair. Screening berms will also be used, when possible, to deflect sound upward.

4.5.6 Recordkeeping

An operating record will be maintained at the site including all records, reports, analytical results, demonstrations and notifications; any construction, operation, and closure permits, including all modifications to those permits, issued by the FDEP, along with the engineering drawings and supporting information; as well as training verifications. This record will be kept with the operation plan at or near the landfill facility, or in an alternate location designated in the operating permit which is readily accessible to landfill operators. The operating record will be available for inspection at reasonable times by the FDEP and maintained for the design period of the landfill.

As part of the operating record, waste records will be maintained. These waste records will indicate the amount of each type of solid waste received each day. Waste reports, summarizing the waste records will be compiled monthly and copies will be provided to FDEP quarterly. The waste records will be kept with the operation plan at the landfill and will be available for inspection at reasonable times by the FDEP. These records will be kept for the design period of the landfill.

> The operating record will also include the information and observations resulting from each random inspection of a waste load conducted as part of the load checking program as described previously in Section 2.2.2.

The operating record will also include:

- the quantities of leachate collected by the primary leachate collection and removal system, and the secondary leachate detection and removal system, in gallons per day; and

- a record of the daily precipitation at the landfill based on the rain gauge installed, operated and maintained at the landfill.

This data will be used to calculate the monthly leachate generation rates expressed as a percentage of the monthly precipitation.

In addition, the operating record will also include the following:

- records of all information used to develop or support the permit applications and any supplemental information required;

- records of all monthly information, including calibration and maintenance records, and water quality records; and

- an annual estimate of the remaining life and capacity in cubic yards of the existing, constructed landfill and remaining life and capacity of other permitted areas not yet constructed. This estimate will be reported annually to FDEP.

The operating records will be maintained at the landfill throughout the design life of the landfill. Records that are more than five years old which are required to be retained may be archived, provided that the landfill operator can retrieve them for inspection within seven days.

5. EMERGENCY CONTINGENCY PLAN

5.1 Introduction

This section identifies a set of unplanned circumstances that may occur at the landfill. If handled correctly, the damage or impacts from these problems can be minimized. This section presents procedures to follow for dealing with problems as they occur. Operating personnel will become familiar with the procedures in order to prevent environmental contamination or damage to landfill facilities.

The entrance to the facility allows emergency vehicles immediate access to the landfill by police, fire, and ambulance.

Appendix C presents a list of individuals and emergency response agencies to contact. This list will be posted near all telephones on-site to provide "ready" access to emergency response agencies.

This plan is organized by subsection and contains specific plans to address each type of occurrence listed below:

- fire;
- accident or injury;
- release of contamination to environment;
- hazardous waste;
- uncooperative customers;
- inclement weather; and
- problems with the leachate collection and leachate removal systems.

5.2 Fire Control Plan

5.2.1 When Fire Occurs

The following procedures will be followed in the event of a fire at the facility:

- extinguish small fires with fire extinguisher or smother with soil - do not remain near large fires or explosive materials;

- determine location, extent, type, and, if possible, cause of fire or explosion;

- notify on-site personnel and implement safety and fire control procedures;

- notify Landfill Site Manager if the fire cannot be immediately controlled;

- notify fire department if necessary. Clearly state:

  - location of landfill,
  - location of fire or explosion in landfill,
  - extent of fire or explosion,
  - type of fire or explosion,
  - actions now being taken, and
  - injuries;

- notify rescue squad, if necessary;

- notify health care facility, if necessary; and

- notify sheriff, if necessary.

5.2.2 "Hot Load" Procedures

In the unlikely event that a "hot load" is not identified before entrance into the facility, the following procedures are implemented:

- the truck carrying the "hot load" is to be directed to discharge the load in the landfill but away from the working face and any exposed liner;

- the load is to be placed on top of intermediate cover which will provide sufficient protection between the "hot load" and the underlying waste;
- soil will be spread over the load to smother the "hot load"; and

- the "hot load" will be monitored until there is no evidence of smoldering or high temperatures.

At the end of the day or when appropriate, the load will be worked into the active working face. Areas where "hot loads" are extinguished varies depending on the location of the working face, but will always be away from the working face and any exposed liner.

5.2.3 Fire Extinguishers and First Aid Kits

Fire extinguishers and first aid kits will be installed in the following locations:

- office building/ticket house/weigh station; and
- selected on-site vehicles and equipment.

5.3 Accident or Injury

5.3.1 When an Injury Occurs

When an injury occurs, the following procedures will be implemented:

- shut down equipment in the immediate vicinity as is appropriate;
- determine extent of injuries (location, seriousness);
- apply pressure (compress) on wound to stop severe bleeding;
- if victim is not breathing and has a pulse, administer rescue breathing, if trained;
- if victim has no signs of circulation, administer CPR, if trained;
- DO NOT MOVE VICTIM(S), unless:
  - victim is still in danger, or
  - victim can move self without great pain;
- have someone phone rescue squad (911) unless injuries are clearly minor, and provide the following:
  - clearly state location, and
  - describe injuries;
- stay with and keep victim(s) warm;
- notify Landfill Site Manager;
- transport victim(s) to a nearby medical center if:

  - injury is not serious, but requires medical attention (e.g., broken fingers, minor burns), and
  - victim(s) can move self without great pain;

- notify sheriff, if necessary; and

- apply first aid, as described below:

  - Landfill Employees - Minor accidents, such as bee stings, minor cuts, and small burns may be treated on site by an employee trained to administer first aid, and
  - Customers - First aid treatment will not be given to customers who have minor accidents at the site. However, personal information about the victim and a description of the accident will be obtained. The customer will be instructed to go to his/her doctor for examination and treatment, if required.

5.3.2 Procedures After an Accident

The following procedures will be implemented in the event of an accident:

- Accident Investigation - The Landfill Site Manager will make a complete investigation of the accident and events leading up to the time of the accident. The investigation will be started as soon as possible after the accident. All witnesses to the accident and persons involved in the accident will be interviewed.

- Determination of Cause - After the facts about the accident have been gathered, the Landfill Site Manager will make a determination as to the cause(s) of the accident.

- Filing of Reports - The Landfill Site Manager will complete and file the appropriate accident report forms.

- Corrective Steps - After a thorough investigation and determination of the cause(s) of an accident, the Landfill Site Manager will take corrective steps so that the same type of accident will not re-occur. These corrective steps may take the form of repair of faulty equipment, installation of safety equipment, or instruction of personnel in safe operating procedures.

- Discussion with Employees - If it is determined that the cause(s) of the accident were related to employee work habits and that remedial safety instructions would be helpful, a meeting with site employees will be held. The accident and the corrective measures that will be taken will be discussed to prevent another accident. All employees will be instructed in proper safety procedures which should be followed.

- Follow-up - The Landfill Site Manager will follow-up the corrective measures to make certain that proper safety precautions are being taken. All unsafe practices will be called to the attention of the employees.

5.4 Release of Contamination to Environment (Remedial Response)

5.4.1 Response

If contamination is released to the environment, the following procedures will be implemented:

- determine location, extent, type, and, if possible, cause of release (e.g., leachate, contaminated surface water, fuel spill, etc.);

- notify Landfill Site Manager and implement safety and emergency response procedures;

- notify fire department. State clearly:

    - location of landfill,
    - location of contaminant release,
    - extent of release,
    - type of release, and
    - actions now being taken; and

- notify proper authorities including the Florida "Hot Line".

A list of individuals and emergency response agencies to contact in the event of a release of contamination to the environment is provided in Appendix B.

5.4.2 Follow-Up

Unless the occurrence of a contaminant release is clearly due to very unusual circumstances, the Landfill Site Manager will take corrective action to prevent recurrence of the release. The corrective action will be approved by the FDEP.

A report will be filed at the landfill by the Landfill Site Manager in order to have further reference for inquiries by authorities or Omni personnel. The report will state:

- time/date of incident or its discovery;
- type of release and effects;
- source;
- response and effectiveness;
- agencies contacted; and
- corrective actions planned and scheduled.

5.5 Hazardous or Other Unauthorized Materials

In the event that a substance known to be or suspected of being hazardous is dumped from any vehicle at the waste disposal facility, the actions described below will be taken immediately.

5.5.1 The Observer

The Observer will take the following actions:

- Immediately report the incident to the Landfill Site Manager or their designee.
- Avoid exposure to the substance in question. Stay upwind.
- Observe where the material was dumped, by whom (which vehicle), how much was dumped, whether the container appears sound or is leaking, and what the substance looked and smelled like. Such observations will only be made with extreme caution and with the utmost regard for safety. DO NOT SNIFF OR TOUCH THE SUBSTANCE.
- Ask the individual who dumped the suspect load where the material was obtained.
- Isolate the approximate area of the suspected load before it is covered or mixed with wastes from other vehicles.

- Ask the driver of the vehicle to remain at the dumping point to ensure adequate vehicle identification. If the driver attempts to leave the discharge point, the observer should inform the Scale master and/or the Landfill Site Manager.

5.5.2 Landfill Site Manager

The Landfill Site Manager will take the following actions:

- Notify the FDEP.

- Record all pertinent facts regarding vehicle, including but not limited to: name of carting company; license plate number; where the load was obtained, if known; any visible evidence identifying the waste substance; and quantity and state of the substance (e.g., solid or liquid or if contained or loose).

- Maintain careful records of other costs incurred as a result of the dumping incident including, but not limited to, security costs in isolating the area, costs of removal (by contract or otherwise) of the suspect material, other costs of intermediate or ultimate treatment and/or disposal, and any other pertinent costs.

- Coordinate the removal of the unacceptable waste with the proper authorities.

5.5.3 Non-Discharged Load

If, before a waste load can be discharged (e.g., during inspection), it is discovered to contain, or is suspected of containing hazardous or other unauthorized materials, the same reporting procedures by the Observer and Landfill Site Manager described for the discharged loads still apply, except concerning the discharging itself. In addition:

- inform the driver that his load is unacceptable and why;

- do not permit the load to be discharged; and

- suggest to the driver that he phone the FDEP to determine what he should do with the load.

5.6 <u>Uncooperative Customers</u>

The following actions will be implemented if a customer will not obey site rules or cooperate with site personnel.

- if the customer is creating a substantial problem involving their or other's safety, or significantly interfering with disposal operations, the Landfill Site Manager will decide what action should be taken;

- if the customer is creating a minor nuisance and does not respond to polite suggestions, the employee will record the vehicle description and license number, and report the incident to the Landfill Site Manager or home office management; and

- in a case where a customer causes or threatens to cause harm to landfill property or personnel, or otherwise interferes with safe operation of the landfill, the Landfill Site Manager will contact the Sheriff.

5.7 Inclement Weather

5.7.1 Operation in Wet Weather

Problem		Solution
Saturated Unloading Area	1)	Stockpile well-drained soil and apply as necessary.
	2)	Keep compactors off area; use dozers on unloading area. Unload and push refuse perpendicular to area.
	3)	Grade unloading area slightly to permit runoff.
Mud Carried Onto Access/ Public Roads	1)	Carefully scrape mud from pavement.
	2)	Provide clean rock dressing to internal access roads. If internal access roads are properly maintained, then dirt on the tires of disposal vehicles will be thrown off prior to reaching public access roads.
Cover is Wet/Unworkable	1)	Maintain compacted, sloped stockpiles.
	2)	Use alternate cover approved by permit.

5.7.2 Preparation for Inclement Weather

The following preparations will be made for inclement weather:

- Wet weather areas will be prepared during periods of dry soil conditions. The wet weather area will be constructed close to an all weather road. Work on the wet weather area will be performed at various times when personnel and equipment are not required for other higher priority assignments.

- Access roads around the site will be maintained as necessary. These roads will be maintained in a serviceable condition with the use of the available equipment on site, such as grader, water truck, dozer and loader. Major repairs will be scheduled, if required.

- Drainage structures, ditches, and sediment control will be checked to ensure they are in good repair and free of significant debris prior to anticipated heavy rains.

- Temporary (Operations Area) Drainage Control - cover material, rock/sand, and corrugated metal pipe, will be stockpiled for use in an emergency situation.

- When periods of high wind are predicted, litter fencing will be moved to close proximity of the working face and in the expected downwind direction. Cover may be required frequently during the day.

5.8 Problems Affecting the Leachate Collection and Removal Systems

5.8.1 Interruption of Power Service to the Landfill

The ability to switch over to the secondary power supply allows the leachate collection and removal systems to continue operating with virtually no interruption. In the event that the main power service to the landfill is interrupted for more than 24 hours, the site will be switched over to the secondary power supply system consisting of diesel generators.

5.8.2 Interruption of Flow to Leachate Storage Facility

In the event that leachate flow to the leachate storage facility is temporarily interrupted, the leachate will be stored in the active cell(s). If the system cannot be restored within a reasonably acceptable period, leachate will be pumped directly from the sump to tanker trucks for off-site treatment.

5.8.3 Primary Leachate Sump Alarm Level Switch

An alarm level switch will be installed in one of the primary leachate sumps to notify the operator in the event that leachate levels in the sumps reach this level. The intent of the alarm is to notify the operator of a potential problem with the leachate pumps or piping. The alarm may indicate that either one or possibly both of the primary leachate pumps may have stopped working, the pumping capacity of both pumps has been exceeded, the storage containers are full, or there is possible blockage in the leachate transmission line. The operator shall observe the leachate pumps, pump control panels and flow meter to determine if either or both of the pumps are working. If at least one of the pumps is operational and there is no blockage in the leachate transmission line the operator will open the gate valve located in the secondary leachate manhole. By opening this valve leachate from the adjacent primary sump may flow into the secondary leachate sump for pumping. The operator shall record the flow meter reading on the secondary leachate sump pump prior to opening the gate valve. The operator shall also record the date and time of the occurrence and reason why the valve was opened (i.e., primary pumps failed, excessive leachate flow, etc.). The operator shall monitor the pumping of leachate to determine if the high leachate levels were associated with the pumps. The operator shall also examine the leachate transmission line manholes, piping and storage tanks assess any other potential problem. The leachate pumping system will require troubleshooting to determine the cause of the leachate build-up in the primary sumps and malfunctioning/inoperable pumps shall be replaced or repaired as soon as practical.

5.8.4 Managing Hazardous Leachate

In the event the leachate quality monitoring indicates the leachate is a hazardous material, the leachate will be managed in accordance with Chapter 62-730 of the FAC.

6. SAFETY PLAN

6.1 Emergency Procedures

- Posting of Procedures - All emergency procedures (Emergency Contingency Plan - Section 6 of this Operation Plan) will be updated as appropriate and after each emergency, if required. All emergency procedures will be posted in the Landfill Site Manager's office, in conspicuous places at the site, and at the gate house.

  The name, location, and telephone number of the nearest doctors, medical treatment facilities, and ambulance services (contained in Appendix B of this plan) will be posted in the Landfill Site Manager's office and all occupied buildings (i.e., maintenance building, gate house and office).

- Instructions on Procedures - All new personnel will be instructed on the emergency procedures used at the landfill. All employees will be informed of any changes in emergency procedures.

- Responsibility of Employee - It is the responsibility of every employee to know and remember their role in each emergency procedure at the site.

6.2 General Safety Practices

- Knowledge of Procedures - All employees at the landfill will know the proper procedures for reporting accidents, injuries, and fires.

- Posting of Information – Roadway limits within the landfill footprint will be clearly posted as necessary. Site speed limits will be clearly posted on the main access road. Direction of travel and location of curves will also be posted. The location of disposal areas will be clearly indicated.

- Site User Rules - Site user rules will be posted at the entrance to the landfill. Employees will watch for violations. Employees will explain rules to violators, stressing that the rules are for their protection. As a last resort, the Landfill Site Manager will notify the County Sheriff's Office for further action.

- Discharging Loads - For safe operations, the discharging area will be only slightly sloped (for drainage) at all times and equipment maintained in good repair.

- Safety Devices - Proper safety devices, such as roll-over protective cabs, will be installed on all equipment and kept in good repair.

- Fire Extinguishers - Fire extinguishers will be provided in buildings and on equipment. Each extinguisher will be appropriate for the types of fires likely and they should be checked or serviced as appropriate. Discharged (even partially) fire extinguishers will be removed and replaced with fully charged units.

- First Aid Kits – First aid kits will be maintained in the main office building and in select site vehicles. An inventory of the first aid supplies should be maintained in order to re-supply the first aid kits when items used.

- Safety Meetings - Safety meetings will be regularly scheduled. Situations that can cause accidents and ways to prevent them will be discussed. Also, the effectiveness of corrective actions following accidents at the site will be discussed.

- NO SMOKING will be allowed within the landfill area or near fuel storage facilities.

6.3 Safety Equipment

Certain safety equipment is specified for equipment operator protection. It is the responsibility of every employee to ensure that their safety equipment is in good condition. All employees are to use their safety equipment at appropriate times. The safety equipment recommended for equipment operators is listed in Table 4.

6.4 Site User Rules

The following set of rules will be observed at the landfill.

- No Smoking - Users will not smoke on the site.

- Children and Pets in Vehicles - Individuals (children and pets) not involved in unloading refuse will remain in the vehicle.

- Persons Unloading to Remain Near Vehicle - Persons unloading will remain within 10 ft (3 m) of their vehicle at all times.

- No one will be allowed to ride on the outside of a vehicle while on site.

- Discharge Waste Behind Vehicle - Whenever possible, waste will be discharged immediately behind the unloading vehicle.

- Unloading - No unloading by non-mechanized trucks or passenger cars is to be done using rapid acceleration or deceleration of the vehicle.

- Keep Tools in Vehicle - Tools, removable tailgates, sideboards, wheelbarrows, ladders, and tarps will be kept in, on, or under the vehicles being unloaded to prevent damage to other vehicles or site equipment.

- Speed Limit - The posted speed limit within the landfill site will be enforced. Operating personnel will direct users to further reduce their speed when justified by site conditions.

- No Scavenging - Scavenging is not permitted at the landfill site.

- No Shooting - Firearms are not permitted at the landfill site.

- No Explosives - Explosives are not permitted at the landfill site.

7. FINAL CLOSURE

7.1 Introduction

The OHD landfill will be closed as sections of the landfill reach final design elevations. The final cover system components are described in Section 7.2. Seeding and planting requirements are described in Section 7.3. Erosion minimization activities are described in Section 7.4. The final cover drainage system is described in Section 7.5.

7.2 Final Cover System Components

The cross section of the final cover system on the top slopes of the landfill is shown in the permit drawings and consists of, from top to bottom:

- a 0.5-ft (0.15-m) thick vegetative layer;
- a 1.5-ft (0.45-m) thick vegetative support layer;
- a 40-mil (1-mm) thick polyethylene (PE) geomembrane; and
- a 1-ft (0.3-m) thick intermediate cover layer.

The cross section of the final cover system on the side slopes of the landfill is shown in the permit drawings and consists of, from top to bottom:

- 0.5-ft (0.15-m) thick vegetative layer;
- a 1.5-ft (0.45-m) thick vegetative cover layer;
- a geocomposite drainage layer;
- a 40-mil (1-mm) thick PE geomembrane; and
- a 1-ft (0.3-m) thick intermediate cover layer.

The final cover system incorporates a geomembrane, which significantly reduces infiltration into the landfill cells. The grades of the final cover system are 4H:1V on the side slopes, and 5.0 percent on the top slopes.

7.3 Seeding and Planting

A vegetative cover will be established for the OHD landfill in order to minimize erosion on the final cover. Grass will be propagated by hydroseeding, sodding or by other equivalent method in order to promote vegetative growth on the slopes of the final cover as construction of the cover progresses.

An initial watering schedule will be developed at the time of closure, and will be dependent on whether the landfill is closed in the dry season or the rainy season. The grass will be watered and fertilized, as necessary, to ensure continued growth.

7.4 Erosion Minimization

Erosion of the final cover system will be minimized by final cover swales. The swales will intercept sheet flow from the final cover system. The final cover swales will direct the collected surface-water runoff to downchutes and the perimeter swale.

A vegetative cover will be placed on the final cover slopes of the landfill as described in Section 7.3. This vegetative cover will minimize erosion and reduce soil loss from the final cover system. The final cover system will be periodically inspected and erosion damage or vegetative stress will be repaired before significant erosion has a chance to develop.

7.5 Drainage

Drainage swales are proposed on the final cover system to intercept the surface water runoff from higher elevations and direct the water via downchutes to the perimeter ditches around the landfill perimeter. The surface water flow direction on top of the final cover is illustrated in the permit drawings.

As required, the swales, downchutes, culverts, and perimeter ditches will be maintained on a regular basis. Significant sediment and debris, which has accumulated in the swales, culverts, and perimeter ditches will be removed to facilitate flow and prevent overflow. Significant sediment and debris is considered any amount that impedes flow in the swale or any buildup greater than 0.5 feet.

8. BORROW AREA OPERATIONS

8.1 Overview

Fill material needed for the OHD landfill construction and daily operations will be borrowed from excavations, or pits, located in the areas indicated on the Permit Drawings. Prior to any borrow activities in the location designated as Borrow Area A, the storm water management berm, in its interim configuration, will be constructed and vegetated. The outside toe of this berm will be constructed no closer than 25 feet to the nearest wetland boundary. In subsequent stages of the landfill development, the storm water management berm around Borrow Area A will be raised to its final height prior to the edge of the borrow excavation getting closer than 250 feet from the inside toe of the berm.

The development of Borrow Areas B and C will be undertaken in future phases of the OHD landfill development. It is anticipated that these areas will be developed in a manner similar to Borrow Area A except that the perimeter berm will be replaced with a wire-reinforced silt fence. The plan for borrow area operations in the Borrow Areas B and C may be reviewed based on the experiences gained from operation of Borrow Area A during construction.

Two methods are proposed for excavating fill material from the borrow areas. These methods include: (i) mechanical excavation without dewatering (i.e. wet excavation) and/or (ii) dewatering the borrow area (i.e. dry excavation) and excavating fill using conventional earth moving equipment. Both methods are to be implemented in a manner which will minimize impacts to adjacent wetlands.

8.2 Wet Excavation

Wet excavation is expected to be the primary method of borrow area operation during construction at the OHD facility. This method of borrow area operation will require removal of soil materials from the pit without first dewatering the pit. Initially, the area will be cleared and grubbed and the topmost organic soil layers will be stripped and used for construction of the perimeter berm or stockpiled for future use. Next, typical excavation equipment such as a dragline or backhoe excavator will be positioned to remove soils and temporarily stockpile the material on the surface adjacent to the excavation. The slope of the temporary stockpile area will be maintained to channel excess water back to the open excavation or to allow infiltration. A bucketloader or other suitable equipment will maintain the temporary stockpile and will load trucks or pans used to haul the material to the area of current construction or to designated stockpile areas.

All borrow areas will be developed from the center of the designated area towards the outer perimeter. The excavation equipment will continuously move around the perimeter of the borrow area excavation. After digging to the equipment's optimum depth, the equipment will move in a clockwise or counterclockwise direction to continually expand the pit until it reaches the final planned dimensions.

8.3 Dry Excavation

Dry excavation will be the alternative method of borrow area operation at the OHD facility. This method of borrow area operation requires dewatering of the borrow area prior to removal of soil materials. Initially, the borrow area will be cleared and grubbed and the topmost organic soil layers will be stripped and used for construction of the perimeter berm or stockpiled for future use. Next, a ditch recharge system will be constructed between the area to be dewatered and adjacent wetland areas, which may be affected by the dewatering activities. The purpose of the ditch recharge system is to maintain a ground water level between the dewatered pit and the adjacent wetland, which will prevent detrimental affects to the wetland area. It is anticipated that Omni may be required to obtain a water use permit from the South Florida Water Management District for the dewatering system if daily pumping quantities exceed 100,000 gallons. In conjunction with the water use permit application, a detailed layout of the recharge ditches, sequence of developing the dry pit, and location of pumps will be prepared.

The groundwater will be lowered in the borrow pit as the soil is excavated to provide trafficability in the excavation for equipment performing the excavation. It is anticipated that earth will be moved using self-loading pans, dump tucks loaded by backhoe, or other suitable heavy equipment, which will cycle through the borrow area to load and to the construction or stockpile site for unloading. As the excavation is progressively deepened, the ground water elevation in the excavation will be lowered ahead of the excavation bottom elevation. All water taken from the pit will be deposited in the recharge ditches, where it will maintain the ground water level in adjacent wetlands.

TABLE 1
PERSONNEL REQUIREMENTS
FOR RECEIPT OF UP TO 3,000 TONS OF WASTE PER DAY
OHD LANDFILL

Personnel Classification	Total Number of Personnel Employed	Minimum Number of Personnel Required for Receipt of Waste
Office Administrator	1	0
Scale master	1	1
Landfill Equipment Operator (s)	3	1
Spotter*	1	1
Landfill Site Manager/Operator**	1	1

Note:

* Spotter/Landfill Site Manager/Equipment operator – if trained

** random load waste inspector or designee

TABLE 2
HEAVY EQUIPMENT REQUIREMENTS [1]
FOR RECEIPT OF UP TO 3,000 TONS OF WASTE PER DAY
OHD LANDFILL

	Equipment On-site	Back-Up On-site
Chevy 1500 1/2 ton pick-up	1	0
Caterpillar 12G Motor Grader	1	0
2555 John Deere Tractor	1	0
Water truck	1	0
6" water pumps	1	0
4"water pumps	1	0
Caterpillar D8N Dozer	1	0
Caterpillar D7 Dozer	0	1
Volvo Articulating Hauling Truck	1	0
Caterpillar 225 Excavator	1	0
Caterpillar 963 Track Loader	1	0
Caterpillar 836 compactor	1	0
Caterpillar 826 compactor	0	1

Note:

(1) Equipment manufacturers' names are provided to indicate the approximate size and/or capacity of the equipment. The specific manufacturer for this equipment is not required but similar size is.

TABLE 3
HEAVY EQUIPMENT RENTAL COMPANIES

Name of Rental Business	Phone Number
United Rental	(407) 332 – 1470
Lundquist Excavating	(407) 847 – 9419

TABLE 4
OPERATOR PROTECTIVE EQUIPMENT

Equipment: Each piece of heavy equipment should be provided with:

- Safety restraint belt
- Roll-over bars
- Backup warning system
- Fire extinguisher

Personal: Equipment operators should have the following personal protective clothing and accessories:

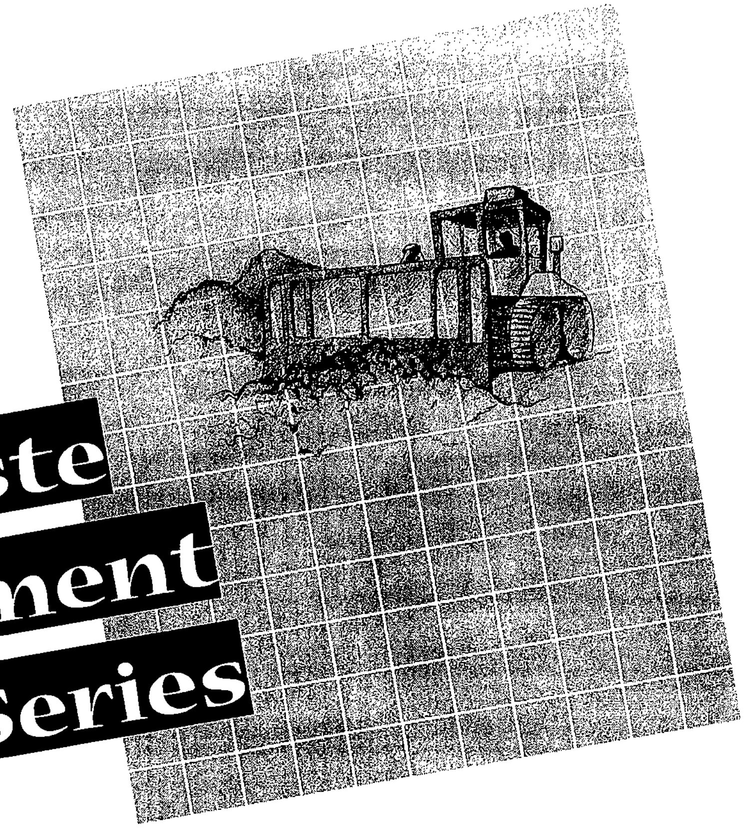
- Ear muffs or ear plugs
- Safety glasses or face shields
- Rubber or leather (steel toe, shank) boots
- Work gloves
- Hard hats

APPENDIX A

TRAINING PLAN

UNIVERSITY OF FLORIDA
TREEO CENTER

presents



2001-2002 Solid Waste Management Facility Series

EXCELLENCE IN ENVIRONMENTAL TRAINING AND EDUCATION

Solid Waste Training

UF/TREEO has been providing quality solid waste training to all levels of personnel since 1989. Our solid waste courses are taught by highly qualified professionals in the field, and you receive comprehensive course materials. You learn meaningful procedures and techniques that you can immediately implement at your job, as well as concepts and skills that should be beneficial to you as you progress in your career.

As public awareness of solid waste environmental issues expands dramatically from year to year, UF/TREEO responds to these growing concerns by developing training courses representing all aspects of the solid waste environmental field.

Approvals and Continuing Education

All courses have been reviewed by the Solid Waste Management Training Committee (SWMTC) for contact hours for solid waste management facility operators. Please review the list of courses for the awarded contact hours for the following type operators: Class I, II, III; Construction & Demolition (C&D); Transfer Station (TS); Materials Recovery Facilities (MRF). All previously approved courses are currently being reviewed by the SWMTC for satisfying continuing education requirements under 62-701 FAC that went into effect May 27, 2001. Please review the list of approved courses for updated hour awards for TS and MRFs. The list may be obtained at www.treeo.ufl.edu or by requesting a copy at 352/392-9570 ext 127.

Courses may be retaken for continuing education credit if you have not already taken the course within your current three-year period.

Many of UF/TREEO Center courses have been approved by the Solid Waste Association of North America (SWANA) for continuing education. The list may be obtained at www.treeo.ufl.edu or by requesting a copy at 352/392-9570 ext 127.

Course Descriptions

Courses begin at 8:00 am and adjourn at 5:00 pm unless otherwise noted. On-site registration and check-in begins 15 minutes prior to the start of the course.

Asbestos Awareness Course for Landfill Operators

This course provides background information on asbestos, including its various uses and forms. Your instructor discusses potential health effects associated with asbestos exposure, recognition of damage, deterioration or delamination of asbestos-containing materials, as well as ways to avoid inadvertent exposure.

This class can be brought to your site. Contact us for information.

Bird Management at Solid Waste Facilities

This four-hour course explains landfill operations and regulations regarding bird and wildlife management at solid waste facilities. Course instructors discuss landfill observations and case studies. Topics include: bird hazards to aircraft, effects of runoff from stormwater management, habitat and wildlife management, public education and working with environmental groups, threatened species, endangered and nuisance species.

Mar. 19, 2002, Daytona Beach ◆ #020376, 1:00 pm–5:00 pm Fee: $225

Construction and Demolition Debris Landfills: A Short Course for Operators – 24 hours

Topics discussed include: regulations, recycling, siting, groundwater monitoring, regulatory compliance inspections, basic operating guidelines, Leachate, and financial responsibility. This course is approved as an initial course for C&D operators and continuing education for class I, II, III operators. Participants must be present for the entire course and pass the exam with 70% proficiency.

Aug. 20-22, 2001, Cocoa Beach ◆ #010603, Fee: $325
Jan. 29-31, 2002, Gainesville ◆ #020373, Fee: $395

Groundwater Issues for Landfill Operators

This six-hour course is a basic introduction to information about dealing with groundwater at a landfill. The instructor will discuss groundwater sampling and analysis, monitoring plans, as well as regulations and guidelines you need to follow at your site. North Florida Hydrogeology is also covered.

April 9, 2002, Gainesville ◆ #020379, Fee: $250

Hazardous Materials in Construction and Demolition Waste

This four-hour course covers the risk of hazardous materials in C&D waste and regulatory issues. It will also review the types of hazardous materials you may encounter in C&D wastes. Some materials discussed are: paints, solvents, treated wood, asbestos, lead fixtures, batteries and mercury containing devices.

Available on-line after Sept. 2001 ◆ #020368, Fee: $295
The hours will be awarded on the date that you complete the course and exam. Prepayment is required.

Health and Safety Training for Landfill Operations

This five-hour overview course is designed to introduce participants to the major health and safety issues (and areas of regulation) applicable to this type of operation. The course centers on discussion of the types of hazards that could be encountered, how to avoid them and what to do if encountered. Applicable OSHA, EPA/FDEP and DOT programs are covered.

Aug. 23, 2001 ◆ #020114, Fee: $175
Available on-line after Sept. 2001 ◆ #020366, Fee: $295
The hours will be awarded on the date that you complete the course and exam. Prepayment is required.

Landfill Gas and Leachate Systems

This eight-hour course teaches you how to comply with local, state and federal regulations governing landfill gas and leachate systems. During course presentations and demonstrations, you learn about up-to-date technology on the control processes and designs of these systems. Topics include: biological decomposition of wastes, characteristics of landfill gas and leachate, migration and monitoring of landfill gas design considerations and treatment options.

Oct. 31, 2001, Location TBA ◆ #020369, Fee: $250

Manager of Landfill Operations (MOLO)

During this (30 hour) four-day course, you learn about the current landfill design and operating practices and requirements, including site selection, wastescreening, gas and leachate issues, training and overview of state and federal regulations. Plus MOLO offers a field exercise to give you the opportunity to review the classroom concepts and see how they can be applied on the job. There is also a written exam with multiple choice, true/false and problem-solving questions.

Participants must complete the course and pass the exam with a 70% proficiency to satisfy Florida Department of Environmental Protection training requirements for landfill operators under 62-701 FAC.

This course is approved as an initial training course for Landfill and C&D operators and as a continuing education course for those who have not taken it as their initial course.

Sept. 11-14, 2001, Cocoa Beach, FL ◆ #020176
Feb. 12-15, 2002, Gainesville, FL ◆ #020374
Fees: Florida Residents (a portion of the cost of this course is being provided by the Florida Chapter of SWANA).
Florida Residents: Member–Regular $695/Your cost $485*
Non-member–Regular $855/Your cost $535
Non-Florida Residents: Member $750, Non-member $1025

Manager of Landfill Operations (MOLO) - EXAM Only

For individuals interested in seeking the voluntary certification as a Manager of Landfill Operations (MOLO) with the solid Waste Association of North America (SWANA), you are now allowed to take the exam without taking the course if you have certain landfill operations experience and meet the minimum qualifications. (To receive credit in the State of Florida for being MOLO certified, operators must show proof of taking the course.) Failed written exam candidates: if you need to retake the MOLO exam, you can do so at any of these exam dates. You may take the exam for an additional fee as many times as you like without retaking the course.

This exam is given on the last day of the MOLO course and will also be given at the SWANA-Florida Sunshine Chapter Fall 2001 Training Institute, Spring 2002 Tri-State Conference and Summer 2002 Conference.

Sept. 14, 2001, Cocoa Beach ◆ #020175
Nov. 2, 2001, Fall SWANA-Florida Chapter Conference ◆ #020177
Feb. 15, 2002, Gainesville ◆ #020375
Mar. 2002, Panama City ◆ 020174
July 2002, Summer SWANA-Florida Chapter Conference
Fee: $125 member, $250 non-member

Management of Leachate, Gas, Stormwater and Odor at Class I, II, and III Landfills

This eight-hour course covers the production and collection of Leachate and management of stormwater within a landfill, as well as liner systems and the importance of gas control. Topics on odor include: the source, testing for odors and record keeping.

Aug. 28, 2001, Gainesville ◆ #020367
Mar. 20, 2002, Daytona Beach ◆ #020377
Fee: $250

Pedestrian, Vehicles, and Equipment Safety in Landfills

This two-hour course will review the basic safety concepts of working in a landfill or transfer station. There will also be some discussion on equipment and pedestrian hazards, job safety hazards and working safely within those hazards.

Nov. 29, 2001, Kissimmee, 1:00 pm ◆ #020370, Fee: $175, $150 if taken with Wet Weather Operations

Eight-hour Spotter Training for Class I, II, III Landfills, Waste Processing Facilities, and C&D Facilities

Spotters play a key role in keeping prohibited materials out of landfills, C&D debris sites, transfer staions and MRFs. This course addresses the regulations that are relevant to the spotter and explains which materials are acceptable at these various sites. Topics include stormwater systems, application and maintenance of cover materials, inspections and litter control, typical waste composition, prohibited materials, load inspections, emergency and non-emergency response. This course is approved as an initial course for all Spotters.

Aug. 29, 2001, Gainesville ◆ #020113, Fee: $250

Two-Hour Spotter Refresher Training

This two-hour, web based computer course provides an overview of spotter operations at landfills, including construction and demolition sites and transfer stations. Topics include: spotter responsibility, communication, traffic management, random load inspections, prohibited waste material, hazardous waste materials, construction and demolition debris facilities, personal safety and landfill fires. You can work at your own pace to complete the course.

On-line anytime ◆ #020381, Fee: $225
The hours will be awarded on the date that you complete the course and exam. Prepayment is required.

Training for Spotters at C&D Sites, Landfills and Transfer Stations

This eight-hour course provides an overview of spotter operations at landfills, construction and demolition sites and transfer stations. Topics include: spotter responsibility, communication, traffic management, state regulations, inspections, prohibited and hazardous materials, safety, and landfill fires. This course is approved as an initial course for all Spotters.

Mar. 21, 2002, Daytona Beach ◆ #020378
June 26, 2002, Gainesville ◆ #020380
Fee: $250

Waste Screening and Identification for Landfill Operators and Spotters

Designed to enhance the skills and raise the competency level of landfill operators, this 8-hour course familiarizes you with federal and state rules that governs waste screening and prohibited waste. You learn about common practices in screening waste loads, handling unacceptable waste, identifying waste sources, constructing a screening area, and forming a facility contingency plan to manage unknown and hazardous waste. Topics include: overview of state and federal regulations and issues, generators, operating procedures for waste screening, managing identified hazardous waste and unknown waste, regular training of responsible personnel, equipment, summary of issues. This course is approved as an initial course for all Spotters.

Nov. 30, 2001, Kissimmee ◆ #020372, Fee: $250

Wet Weather Operations

This four-hour course explains landfill operations and regulations during rainy seasons or unusually wet weather. You discuss the hydrologic cycle and the function, design, maintenance and modification of your facility's stormwater system. Topics include: developing a wet weather plan, designating a wet weather cell, segregating stormwater from leachate, using energy dissipaters and temporary letdown structures.

Nov. 29, 2001, Kissimmee, 8:00 am ◆ #020371, Fee: $225

Register online at www.treeo.ufl.edu

Other Courses of Interest

Excavation and Trenching: Competent Person Training

If you or your employees engage in trenching activities, you may be the target of increased scrutiny by OSHA, safety inspectors and insurance carriers. This course is designed to give you a practical interpretation of the requirements of OSHA's "Competent Person" rules as well as other regulations related to trenching. Topics include: OSHA standards, protective systems, soil analysis.

Aug. 21, 2001, Shalimar/Ft. Walton Beach ◆ #020390
Oct. 3, 2001, Orlando ◆ #020152
June 27, 2002, Gainesville ◆ #020302
Fee: $295, contact Wendy Thornton, 352/392-9570, ext 114 or wthornt@treeo.doce.ufl.edu

Permit-Required Confined Space Training

This eight-hour training course objective is to enable you to develop a confined space program that complies with the regulation. The course consists of lecture, discussion, skill and equipment demonstrations, and study guide. Topics include: acceptable or prohibited conditions, entry requirement and documentation, elements of an entry into or evacuation from a confined space, employee record keeping, skill testing and training, and rescue and emergency services.

Aug. 20, 2001, Shalimar/Ft. Walton Beach ◆ #020389
Oct. 4, 2001, Orlando ◆ #020151
June 27, 2002, Gainesville ◆ #020301
Fee: $295, contact Wendy Thornton, 352/392-9570, ext 114 or wthornt@treeo.doce.ufl.edu

Hiring and Retaining Good Employees

How does a company hire and retain the employees it needs when the job market is so good? This course is designed to show how you can keep qualified employees at your company as well as attract the new talent you need. The instructor in this four-hour course discusses successful methods from a variety of industries you can use to increase access to new qualified workers and options to boost retention.

Oct. 2, 2001, Orlando ◆ #020115
Fee: $195, contact Dawn Jenkins, 352/392-9570, ext 127 or djenkin@treeo.doce.ufl.edu

Health and Safety Training for Hazardous Materials Training: 8-Hour OSHA Refresher

This interactive eight- hour course allows participants to meet the annual refresher training requirement outlined in 29 CFR 1910.120 (HazWoper). This course includes several classroom exercises to help participants evaluate their current skill level.

Aug. 22, 2001, Gainesville ◆ #020067
Nov. 28, 2001, Kissimmee, ◆ #020321
Feb. 28, 2002, Shalimar/Ft. Walton Beach ◆ #020298
Mar. 19, 2002, Daytona Beach ◆ #020299
Fee: $295, contact Wendy Thornton, 352/392-9570 ext 114 or wthornt@treeo.doce.ufl.edu

Health and Safety Training for Hazardous Materials Training: 40-Hour OSHA Course

This course provides 40 hours of intensive classroom instruction and hands-on training fulfilling OSHA requirements 29CFR 1910.120 paragraph [e] or [q] – for both controlled and uncontrolled sites. If you are involved in the implementation and review of site safety plans and systems, you also should attend this course. Hands-on exercises involve air monitoring operations, decontamination exercises, plugging and patching, and respirator use. This course satisfies training requirements for regular activities conducted on hazardous waste sites.

Nov.5-9, 2001, Gainesville ◆ #020143
Apr. 1-5, 2002, Gainesville ◆ #020297
Fee: $895, contact Wendy Thornton, 352/392-9570, ext 114 or wthornt@treeo.doce.ufl.edu
HazWoper is available on-line with eight hours of hands-on training at UF TREEO on Nov. 8, 2001, Mar. 19, 2002 or Apr. 4, 2002. The hours will be awarded on the date that you complete the course and exam. Prepayment is required.

Hazardous Waste Regulations for Generators

A "how to" course for both the novice and seasoned Hazardous Waste Manager, this eight-hour course shows you how to inspect your facility the way that FDEP will. The course instructor and an FDEP representative answer the questions you may have been afraid to ask. Hear the FDEP's latest on inspection and enforcement strategies and the common mistakes that can result in costly penalties.

Aug. 21, 2001, Gainesville ◆ #020066,
Nov. 29, 2001, Kissimmee ◆ #020284
Feb. 27, 2002, Shalimar/Ft. Walton Beach ◆ #020286
Mar. 20, 2002, Daytona Beach ◆ #020287
Fee: $295, contact Carol Magary, 352/392-9570 ext 109 or cmagary@treeo.doce.ufl.edu

US DOT Hazardous Materials/Waste Transportation

Obtain the required training you need in this seven- hour course for all personnel in the preparation, documentation packaging, labeling, shipping or transportation of hazardous materials.

Aug. 23, 2001, Gainesville ◆ #020282
Nov. 30, 2001, Kissimmee ◆ #020283
Mar. 21, 2002, Daytona Beach ◆ #020288
Fee: $325, contact Carol Magary, 352/392-9570 ext 109 or cmagary@treeo.doce.ufl.edu

Hazardous Material Chemistry for Environmental Professionals

This one-day seminar introduces you to hazardous chemicals and their properties as well as their classification by OSHA, USEPA, US DOT. Learn about chemical terminology, the difference between chemical and hazard classifications, and other aspects of commonly found chemical hazards. This eight-hour course is especially beneficial for professionals without a chemistry background.

Nov. 2, 2001, Gainesville
April 8, 2002, Gainesville
Fee: $295, contact Wendy Thornton, 352/392-9570 ext 114 or wthornt@treeo.doce.ufl.edu

Pumps and Pumping

Proper installation, operation and maintenance of pumping equipment are vital to any wastewater operation. This "how to" three-day course addresses every aspect of pump operation, efficiency and maintenance to reduce pump problems as well as operating costs.

Sept. 18-20, 2001, Gainesville ◆ #020141
Fee: $495, contact Wendy Thornton, 352/392-9570 ext 114 or wthornt@treeo.doce.ufl.edu

Instructors and Speakers

Larry Bäck, University of Florida TREEO Center
John Banks, SCS Engineers
Sam Barker, S. Barker & Associates, Inc.
Allan Biddlecomb, JEA, Inc.
Bruce Clark, ERM
Raymond Dever, SCS Engineers
Judy Devita, JEA, Inc.
David Gregory, Seminole County Solid Waste
Mark Hammond, Palm Beach County SWA
Tim Hunt, Timothy Hunt, Jr. & Associates
David Keough, JEA, Inc.
Chris Kohl, Chris Kohl Training and Consulting Services
Paul Luth, Paul Luth Consulting & Training Environmental Services, Inc.
Lenny Marion, Osceola County Solid Waste
Ron Merritt, GEO-Marine, Inc.
Chris McGuire, Florida Dept. of Environmental Protection
Doug Prentiss, Gainesville Regional Utilities
Thomas Roberts, Roberts and Associates
Chris Roeder, Florida Dept. of Environmental Protection
Larry Ruiz, SCS Engineers
Fred Sebesta, HDR Engineering, Inc.
Brian Storey, JEA, Inc.
James Thompson, Charlotte County Dept. of Env. Services
Timothy Townsend, University of Florida, College of Engineering
Robert Westly, SCS Engineers
Mary Jean Yon, Florida Dept. of Environmental Protection

Solid Waste Courses Coordinator

Dawn Jenkins, University of Florida TREEO Center, 3900 SW 63rd Blvd., Gainesville, FL 32608, 352/392-9570 ext 127,
Fax 352/392-6910, djenkin@treeo.doce.ufl.edu
www.treeo.ufl.edu

Training Requirements

To meet the training requirement of FAC 62-701 Operator(s) or spotter(s) must successfully complete an approved initial training course, be in attendance for entire course and pass exam – 70% or higher.

Effective May 27, 2001 — C&D/Transfer Station/MRF facility operators also have to pass exam with 70% or higher.

All previously approved courses are currently being reviewed by the SWMTC for satisfying continuing education requirements under 62-01 FAC that went into effect May 27, 2001. For updated hour awards see **www.treeo.ufl.edu.**

Classification	Initial Course	Continuing Education
Landfill – Class I, II, III	24 hours (previous 20 hours)	16 hours (previous 15 hours)
Construction and Demolition (C&D) Landfill	24 hours (previous 20 hours)	16 hours (previous 15 hours)
Transfer Station	16 hours	8 hours
Material Recovery Facility (MRF)	16 hours	8 hours
Landfill Clearing Debris Facility	no operator training required	no training required
Spotter of all Facilities	8 hours (previous 8 hours)	4 hours (previous 8 hours)

	Courses	Hours I, II, III	C&D	Transfer	MRF
Initial Landfill	Construction & Demolition Debris Landfill Short Course		24		
Initial Landfill	Manager of Landfill Operations (MOLO)	30	30		
Initial Landfill	MOLO Exam				
Initial Spotter	8-Hour Spotter Training for Class I, II, III Landfills, Waste Processing Facilities, and C&D Facilities	8	8	8	8
Initial Spotter	Training for Spotters at LDF, C&D Sites and TS	8	8	8	8
Initial Spotter	Waste Screening and Identification for LDF Operators and Spotters	8	8	8	8
Continuing Education	Bird Management at Solid Waste Facilities	4	4	4	
Continuing Education	Groundwater Issues for Landfill Operators	6			
Continuing Education	Wet Weather Operations	4			
Continuing Education	Landfill Gas and Leachate Systems	8			
Continuing Education	Mgmt. of Leachate, Gas, Stormwater & Odor	8			
Continuing Education	Pedestrian, Vehicles, and Equipment Safety in Landfills	2	2		
Cont. Education	2-Hour Spotter Refresher	2	2	2	2
Cont. Education	Health & Safety Training for Landfills Operations	5	5	5	5
Cont. Education	Hazardous Materials in C&D Waste	4			
Cont. Education	Health & Safety Training for HazMat: 40-Hr OSHA	8	8	8	8
Other Courses of Interest	Permit Required Confined Space Training	8	8	8	8
Other Courses of Interest	Excavation and Trenching Competent Person	8	8		
Other Courses of Interest	HazMat Chemistry for Env. Professionals	8			
Other Courses of Interest	Hiring and Retaining Good Employees	3			
Other Courses of Interest	Health & Safety Training for HazMat: 8-Hr OSHA	4	4	4	4
Other Courses of Interest	Health & Safety Training for HazMat: 40-Hr OSHA	8	8	8	8
Other Courses of Interest	Hazardous Waste Regulations for Generators	4			
Other Courses of Interest	US DOT Hazardous Materials/ Waste Transportation	6			
Other Courses of Interest	Pumps and Pumping	8			

Initial spotter courses may be taken as continuing education by operators for 8 hours.

UNIVERSITY OF FLORIDA
TREEO CENTER

Spotter Training
January - December 2002

Training for Spotters at Construction and Demolition Sites, Landfills and Transfer Stations

March 21, 2002 • Daytona Beach, FL • Cost: $250
June 26, 2002 • Gainesville, FL • Cost: $250

This one-day course provides an overview of spotter operations at landfills, construction and demolition sites and transfer stations. Topics include: Spotter Responsibility, Communication,Traffic Management, State Regulations, Compliance Inspections, Forms, Random Load Inspections, Classes of Landfills, Prohibited Waste Material, Hazardous Waste Material, Construction and Demolition Debris Facilities, Personal Safety, Personal Hygiene, and Landfill Fires.

8:00 a.m. - 5:00 p.m.; SWMTC hours: 8; SWANA CEUs: 5

Waste Screening and Identification for Landfill Operators and Spotters

October 8, 2002 • Tampa, FL • Cost: $250

Designed to enhance the skills of landfill operators and spotters, this course familiarizes you with federal and state rules governing waste screening and prohibited waste. You learn about common practices in screening waste loads, handling unacceptable waste, identifying waste sources, constructing a screening area, and forming a facility contingency plan to manage unknown and hazardous waste.

8:30 a.m.- 5:30 p.m.; SWMTC hours: 8; SWANA CEUs: 5

Eight-Hour Spotter Training for Class I, II, III Landfills Waste Processing Facilities, and C&D Sites

January 18, 2002 • Gainesville, FL • Cost: $250
August 2002 • Gainesville, FL • Cost: $250
November 2002 • Kissimmee, FL • Cost: $250

Spotters play a key role in keeping prohibited materials out of landfills. This course addresses landfill regulations that are relevant to the spotter and explains which materials are acceptable in a landfill. Topics include stormwater systems, application and maintenance of cover materials, inspections and litter control.

8:00 a.m. - 5:00 p.m.; SWMTC hours: 8; SWANA CEUs: 5

Two-Hour Spotter Refresher Training

On-Line Anytime • Cost: $225 • #020381

Locations and Accommodations

Daytona Beach - Daytona Beach Hilton Oceanfront Resort. 2637 S Atlantic Ave., Daytona Beach, FL 32611, 386/767-7350, $89 single/double.

Gainesville - University of Florida TREEO Center, 3900 SW 63 Blvd., Gainesville, FL 32608-3848, 352/392-9570.
Accommodations: Cabot Lodge, 3726 SW 40 Blvd (I-75 and SR 24, exit 75), Gainesville, FL 32608, 352/375-2400, 1-800-843-8735, $55 single, $62 double.

Tampa - Hilton Garden Inn-North, 600 Tampa Oaks Blvd [I-75, Exit #55], Tampa, FL 33637, 813/342-5000, $85 single/double.

Information: 352/392-9570 Course: Dawn Jenkins, ext. 127 or djenkin@treeo.doce.ufl.edu
Registration: Janet Touchton, ext. 112 or jtoucht@treeo.doce.ufl.edu

Note: These courses are approved as initial training courses for spotters and as continuing education for all operators.

Online registration for these courses is available at **www.treeo.ufl.edu.**

You may fax your completed registration form to 352/392-6910.

REGISTRATION FORM 02-103

- ☐ Two Hour Spotter Refresher Training • On-line Anytime • #020381 • $225
- ☐ Training for Spotters at Constuction & Demolition Sites, Landfills and Transfer Stations • March 21, 2002 • #020378 • $250
- ☐ Training for Spotters at Constuction & Demolition Sites, Landfills and Transfer Stations • June 26, 2002 • #020380 • $250
- ☐ Eight Hour Spotter Training for Class I, II, III Landfills, Waste Processing Facilities and C&D Sites • January 18, 2002 • #020655• $250
- ☐ Waste Screening and Identification for Landfill Operators and Spotters • October 8, 2002 • #030219• $250

NAME: ____________________ **SSN*:** ____________________

POSITION: ____________________ **COMPANY:** ____________________

MAILING ADDRESS: ____________________ **CITY:** __________ **STATE:** ____ **ZIP:** ______

BUSINESS PHONE: __________ **FAX:** __________ **E-MAIL:** ____________________

* Social Security Number needed for registration

Completed registration form and payment are needed to process your registration. Make payment in U.S. currency to UNIVERSITY OF FLORIDA. Mail registration form and payment to:
UNIVERSITY OF FLORIDA TREEO CENTER
3900 SW 63RD BLVD.
GAINESVILLE, FL 32608-3848
Register one person per form. Photocopy if more forms are needed.

FEE (Check appropriate boxes):
☐ Check Enclosed in the amount of $__________
☐ Government Purchase Order__________
☐ Please charge ☐ VISA ☐ Mastercard

Card #: ____________________

Expiration Date: __________

Please print name exactly as it appears on the card:

____

Approved Solid Waste Management Facility Operator and Spotter Continuing Education Courses

Last updated 11/30/2001

Note : The Solid Waste Management Training Committee is currently reviewing all approved courses for contact hours for all operators that became effective May 27, 2001 with FAC 62-701. Please continue to review for updates.

Class I, II, III Landfill Operators [*Initial Training*]

(An initial training course can be taken for continuing education credit by an operator only if the course was not taken as their initial training course.)

No.	COURSE TITLE	PROVIDER					
30	**Manager of Landfill Operations Training Course**	SWANA-Intl.	30				
160	**Manager of Landfill Operations**	TREEO/ SWANA-FL	30				
196	**24-Hour Initial Training Course for Landfill Operators (Class I, II and III and C&D Sites)**	Kohl Consulting, Inc.	24				

Construction and Demolition Debris Operators [C & D] [*Initial Training*]

(These courses can be taken as continuing education, if not taken as initial course.)

No.	COURSE TITLE	PROVIDER	I, II, III	C&D	Transfer	MRF	Spotter
200	**Construction and Demolition Debris Landfills - A Short Course for Operators-24 hours**	TREEO/ SWANA-FL		24			
196	**24-Hour Initial Training Course for Landfill Operators (Class I, II and III and C&D Sites)**	Kohl Consulting, Inc	24	24			

Transfer Stations [*Initial Training*]

No.	COURSE TITLE	PROVIDER					
197	**16-Hour Initial Training Course for Transfer Station Operators**	Kohl Consulting, Inc			16		
42	**Transfer Station Design & Operations**	SWANA			16		

Materials Recovery Facilities [MRF] [*Initial Training*]

No.	COURSE TITLE	PROVIDER					
198	**16-Hour Initial Training Course for Materials Recovery Facilities [MRFs]**	Kohl Consulting, Inc				16	

Spotters [*Initial Training*]

(These courses can be taken as continuing education.)

No.	COURSE TITLE	PROVIDER					
91	**Eight Hour Spotter Training for C&D Sites**	Kohl Consulting, Inc.	8	8	8	8	8
121	**Eight- Hour Training for Personnel at C&D Materials Recovery Facilities**	Kohl Consulting, Inc.	8	8	8	8	8
147	**Spotting at Landfills, C&D Sites and Transfer Stations**	JEA/TREEO	8	8	8	8	8
203	**8 Hour Initial Training for Spotters at Class I, II, III Landfills, Waste Processing Facilities, and C&D Sites**	Kohl Consulting, Inc.	8	8	8	8	8
36	**Waste Screening & Identification For Landfill Operators and Spotters**	TREEO	8	8	8	8	8
10	**Waste Screening at MSW Management Facilities** {On-site Delivery}	SWANA	10	10	10	10	10
122	**Waste Screening and Operation Orientation for Transfer Station Personnel**	Kohl Consulting, Inc.	8	8	8	8	8

Continuing Education			I,II, III	C&D	Transfer	MRF	Spotter
No.	COURSE TITLE	PROVIDER					
214	**Spotter Training Plan for Land Clearing Debris Site**	Wetland Solutions	8	8	8	8	8

Continuing Education

No.	COURSE TITLE	PROVIDER	I, II, III	C&D	Transfer	MRF	Spotter
105	11th Annual SE Recycling Conference & Trade Show [3/1-4/98]	SE Recycling	8	8			
197	16-Hour Initial Training Course for Materials Recovery Facility (MFR) Operators	Kohl Consulting, Inc.				16	
196	16-Hour Initial Training Course for Transfer Station Operators	Kohl Consulting, Inc.			16		
52	17-701 & 17-703 Update [6/17/94]	Solid Waste Association of North America SWANA-FL	4				
204	1-Hour Overview of Health and Safety Issues at Solid Waste Facilities	Kohl Consulting, Inc	1	1	1	1	
205	2001 Florida Recycling Coordinators Training Course [8/2--24/01]	Solid Waste Association of North America SWANA-FL					
195	24-Hour Initial Training Course for Landfill Operators (Class I, II, III, and C&D Sites)	Kohl Consulting, Inc.	24	24			
148	2-Hour Landfill Spotter Refresher Training	JEA, Inc.	2	2	2	2	2
169	40-hour Train-the-Trainer Program for Hazardous Waste Operations and Emergency Response Program	Chinn Training	8	8	8	8	
144	8-Hour HazWoper Refresher Training	Stephen Mraz	4	4	4	4	
203	8-Hour Initial Training Course for Spotters at Class I,II,III Facilities, Waste Processing Facilities, and C&D Sites	Kohl Consulting, Inc.	8	8	8	8	8
167	8-Hour OSHA Refresher	Florida Dept. of Environmental Protection / USL City Environmental Services, Inc of Florida	4	4	4	4	
182	Air Compliance and LGF System Operation [11/9-10/00]	SCS Engineers	16				
171	An Overview of Solid Waste Technologies and Waste Screening Review	Kohl Consulting, Inc.	2	2	2	2	2
71	Asbestos Awareness Course for Landfill Operators	University of Florida TREEO Center	4	4	4	4	4
127	Asbestos Awareness Refresher Course for Landfill Operators	University of Florida TREEO Center	2	2	2	2	2
145	Avoiding OSHA Citations and Liabilities in Florida [6/29/99]	Lorman Education Services	6				
143	Basic Confined Space [8/17/99]	North Florida Environmental Services	8	8	8	8	8
97	Basic Landfill Operations	Kohl Consulting, Inc.	8	8			4
72	Bird and Wildlife Management at SW Mgmt Facilities	University of Florida TREEO Center	8	8	8		
206	Bird Management at Solid Waste Management Facilities	University of Florida TREEO Center	4	4	4		
16	Complete Preventative Maintenance: Using New Technologies *[No longer offered]*	University of Florida TREEO Center	13				
35	Confined Space Entry & Assessment	Applied Associates International	8	8	8	8	
18	Confined Space Entry & Assessment *[no longer offered]*	University of Florida TREEO Center	20				
29	Confined Space Entry & Rescue	South Tech Fire Academy	40	40	40	40	
181	Confined Space for Private Industry	Sarasota Co. Tech	24	24	24	24	
200	Construction and Demolition Debris Landfills - A Short Course for Operators - 24 hours	University of Florida TREEO Center/ Solid Waste Association of North America SWANA-FL	24	24	7	7	
80	Construction and Demolition Debris Landfills - A Short Course for Operators *[no longer offered] (See #200)*	University of Florida TREEO Center/ Solid Waste Association of North America SWANA-FL	20	20			
103	Construction and Demolition Waste Recycling	University of Florida TREEO Center	7	7		7	7
114	Debris Management G202	FEMA/FL Div	12	12	12	12	12

Continuing Education

No.	COURSE TITLE	PROVIDER	I, II, III	C&D	Transfer	MRF	Spotter
136	Debris Management-Advanced Course (G202-Advanced)	Florida Dept. of Environmental Protection/FEMA	8	8	8	8	8
161	Design of Lateral Drainage Systems for Landfills [3/14/00]	Tenax	5				
108	Developing a Usable Operations Plan	Kohl Consulting, Inc.	4	4	4	4	4
130	Eight Hour Confined Space Training Course	Charles Davis	8	8	8	8	8
91	Eight Hour Spotter Training for C&D Sites	Kohl Consulting, Inc.	8	8	8	8	8
40	Environmental Drilling, Well Installation & Sampling	Nielson Environmental Field School, Inc.	16	16			
175	Environmental Management Systems - Overview	University of Florida TREEO Center	4	4	4	4	
176	Environmental Management Systems Internal Audit Procedures	University of Florida TREEO Center	4	4	4	4	
43	Environmental Sampling Laboratory & Data Analysis [12/12-12/94]	Executive Enterprises, Inc.	12				
100	Excavation, Trenching: Competent Person Training	University of Florida TREEO Center	8	8			
66	Exposure to Bloodborne and Waterborne Pathogens *[No longer offered]*	University of Florida TREEO Center	8				
32	Field Sampling Short School [7/22-24/91]	Environmental Technology Center	22				
47	Financing Integrated MSW Management Systems [5/14/96]	Solid Waste Association of North America SWANA	8				
110	Fires at Landfills	Kohl Consulting, Inc.	2	2		2	
199	Florida Dept. of Environmental Protection 8 Hour HazWoper OSHA Refresher [5/1/01]	Florida Dept. of Environmental Protection	4	4	4	4	
48	Florida Dept. of Environmental Protection Annual SQG Assessment, Notification & Verification Program Workshop [4/30/96]	Florida Dept. of Environmental Protection	5				
134	Florida Dept. of Environmental Protection Annual SQG Assessment, Notification & Verification Program Workshop [5/3-5/99]	Florida Dept. of Environmental Protection	5	5	5	5	
107	Florida Dept. of Environmental Protection Annual SQG Assessment, Notification & Verification Program Workshop [5/4-6/98]	Florida Dept. of Environmental Protection	7	7	7	7	
88	Florida Dept. of Environmental Protection Annual SQG Assessment, Notification & Verification Program Workshop [5/5-7/97]	Florida Dept. of Environmental Protection	5				
198	Florida Dept. of Environmental Protection HHW & Conditionally Exempt SQG [4/30-5/1/01]	Florida Dept. of Environmental Protection	5	5	5	5	
59	Florida Dept. of Environmental Protection HHW & Conditionally Exempt SQG [5/1/96]	Florida Dept. of Environmental Protection	5				
166	Florida Dept. of Environmental Protection HHW & Conditionally Exempt SQG [5/1-3/00] [Management credit]	Florida Dept. of Environmental Protection	5	5	5	5	
54	Florida Dept. of Environmental Protection HHW & Conditionally Exempt SQG [5/3-5/95]	Florida Dept. of Environmental Protection	14				
84	Florida Dept. of Environmental Protection HHW & Conditionally Exempt SQG [5/5-7/97]	Florida Dept. of Environmental Protection	5				
135	Florida Dept. of Environmental Protection HHW & Conditionally Exempt SQG [5/5-7/99] [Management credit]	Florida Dept. of Environmental Protection	5	5	5	5	
106	Florida Dept. of Environmental Protection HHW & Conditionally Exempt SQG [5/6-8/98]	Florida Dept. of Environmental Protection	5	5	5	5	
173	Florida SWANA 2000 Summer Conference [8/10-11/00]	Solid Waste Association of North America SWANA -FL	6	6			

Continuing Education No.	COURSE TITLE	PROVIDER	I, II, III	C&D	Transfer	MRF	Spotter
207	Florida SWANA 2001Summer Conference	Solid Waste Association of North America SWANA-FL	5	5	5	5	1
162	Florida SWANA Spring Tri-State 2000 Conference [4/3-5/00]	Solid Waste Association of North America SWANA-FL	3				
155	Four Hour Spotter Orientation for Class I, II and III Supervisors	Kohl Consulting, Inc.	4	4	4	4	4
156	Four Hour Spotter Orientation for Class I, II, and III Landfills	Kohl Consulting, Inc.	4	4	4	4	4
119	Four Hour Spotter Training Refresher for C&D Sites	Kohl Consulting, Inc.	4	4	4	4	4
113	Full Cost Accounting for Municipal Solid Waste Management [2/17/98]	Terra Tech EM Inc	6				
120	Fundamentals of Operations for MRF Facilities Personnel	Kohl Consulting, Inc.	8			8	
154	Geosynthetics for Advanced Solutions [11/4/99]	GSE Lining Tech	6				
152	Groundwater Issues for Landfill Operators	University of Florida TREEO Center	6	6			
17	Groundwater Monitoring, Analysis and Data Interpretation	University of Florida TREEO Center	12	12			
76	Groundwater Monitoring, Requirements and Techniques for Landfills	Kohl Consulting, Inc.	2	2			
46	Groundwater Monitoring/Leachate Mgmt	Solid Waste Association of North America SWANA	8	8			
101	Hazard Communications Course	Escambia County Emergency Prep	4	4	4	4	4
85	Hazardous Material and Site Investigations	EnSafe	6	6	6	6	6
12	Hazardous Material Chemistry for Environmental Professionals	University of Florida TREEO Center	8	8	8	8	8
82	Hazardous Material Chemistry for Non-Chemist [1/18/95]	St. Petersburg Junior College	7				
131	Hazardous Material Recognition Awareness Level Refresher [3/1/96]	Citrus County	4				
81	Hazardous Material Transportation *[no longer offered]*	University of Florida TREEO Center	4				
50	Hazardous Materials Awareness Training [1/25/94]	Citrus County	8				
102	Hazardous Materials in Construction & Demolition Waste	University of Florida TREEO Center	4	4			
86	Hazardous Materials Incident Awareness Level Training [2/5/97]	Escambia County Emergency Prep	8	8	8	8	8
70	Hazardous Materials Management Conference [11/6-9/96]	International City & County Mgmt Associate	12				
98	Hazardous Materials Transportation Seminar	City Environmental Services, Inc of Florida	5	5	5		
34	Hazardous Waste & Emergency Response	Applied Associates International	8	8	8	8	8
53	Hazardous Waste Management for Government Employees [9/95, 10/95]	University of Florida TREEO Center	6				
60	Hazardous Waste Mgmt 40 CFR 261-265 [4/17/96]	Occupational Safety Training, Inc.	8				
99	Hazardous Waste Operations & Emergency Response	Sterling Fibers/ESP	3	3	3		
188	Hazardous Waste Operations Emergency Response Refresher	Orange Co. Environmental Protection Division	4	4	4	4	
63	Hazardous Waste Regulations for Generators	University of Florida TREEO Center	4	4	4	4	4
20	Hazardous Waste Training for Solid Waste Managers [7/16/93]	Solid Waste Association of North America SWANA-FL	5				
115	HazWoper Material Control & Emergency Response	Air Safe	8	8	8	8	4
94	Health & Safety at MSW Landfills	Solid Waste Association of North America SWANA	10	10			

Continuing Education							
No.	COURSE TITLE	PROVIDER	I, II, III	C&D	Transfer	MRF	Spotter
69	Health & Safety Training for Hazardous Materials: 40-Hour OSHA Compliance Course	University of Florida TREEO Center	8	8	8	8	
62	Health & Safety Training for Hazardous Materials: 8 hour OSHA Refresher	University of Florida TREEO Center	4	4	4	4	2
170	Health and Safety Issues for Solid Waste Management Facilities	Kohl Consulting, Inc.	8	8	8	8	4
149	Health and Safety Training for Landfill Operations	University of Florida TREEO Center	5	5	5	5	2
201	Hiring and Retaining Good Employees	University of Florida TREEO Center	2	2	2	2	
33	Household Hazardous Waste [6/30/94]	Care Environmental Corp.	4				
209	Hurricane Preparedness and Post Disaster Recovery Workshop	Dewberry & Davis LLC	8	8	8	8	8
19	Hydrogeology: Applications of Fundamental Concepts & Field Techniques to Florida Groundwater Investigations *[No longer offered]*	University of Florida TREEO Center	20	20			
11	Inspection Procedures for Agri-chemical Containers offered for Recycling *[No longer offered]*	Dept. of Agriculture & Consumer Services	1				
44	Inspection Procedures for Agri-chemical Containers offered for Recycling [Pesticide] *[No longer offered]*	Institute of Food & Agriculture Science [IFAS]	1				
129	Inspector's Handbook for Construction Projects	Hillsborough County Solid Waste	7				
151	Integrated Management Course: Hurricane Recovery and Mitigation	FEMA/EMI	7	7	7	7	
26	International Meeting SWANA [8/11-13/91]	Solid Waste Association of North America SWANA	20				
37	Introduction to Electrical Maintenance (Technical Credit) see #212	University of Florida TREEO Center	7				
212	Introduction to Electrical Maintenance	University of Florida TREEO Center	16	16	16	16	
14	Introduction to Groundwater: Contamination, Investigation, & Remediation Assessment	University of Florida TREEO Center	13	13			
27	Landfill Gas Management (SWANA Spring Seminar 1994) [3/4/94]	Solid Waste Association of North America SWANA	4				
124	Landfill Compaction Training School	Caterpillar & Ringhaver Equipment	5	5			
75	Landfill Compliance Inspections	Kohl Consulting, Inc.	2	2			2
157	Landfill Design and Construction [3/27-30/00]	University of Florida TREEO Center	28				
4	Landfill Design: Cell Design & Construction [3/9/92]	University of Florida TREEO Center	14.5				
6	Landfill Design: Closure & Long Term Care [5/19/92]	University of Florida TREEO Center	1				
2	Landfill Design: Conceptual Design Operations & Monitoring [1/12/92]	University of Florida TREEO Center	14.5				
5	Landfill Design: Leachate & Gas Management [3/11/92]	University of Florida TREEO Center	15				
3	Landfill Design: Liner Systems Materials Installation & Quality Assurance [2/11/92]	University of Florida TREEO Center	14				
1	Landfill Design: Planning & Permitting [1/21/92]	University of Florida TREEO Center	14				
179	Landfill Gas & Energy: Alternative Uses [9/25-27/00]	CDM, Inc.	8				
49	Landfill Gas & Leachate Systems	University of Florida TREEO Center / SCS Engineers	8	8			
172	Landfill Gas Collection and Control Systems [8/19-20/99]	CDM, Inc.	8				
83	Landfill Gas NSPS Workshop [7/15/96]	Florida Dept. of Environmental Protection	6				
67	Landfill Gas NSPS Workshop [7/9/96]	Solid Waste Association of North America SWANA -FL	4				

Continuing Education

No.	COURSE TITLE	PROVIDER	I, II, III	C&D	Transfer	MRF	Spotter
57	Landfill Gas System Design- A Practical Approach [6/14-15/94]	Landfill Control Technologies	8				
89	Landfill Gas: How to Profit From the New Mandates [6/17/97]	Florida Dept. of Environmental Protection	7				
194	Landfill Operating Issues for Class I, II, III And C&D Sites	Kohl Consulting, Inc.	8	8			8
111	Landfill Operations and Waste Screening for Class I, II & III Sites	Kohl Consulting, Inc.	8				8
58	Landfill Operator Education (Landfill Mining and Landfill Gas and Leachate Mgmt) [3/22/96]	Solid Waste Association of North America SWANA -FL	4				
168	Landfill Service School (Leachate Pumps and Controls School) [3/25-26/99]	EPG Companies	7	7			
74	Landfill Symposium 1st Annual [11/4-6/96]	Solid Waste Association of North America SWANA	18				
87	Landfill Symposium 2nd Annual [2/4-6/97]	Solid Waste Association of North America SWANA	18				
117	Landfill Symposium 3rd Annual [7/22-24/98]	Solid Waste Association of North America SWANA	16				
159	Landfill Symposium 4th Annual [6/28-30/99]	Solid Waste Association of North America SWANA	18				
211	Landfill Symposium 6th Annual [6/18-20/01]	Solid Waste Association of North America SWANA -FL	15	15			
118	Landfill Wildlife Training Course	Applied Technology & Management, Inc - ATM	4	4			
158	Leachate and Gas Management System Design [5/9-10/00]	University of Florida TREEO Center	12				
125	Management of Leachate, Gas, Stormwater and Odor at Class I Landfills	Kohl Consulting, Inc.	8	8			
160	Manager of Landfill Operations	University of Florida TREEO Center/Solid Waste Association of North America SWANA -FL	30				
30	Manager of Landfill Operations Training Course	Solid Waste Association of North America SWANA	30				
8	Managing Landfill Gas at MSW Landfills	Solid Waste Association of North America SWANA	10	10	10	10	10
95	Managing Landfill Gas at MSW Landfills	Solid Waste Association of North America SWANA	5	5			
109	Measurements and Calculations for Landfill Operators	Kohl Consulting, Inc.	5	5			
140	Meeting the Challenges of Environmental Liability with Case Studies in Solid Waste [6/16/99]	Solid Waste Association of North America SWANA -FL	4				
128	Methods of Erosion and Sedimentation Control for Construction Sites	University of Florida TREEO Center/Florida Dept. of Environmental Protection	6	6			
208	NPDES Phase II Inspector Certification Course	University of Florida - T2 Center	12	12	8	4	
180	NUCA Competent Person Training	Sarasota Co. Tech	8	8			
10	On Site Operations Personnel [11/91]	Solid Waste Association of North America SWANA -FL					
93	Operational Issues for Landfill Managers	Solid Waste Association of North America SWANA	17				
177	OSHA 40-hour Course	R. Cooey	8	8	8	8	
165	OSHA 8-Hour Hazwoper Annual Refresher [8/25/00]	University of North Florida Safety America	4	4	4	4	2
142	OSHA 8-Hour Refresher for Hazardous Waste Operations and Emergency Response	Florida Dept. of Environmental Protection/Jamson	4	4	4	4	2

Continuing Education			I, II, III	C&D	Transfer	MRF	Spotter
No.	**COURSE TITLE**	**PROVIDER**					
68	OSHA Update Seminar [8/7/96]	J.J. Keller & Associates, Inc.	6				
183	Overview of Class I Landfill Operations and Waste Screening	Kohl Consulting, Inc.	3	3			3
92	Overview of Solid Waste Management Technologies	Kohl Consulting, Inc.	3				
184	Overview of Transfer Stations and Waste Screening	Kohl Consulting, Inc.			3	3	3
15	Overview understanding the Planning & Training Requirements of Big 3:OSHA, EPA, DOT (Regulatory Overview) (Management Credit ONLY)	University of Florida TREEO Center	7				
178	Paying for your MSW Management Systems -Revenue Generation & Cost Accounting (Management Credit ONLY)	Solid Waste Association of North America	7				
192	Pedestrian, Vehicles and Equipment Safety at Transfer Stations	Kohl Consulting, Inc.			2	2	2
186	Pedestrian, Vehicles and Equipment: Operating Safely in the Landfill Environment	Kohl Consulting, Inc.	2	2			2
104	Permit Required Confined Space Training	University of Florida TREEO Center	7	7	7	7	
96	Personnel Law Up-date [12/11-12/96]	Council on Education in Management	5				
45	Principles of Managing IMSWM Systems [Certified Municipal Solid Waste Manager I]	Solid Waste Association of North America SWANA	24				
174	Principles of Managing Integrated Municiple Solid Waste Management Systems	Solid Waste Association of North America SWANA	7				
153	Pump Maintenance [4/13-14/00]	National Tech Transfer	7				
213	Pumps and Pumping	University of Florida TREEO Center	16	16	16	16	
38	Pumps and Pumping (Technical Credit) see #213	University of Florida TREEO Center	7				
90	Recycling Coordinator Training Course 1997 [5/19-21/97]	University of Florida TREEO Center	8	8			
137	Recycling Coordinator Training Course1999	University of Florida TREEO Center	8	8			
146	Recycling Disaster Debris [8/6/99]	University of Central Florida/Engineering	6	6	6	6	6
193	Safe Operating Issues for Transfer Stations	Kohl Consulting, Inc.			2	2	
123	School/University Advanced Recycler Training Course [10/20-21/98]	University of Florida TREEO Center	7	7			
7	Site Monitoring at Solid Waste Facilities	Solid Waste Association of North America SWANA -FL	10				
139	Solid Waste Facility Operations for Construction and Demolition Operators [No longer offered] (See #196)	Kohl Consulting, Inc.		20			
138	Solid Waste Facility Operations for Landfill Operators [No longer offered] (See *#196)*	Kohl Consulting, Inc.	20				
41	Solid Waste in Florida's Small Counties Workshop (Management Credit Only) [5/16/94]	Florida Counties Foundation & the Florida Institute of Government	4				
78	Solid Waste Landfill Design: Landfill Design and Construction [5/5-9/97]	University of Florida TREEO Center	28				
79	Solid Waste Landfill Design: Leachate and Gas Mgmt System Design	University of Florida TREEO Center	21				
77	Solid Waste Landfill Design: Planning and Permitting for Solid Waste Management [4/8-9/97]	University of Florida TREEO Center	16				
21	Solid Waste Landfill Operators Short School *[No longer offered]*	University of Florida TREEO Center/Solid Waste Association of North America SWANA -FL	20				
28	Solid Waste Landfills Correspondence Course (course # C240-A180)	University of Wisconsin	20	20			

No.	Continuing Education COURSE TITLE	PROVIDER	I, II, III	C&D	Transfer	MRF	Spotter
22	Solid Waste Management: Managing Special Waste [5/19/92]	University of Florida TREEO Center	6				
55	Solid Waste Regulatory Review Workshop [3/10/95]	Solid Waste Association of North America SWANA-FL	3				
150	Storm Water Management Training	S2Li	4				
202	Stormwater Inspector Certification Course	Sarasota Co. Tech	12	12	8	4	
39	Stormwater Management for Landfills *[No longer offered]*	University of Florida TREEO Center	8				
56	Successfully Contracting for Solid Waste Services [7/14/95]	Solid Waste Association of North America SWANA-FL	4				
61	Successfully Contracting Solid Waste Services	University of Florida TREEO Center / SCS Engineers	4				
189	SWANA - Florida 2001 Spring Conference [3/29-31/01]	Solid Waste Association of North America SWANA-FL	3	3			
133	SWANA 22nd Annual Landfill Gas Symposium [3/22-25/99]	Solid Waste Association of North America SWANA	15				
163	SWANA 23rd Annual Landfill Gas Symposium [3/22-30/00]	Solid Waste Association of North America SWANA	15				
190	SWANA 24th Annual Landfill Gas Symposium [3/19-23/01]	Solid Waste Association of North America SWANA	18				
141	SWANA-FL 1999 Summer Conference [8/3-5/99]	Solid Waste Association of North America SWANA-FL	4				
116	The Complete Ground-Water Monitoring Course	Nielson Environmental Field School, Inc.	16	16			
187	Traffic and Equipment Safety at Landfills	Kohl Consulting, Inc.	2	2			2
121	Training for Personnel at C&D Materials Recovery Facilities	Kohl Consulting, Inc.	8			8	
147	Training for Spotters at Landfills, C&D Sites and Transfer Stations	JEA, Inc.	8	8	8	8	8
132	Training Sanitary Landfill Operating Personnel	Solid Waste Association of North America SWANA	5				
13	Train-The-Trainer for Environmental Occupations (Management Credit ONLY)	University of Florida TREEO Center	7				
42	Transfer Station Design & Operations	Solid Waste Association of North America SWANA			16		
112	US DOT Hazardous Material / Waste Transportation	University of Florida TREEO Center	6	6	6	6	
23	Utility Management Certification: Financial Management (Management Credit ONLY) [No longer offered]	University of Florida TREEO Center	7				
24	Utility Management Certification: Management & Supervision (Management Credit ONLY) [No longer offered]	University of Florida TREEO Center	7				
25	Utility Management Certification: Personnel Management (Management Credit ONLY) [No longer offered]	University of Florida TREEO Center	7				
126	Waste Acceptability for Spotters, Equipment Operators and Scale House Personnel	Kohl Consulting, Inc.	2	2	2	2	2
191	Waste Con 2000 [10/23-26/00]	Solid Waste Association of North America SWANA	13		13		
210	Waste Control and Spotter Safety Awareness	Kohl Consulting, Inc.	2	2	2	2	2
31	Waste Management of North America (Landfill University) *(no longer offered)*	Landfill University	20				
36	Waste Screening & Identification For Landfill Operators and Spotters	University of Florida TREEO Center / SCS Engineers	8	8	8	8	8

Continuing Education

No.	COURSE TITLE	PROVIDER	I, II, III	C&D	Transfer	MRF	Spotter
122	Waste Screening and Operation Orientation for Transfer Station Personnel	Kohl Consulting, Inc.	8		8		
9	Waste Screening at MSW Mgmt Facilities [On-site Delivery]	Solid Waste Association of North America SWANA	10	10	10	10	10
51	Waste Screening at Municipal Solid Waste [5/23/94]	Solid Waste Association of North America SWANA -FL	6				
164	Waste Tech 2000 [3/5-8/00]	Waste Tech	7				
185	Weighmaster Orientation and Waste Screening Review	Kohl Consulting, Inc.	2	2	2	2	2
73	Wet Weather Operations	Kohl Consulting, Inc.	4	4			
65	What Can I Accept & How Do I Keep It From Blowing Around	Kohl Consulting, Inc.	2				
64	When it Rains, It Pours (And We Stay Open)	Kohl Consulting, Inc	2	2			

APPENDIX B
WASTE INSPECTION PLAN

INTRODUCTION

This plan specifically addresses the inspection of routine, Class I waste loads for the exclusion of hazardous or otherwise unauthorized materials. The procedures in this text are intended to apply to routine Class I waste loads until a suspected hazardous or otherwise unauthorized waste is identified.

WASTE INSPECTION PROCEDURES

Upon arrival at the landfill property, each and every load of waste is stopped at the scale house to be logged in and weighed by the scale master. Waste arriving outside of the landfill's operating hours will be turned away by a locked gate. The site is accessible only by the main gate.

Once logged in and weighed by the scale master, the truck drivers are asked to confirm that they are hauling routine Class I waste. If the driver identifies the load as routine Class I waste, then one of the following procedures are implemented:

A) Open Topped Municipal Waste Haulers

If a truck is verbally identified to the landfill employees as hauling Class I waste, the truck contents are visually inspected to confirm that the load appears to contain exclusively Class I waste. This inspection is usually performed by looking down from on top into the open topped load, once the truck is un-tarped, by means of an elevated platform or "gantry" located adjacent to the scales. The presence of very noticeable or suspicious odors may trigger further analysis.

If the waste appears to be acceptable **(i.e., does not contain visible quantities of anything other than routine Class I waste)**, then the truck is directed to the landfill active work face where it is visually inspected again by the spotter as it is unloaded and before it is spread and compacted. Any load discovered to contain potentially hazardous or otherwise unauthorized waste at this point is completely reloaded back into the waste truck and removed from the site. The rejected waste will not be authorized to re-enter the landfill site.

B) Class I Waste in Closed Containers

If a truck is verbally identified to the landfill employees as hauling Class I waste, but is not visually accessible for inspection at the gantry, the truck is forwarded to the active face of the landfill where its contents are inspected by the spotter as it is unloaded and before it is compacted or disposed. The inspection procedure at the active work face is identical to that described in the previous section. Any load discovered to contain potentially hazardous or otherwise unauthorized waste at this point is completely reloaded back into the truck and removed from the site. The rejected waste will not be authorized to re-enter the landfill site.

RANDOM WASTE LOAD EXAMINATION

The Landfill Site Manager will examine at least three random loads of waste each week. The waste trucks selected for examination will be directed to the active face where the load can be visually examined upon unloading. Information and observations resulting from each random inspection shall be recorded in writing and retained at the landfill for at least three years. The recorded information, signed by the inspector, will include, at a minimum:

- the date and time of the inspection;
- the names of the hauling firm and the driver of the vehicle;
- the vehicle license plate number;
- the source of the waste as stated by the driver; and
- observations made by the inspector during the examination.

HANDLING HAZARDOUS WASTE

If any suspect wastes or wastes which could potentially be regulated hazardous wastes are identified by random load checking, or are otherwise discovered to be improperly deposited at the landfill, the Landfill Site Manager shall promptly notify the FDEP, the person responsible for shipping the wastes to the landfill, and the generator of the wastes, if known. The area where the wastes are deposited shall immediately be cordoned off from public access. If the generator or hauler cannot be identified, the Landfill Site Manager will assure the cleanup, transportation, and disposal of the waste at a permitted hazardous waste management facility.

HAZARDOUS WASTE TRAINING

The Landfill Site Manager, and all other staff who may be required to perform a waste inspection, will receive training in hazardous waste identification, as well as an evaluation of their knowledge and ability to effectively screen incoming waste according to this "Waste Inspection Plan".

All new landfill employees will be teamed up with experienced personnel for at least one week upon commencement of work as an inspector in order to receive immediate on-the-job training.

NOTIFICATION OF UNACCEPTABLE WASTE LOADS

The rejection of waste, pursuant to this plan, will be recorded in writing and filed on site for a period of one year. The pertinent information concerning the rejection, such as truck license number, assumed contents, volume, and other relevant data, will be recorded on a LOAD REJECTION FORM. The Landfill Site Manager will contact the generator, hauler, or other party responsible for shipping the waste to the landfill to determine the identify of the waste sources. The appropriate local officials will be notified by phone when the waste load is asked to leave the site and all pertinent information made available to them upon their request.

APPENDIX C

EMERGENCY RESPONSE AGENCIES

EMERGENCY RESPONSE COORDINATOR(S)

(Landfill Site Manager will be responsible at the Landfill. Below are names of contacts.

1)	Tim Salopek 1580 Anorada Blvd. Kissimmee, Florida 34744	(407) 957 – 7284 (321) 624 – 9114 (407) 944 – 4702	(Office) (Mobile) (Home)
2)	Sharon Stanfill 1624 Christa Ct. St. Cloud, Florida 34772	(407) 957 – 7284 (321) 624 – 9116 (407) 957 – 6669	(Office) (Mobile) (Home)
3)	Ben Ebert 1700 Citrusview Ct. St. Cloud, Florida 34769	(407) 957 – 7284 (321) 624 – 9120 (407) 892 – 6293	(Office) (Mobile) (Home)

Prepared for

Omni Waste

of Osceola County, LLC
100 Church Street
Kissimmee, FL 34741

OPERATION PLAN

OAK HAMMOCK DISPOSAL LANDFILL

Prepared by

GeoSyntec Consultants
14055 Riveredge Drive, Suite 300
Tampa, FL 33637
(813) 558 - 0990

Project Number FW0400

May 2002

24 May 2002

EMERGENCY RESPONSE TELEPHONE NUMBERS

Fire Department 911
(407) 343 – 7000 Non-Emergency

Sheriff's Office 911
(407) 348 – 2222 Non-Emergency

Rescue Squad 911
(407) 343 – 7000 Non-Emergency

Hospital (Florida Hospital) .... (407) 846 – 4343

County Manager .... (407) 343 – 2380

Florida "Hot Line" .... (904) 488-1320

TABLE OF CONTENTS
TECHNICAL SPECIFICATIONS
OAK HAMMOCK DISPOSAL

APRIL 2002

24 May 2002

SECTION 02100

SURVEYING

PART 1 GENERAL

1.01 SCOPE

A. This section describes the requirements for surveying during construction and the production of "as-built" documents.

1.02 RELATED SECTIONS AND PLANS

A. Section 02200 - Earthwork

B. Section 02215 - Trenching and Backfilling

C. Section 02225 - Low-Permeability Soil

D. Section 02230 - Road Construction

E. Section 02235 - Granular Drainage Materials

F. Section 02240 - Protective Soil Layers

G. Section 02250 - Gas Collection Soil Layer

H. Section 02615 - Drainage Swales, Structures and Downchutes

I. Section 02620 - Culverts

J. Section 02715 - HDPE Pipe & Fittings

K. Section 02770 - HDPE Geomembrane

L. Section 02920 - Vegetative Soil Layer

M. Construction Quality Assurance (CQA) Plan.

1.03 REFERENCES

A. National Geodetic Survey Standards.

1.04 SUBMITTALS

A. An aerial survey of the Oak Hammock Disposal facility (OHD) site shall be performed within 15 calendar days from Notice to Proceed and submitted to the Engineer within 60 days from Notice to Proceed. Submittal shall include:

1. 2 copies of blueline drawings at a scale of 1 in = 100 ft.
2. 2 copies of blueline drawings at a scale of 1 in = 50 ft.
3. Mylar reproducible copies of drawings at both 1 in = 100 ft scale and 1 in = 50 ft scale
4. Two color photographs at a scale of 1 in = 100 ft.
5. Digital files of both 1 in = 100 ft and 1 in = 50 ft scale drawings.

B. An aerial survey of the OHD site having a maximum 2-foot contour interval, and consisting of documents described in Para. 1.04 A. of this Section, shall be performed within 15 calendar days of acceptance by the Engineer of the Contractor's notice of substantial completion of each phase of construction and shall be submitted to Engineer within 60 days of acceptance by the Engineer of contractor's notice of substantial completion of each phase of construction.

C. Interim surveys for measurement and payment shall be submitted to the Engineer with each payment request.

D. Submit survey notes during construction as requested by the Engineer

1.05 PROJECT RECORD DOCUMENTS

A. Contractor shall maintain on-site, a complete, accurate survey log documenting survey work as it progresses.

B. Contractor shall maintain on-site, a plan clearly showing all site reference points, survey control points, and benchmarks.

C. Contractor shall maintain on-site an accurate and current set of marked-up drawings showing "as-built" conditions.

D. As-built surveys, stamped and signed, by a State of Florida Licensed/Registered Land Surveyor or Professional Engineer shall be submitted immediately following the completion of any applicable construction element. Complete as-built surveys shall be submitted upon substantial completion of each phase of construction and are a prerequisite for Phase close-out.

E. Upon completion of each work item, prepare and/or update "as-built" drawings.

PART 2 PRODUCTS

2.01 MATERIALS AND SURVEY EQUIPMENT

A. Provide materials and survey equipment as required to properly perform the surveys, including, but not limited to, instruments, tapes, rods, measures, mounts, and tripods, stakes and hubs, nails, ribbons, other reference markers, and all else as required.

B. The survey instruments used for this work shall be precise and accurate to meet the needs of the projects. All survey instruments should be capable of reading to a precision of 0.001 ft and with a setting accuracy of ± 0.8 seconds.

PART 3 EXECUTION

3.01 GENERAL

A. Maintain accurate and complete notes of surveys:

1. Handwritten survey notes and information shall be written with lead pencil(s) and entered in "write in rain" notebooks. A copy of the numbered, dated, and signed

field book pages shall be provided to the Engineer as requested for use in checking the work.

2. Electronic field survey information shall be collected and backup equipment shall be available in the event of equipment malfunction.
   a. Electronic format for printed output of data collector field survey notes shall be compatible with the approved fieldbook notation format.
   b. Electronic format for printed output of data collector field work shall be compatible with the Contractor's and Engineer's computer equipment and software for verifying and checking the work. A copy of the data disk shall be submitted to the Engineer as requested.

B. During construction, survey notes shall be retained by the Contractor. During construction, the Contractor and/or Surveyor shall submit surveys to the Engineer for review. Prior to the placement of successive soil or geosynthetic layers the Contractor shall submit a written statement certifying compliance of the preceding layer thickness and grades to the Engineer. Surveys will be required from the Contractor prior to approval by the Engineer for the placement of overlying materials.

C. Conformance check surveys for elevation and for horizontal coordinates shall be to the nearest 0.01 ft. and for angles shall be to the nearest 20 seconds.

D. Measurement and payment surveys for elevation and for horizontal distances shall be to the nearest 0.1 ft. ± 0.05 ft.

E. Perform construction layout surveys in advance of scheduled construction activities. At completion of a survey, provide a copy of the field notes, drawings, or sketches to the Engineer for review. The Contractor shall allow the CQA Consultant and/or Engineer three calendar days for review. The Contractor is responsible for rework and/or construction delays caused by survey or staking errors.

F. Set slope stakes in accordance with accepted surveying practices.

G. Set grade stakes required for construction activities as the work progresses. Set fine grade stakes on all items for which the plans show a definite grade line.

C. Preliminary Surveys:
1. Earthwork Staking: Staking for cut and fill limits shall establish the exterior limits of excavations and embankments. The maximum staking interval shall be 50 feet. Stakes shall be prominently noted with description of point, vertical distance to design elevation, and offset distance as applicable.
2. Structures: Stake structure centerlines so that the orientation, position, limits, and foundation elevation(s) are positively identified. Mark stakes to reflect the design elevation and offset distance as applicable.
3. Ditches and Channels: Stake ditches and channels such that the layout remains undisturbed during construction.
4. Pipes and Culverts: Stake pipes and culverts on 50-ft maximum stationing. Place offset stakes beyond excavation limits and material stockpiles. Continuously check invert elevation during placement.

D. Final Surveys:
1. Final topography shall be staked at nominal 50-foot intervals. Additionally, the following points shall be staked and noted as applicable.
   a. Grade breaks.
   b. Mid-point of slopes less than 50 ft.
   c. Points of horizontal curvature and tangency.
   d. Points of stationing equation.
2. Pipes and culverts: Survey alignment and elevations at 50-ft maximum stations.

3.03 SURVEYS FOR MEASUREMENT AND PAYMENT

A. Perform surveys to determine quantities of work and percent of completed work.

B. Calculate and certify quantities and submit survey results, calculations, and certification to the Engineer for review and evaluation.

3.04 SURVEYS FOR CONFORMANCE CHECKS AND "AS-BUILT" DOCUMENTS

A. Survey the following surfaces to verify the lines and grades achieved during construction:
1. for berms, ditches, drainage swales, roads, and other earthwork:
   a. original grade surface;
   b. compacted surface of cut slopes; and

c. finished grade surface;

2. for the composite liner system:
   a. prepared subgrade;
   b. top of compacted foundation;
   c. low-permeability soil layer;
   d. geomembrane seams and panels; and
   e. top of liner protective layer;
3. for the final cover system:
   a. prepared waste surface;
   b. finished intermediate cover, general fill, and gas collection layer;
   c. geomembrane seams and panels;
   d. top surface of cover protective layer; and
   e. finished grade surface of vegetative layer.

B. Perform earthwork conformance checks and "as-built" surveying immediately upon completion of a given installation to facilitate progress and avoid delaying commencement of the next installation. Provide the following minimum spacing and locations for survey points:
   1. surfaces with gradients less than 10 percent, survey on a square grid spaced not wider than 50 ft.;
   2. on slopes greater than 10 percent, a square grid spaced not wider than 50 ft. shall be used, but in any case, a line at the crest, midpoint, and toe of the slope shall be taken;
   3. a line of survey points spaced not more than 50 ft. apart shall be taken along any slope break (this will include the inside edge and outside edge of any bench on a slope); and
   4. a line of survey points spaced not more than 50 ft. apart shall be taken at the top of any pipes or other appurtenances.

[END OF SECTION]

SECTION 02110

CLEARING, GRUBBING, AND STRIPPING

PART 1 – GENERAL

1.01 SCOPE

A. This section describes the requirements for clearing, grubbing, and stripping activities. The work shall include, but not be limited to:
   1. clearing and grubbing the landfill footprint area and vegetated surfaces within the proposed borrow source areas;
   2. stripping vegetation from the landfill footprint and borrow area;
   3. stabilizing any surface soil stockpiles at the site.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 – Surveying

B. Section 02200 – Earthwork

C. Section 02290 – Erosion and Sediment Control

D. Section 02920 – Vegetative Soil Layer

E. Section 02930 – Vegetation

F. Construction Quality Assurance (CQA) Plan

1.03 COMPLIANCE WITH REGULATIONS

A. It is the sole responsibility of the Contractor to be completely familiar with and to follow all local, state, and federal regulations pertaining to the work required in this section.

1.04 CONSTRUCTION QUALITY ASSURANCE

A. Clearing, grubbing, and stripping operations shall be monitored by the CQA Consultant as outlined in the CQA Plan.

B. The Contractor shall be aware of the activities set forth in the CQA Plan and shall account for these activities in the construction schedule.

C. The Contractor shall assist CQA personnel in every manner necessary for the proper performance of activities set forth in the CQA Plan.

D. CQA testing or inspections in no manner relieves the Contractor of the responsibility to perform all work in conformance with to the Construction Drawings and Technical Specifications.

E. If quality control or quality assurance tests indicate Work does not meet specified requirements, the Contractor shall remove Work, replace and retest at no additional cost to the Owner.

1.05 EXISTING CONDITIONS

A. The Contractor shall comply with applicable regulations in locating and providing clearance for all underground and above ground utilities prior to beginning construction activities. The Contractor shall immediately notify the Owner and the Engineer if utility lines or structures not shown on the Construction Drawings, are encountered. Repair of damage and all restitution for liabilities resulting from damage to existing facilities due to activities by the Contractor shall be at the Contractor's expense.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Materials to be cleared include trees, shrubs, and any debris or other foreign matter, as needed to develop work areas and prepare the landfill footprint area.

B. Seed, mulch and other soil amendments shall be as specified in Section 02920 and Section 02930.

PART 3 – EXECUTION

3.01 FAMILIARIZATION

A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with the site, the site conditions, and all portions of the work falling within this Section.

B. Inspection:
   1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the work of this Section may properly commence without adverse impact.
   2. If the Contractor has any concerns regarding the installed work of other Sections, he shall notify the Engineer in writing prior to the commencement of operations. Failure to notify the Engineer will be construed as Contractor acceptance of the related work of all other Sections.

3.02 EROSION AND SEDIMENT CONTROL

A. Prior to implementing any of the work described in this Section, the Contractor shall install all erosion and sediment controls in the relevant area(s) of construction.

B. Contractor is solely responsible for selecting, implementing and maintaining proper and fully adequate erosion and sediment controls at all times during construction.

3.03 CLEARING AND GRUBBING

A. Clearing and grubbing shall be performed in areas identified on the Construction Drawings or as directed by the Engineer. All erosion and sedimentation controls shall be in place before the start of clearing, as described in Section 02290 of these specifications or as indicated on the Construction Drawings.

B. If weather conditions are unsuitable for clearing and grubbing, as determined by the Engineer, the Contractor shall cease operations until permission to resume operations is obtained from the Engineer.

C. The Contractor shall clear all areas required for access to the site and execution of work. Clearing shall consist of removing trees, undergrowth, and deadwood. Clearing activities shall be performed in a manner so as to minimize disturbance.

D. Grubbing shall consist of the removal of stumps, roots, and surficial debris from the borrow areas as shown of the Construction Drawings. Clearing and grubbing for access roads shall also be the responsibility of the Contractor.

E. All cleared and grubbed material shall be reduced to mulch and stockpiled as directed by the Owner.

3.04 STRIPPING

A. Equipment and methods of operation shall be selected by the Contractor with the intent of minimizing disturbance to surrounding areas.

B. If soil or weather conditions are unsuitable for soil and vegetation stripping, as determined by the Engineer, the Contractor shall cease stripping activities until permission to resume stripping activities is obtained from the Engineer.

C. All stripped material shall be stockpiled in the areas indicated on the Construction Drawings or as directed by the Owner.

D. Stockpiled material shall be sloped and grassed as indicated on the Construction Drawings, required in the Specifications, or as directed by the Engineer.

3.05 SURVEYING AND CONSTRUCTION TOLERANCES

A. The Contractor shall retain a Surveyor who shall be responsible for providing survey control of the Work. All surveying shall be performed in accordance with Section 02100 of these Specifications.

3.06 PROTECTION OF WORK

A. The Contractor shall use all means necessary to protect all prior work, including all materials and completed work of other Sections.

B. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary, to the approval of the Engineer and at no additional cost to the Owner.

[END OF SECTION]

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 SCOPE

A. This section includes site preparation, excavation, surface water control, excavation dewatering, stockpiling, compacted fill, subgrade preparation, and earthwork materials.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 – Surveying

B. Section 02110 – Clearing, Grubbing, and Stripping

C. Section 02215 – Trenching and Backfilling

D. Section 02225 – Low-Permeability Soil Layer

E. Section 02230 – Road Construction

F. Section 02240 – Protective Soil Layers

G. Section 02290 – Erosion and Sediment Control

H. Section 02920 – Vegetative Soil Layer

I. Section 02930 – Vegetation

J. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Society of Testing and Materials (ASTM) Standards.
   1. ASTM D 698. Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 5.5-lb (2.49-kg) Rammer and

12-in. (305-mm) Drop.

2. ASTM D 2487 Standard Test Method for Classification of soils for Engineering Purposes.

1.04 SUBMITTALS

A. Within 15 calendar days from Notice to Proceed, submit to the Construction Manager for review an Earthwork Work Plan. The Earthwork Work Plan shall include, at a minimum:
   1. list of equipment proposed for the construction activities including earthwork and for scope of work specified in Sections 02215, 02225, 02230, 02235, 02240, 02245, 02615, 02620, and 02920;
   2. construction methods for each construction activity;
   3. dewatering methods and techniques;
   4. coordination of survey requirements for the earthwork;
   5. proposed locations of temporary soil stockpile areas;
   6. coordination of earthwork activities with surface water management and erosion and sediment control measures;
   7. schedule for earthwork activities; and
   8. dust control measures.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The earthwork will be monitored and tested by the CQA Consultant as required in the CQA Plan.

B. The CQA Consultant will perform soil conformance testing on general fill to establish compliance with this Section. Provide equipment and labor to assist the CQA Consultant in obtaining conformance samples from excavations, stockpiles, and borrow areas.

C. The CQA Consultant will perform soil performance testing on the subgrade surface and general fill lifts to evaluate compliance with this Section. The CQA Consultant will indicate any portion of the earthwork that does not meet the requirements of this Section and will delineate the extent of the nonconforming area.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

E. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for these activities in the construction schedule.

1.06 EXISTING CONDITIONS

A. Existing site surface and subsurface conditions, based on available site data, are indicated on the Construction Drawings.

B. Contractor shall verify existing conditions as indicated in Section 02100.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Obtain material for general fill from the on-site borrow sources indicated on the Construction Drawings.

B. General fill material shall be free of debris, foreign objects, large rock fragments, organics, and other deleterious materials. General fill material shall classify as SW, SP, or SM according to the Unified Soil Classification System (per ASTM D 2487). General fill material having the indicated classification is expected to be available from on-site borrow sources. Soils having other classifications are acceptable as general fill, if approved by the Engineer.

C. General fill material used as prepared subgrade under the liner system of the landfill and leachate storage facility shall be free of sharp materials or any materials larger than one-half inch.

2.02 EQUIPMENT

A. Furnish compaction equipment to achieve the required minimum soil dry density within the range of acceptable moisture contents.

B. Furnish hand compaction equipment, such as a walk-behind compactor, hand tampers, or vibratory plate compactor, for compaction in areas inaccessible to large compaction equipment.

C. Furnish water trucks, pressure distributors, or other equipment designed to apply water uniformly and in controlled quantities to variable surface widths for required in-place moisture adjustment, to prevent drying of soil surfaces, and for dust control.

D. Furnish equipment such as excavators, scrapers, compactors, loaders, dozers, earth hauling equipment and all other equipment, as required for earthwork construction.

PART 3 EXECUTION

3.01 GENERAL

A. All general fill material to be compacted shall be at a moisture content that will readily facilitate effective compaction.

3.02 SITE PREPARATION

A. Install construction fence and barricades around open trenches and excavated areas.

B. Install erosion and sediment controls in relevant areas of construction as indicated on the Construction Drawings and as required by Section 02290. Maintain the erosion and sediment controls for the duration of the Contract and until the contained areas are vegetated in accordance with Section 02930. Accumulated sediment behind silt fences and from drainage swales and structures shall be removed as required or as directed by the Engineer.

C. Prior to any earthwork activity, perform clearing, grubbing and stripping as indicated on the Construction Drawings and in accordance with Section 02110.

D. Construct haul roads and access corridors in accordance with the Construction Drawings and Section 02230.

3.03 SURAFCE WATER CONTROL

A. Installation of surface water and erosion controls shall be in accordance with approved Surface Water Management and Erosion Control Plan as specified in Section 02290.

B. Install surface water and erosion controls in and around work areas to control runoff and erosion and to prevent surface water runon into excavations. Perimeter controls may include shallow ditches, berms, or localized regrading.

3.04 EXCAVATION

A. Excavate designated areas to the subgrade elevations or excavation limits indicated on the Construction Drawings. Stockpile excavated material in areas designated by the Construction Manager for use in subsequent construction.

3.05 EXCAVATION DEWATERING

A. Anticipate seepage of groundwater into, and accumulation of surface water runoff in excavations. Manage groundwater and surface water in excavations in accordance with this section.

B. Prevent surface water runon from adjacent areas from entering the excavation.

C. All fill operations, except hydraulic filling, shall be performed in the dry. Contractor shall expect that groundwater is near the existing ground surface and shall be prepared to lower the groundwater in local areas as required to construct sumps and drainage structures.

3.06 STOCKPILING

A. Separate stockpiles by material type.

B. Stockpile excavated soils at the areas indicated on the Construction Drawings or as designated by the Construction Manager.

C. Construct stockpiles no steeper than 3H:1V (horizontal:vertical), grade to drain, seal by tracking perpendicular to the slope contours with a dozer, and dress daily during periods when fill is taken from the stockpile.

D. Silt fence or berms shall be constructed at the base of stockpiles that will not be immediately used.

E. Restore all areas used for stockpiling when stockpiles are removed.

3.07 SUBGRADE PREPARATION

A. Subgrade material shall consist of soil free of debris, foreign objects, organics and other deleterious materials.

B. Compact all subgrade within the limits of landfill cells to a minimum 95 percent of the Standard Proctor (ASTM D698) maximum dry density at a moisture content approved by the Engineer.

C. Perform subgrade proof rolling by driving a loaded dump truck (minimum weight of 10 tons per axle and minimum loaded weight of 20 tons) or other pneumatic-tired vehicle, back and forth across the area to confirm the firmness of subgrade surface. Overlap the passes such that one set of tires on each pass runs between the two sets of tire tracks from the previous pass. Soils shall not exhibit pumping or develop ruts more than two inches in depth. Minor rutting, defined as less than two inches in depth, shall be regarded or covered with general fill to match finish grade.

D. Subgrade for general fill shall be scarified to a depth of 2 inches using equipment identified in this section.

E. Unsuitable soils shall be removed and replaced with general fill to a minimum depth of 2 feet below the proposed subgrade elevation. Suitable soil exhibiting pumping or developing ruts more than two inches in depth will be removed to a minimum depth of 1 foot or dried in place, if feasible. Compact the general fill material to a minimum 95 percent of standard Proctor (ASTM D 698) maximum dry density at a moisture content approved by the Engineer. Compact the uppermost lift of general fill beneath road alignments to 100 percent of the standard Proctor maximum dry density.

F. In excavations or other areas where water accumulates, implement measures to remove the water in accordance with this section. Maintain the subgrade surface free of standing water and in firm condition to meet proof rolling requirements of this section. Maintain dewatered areas until overlying construction is complete.

G. Manage surface water as described in Section 02290.

3.08 GENERAL FILL

A. Use fill that meets the requirements of this section. Place fill to the limits and grades shown on the Construction Drawings.

B. Place general fill material on surfaces that are free of debris, vegetation, or other deleterious material.

C. Place general fill material in loose lifts with a thickness of 8 inches ± 1 inch. In areas where compaction is to be performed using hand operated equipment, place the fill material in loose lifts with a loose thickness of 4 inches ± 1 inch.

D. Prior to placing a succeeding lift of material over a previously compacted lift, thoroughly scarify the previous lift to a depth of 2 inches by discing, raking, or tracking with a dozer. Moisture condition the preceding lift if not within the acceptable moisture range.

E. The trafficking of scarified surfaces by trucks or other equipment, except compaction equipment, is not permitted.

F. Except as specified in this section, compact general fill in each lift to at least 95 percent of its standard Proctor maximum dry density (ASTM D 698). Compact general fill at moisture content as required to attain the specified density or as approved by the Engineer.

G. Do not place fill during periods of precipitation. Placement may occur during periods of misting or drizzle, but only as authorized by the Construction Manager.

H. Dust shall be controlled by the application of water to the general fill surfaces.

3.09 SURVEY CONTROL

A. Survey limits and elevations of excavations, subgrade, and top of general fill in accordance with Section 02100.

B.

3.10 TOLERANCES

A. Perform the earthwork construction related to the composite liner system and roads to within ±0.1 ft. of the elevations and within 10 percent of the slopes shown or indicated on the Construction Drawings.

B. Perform the earthwork construction related to the final cover system to within ±0.3 ft. of the elevations and within 10 percent of the slopes indicated or shown on the Construction Drawings.

C. Positively draining slopes shall be maintained in all cases.

[END OF SECTION]

SECTION 02215

TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SCOPE

A. This section includes trenching, bedding and backfilling materials, and placement.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 - Surveying

B. Section 02200 - Earthwork

C. Section 02615 - Drainage Swales, Structures, and Downchutes

D. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) Standards:
   1. ASTM C 136. Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   2. ASTM D 698. Standard Test Method for Moisture-Density Relations of Soils and Soil-Aggregate Mixture using a 5.5 Pound Rammer and a 12-inch Drop.
   3. ASTM D 2487. Standard Test Method for Classification of Soils for Engineering Purposes.

B. Standard Specifications, Construction and Materials, Office of Engineering, Florida Department of Transportation, 2001 Edition (FDOT Specifications).

C. Latest version of Occupational Safety and Health Administration (OSHA) Construction Standards.

1.04 SUBMITTALS

A. Submit the following to the Engineer with the Earthwork Work Plan or for review no less than 15 calendar days prior to use:
   1. a list of equipment for trenching and backfilling;
   2. for each source of embedment fill material, submit:
      a. the source of the embedment fill;
      b. the results of tests conducted on embedment fill samples in accordance with ASTM C 136 and ASTM D 2487; and
      c. a 50-pound representative sample of the embedment fill.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The trenching and backfilling will be monitored by the CQA Consultant as required in the CQA Plan.

B. The CQA Consultant will perform material conformance testing and installation quality control testing of the embedment and backfill materials.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for these activities in the construction schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

1.06 EXISTING CONDITIONS

A. In advance of trenching in an area, verify the accuracy of existing conditions shown on the Construction Drawings. Immediately notify the Engineer in writing of deviations from the existing conditions indicated on the Construction Drawings.

B. The approximate locations of all known underground and above ground utilities and structures are indicated on the Construction Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Furnish embedment fill material for culverts and drainage structures meeting the requirements of the FDOT Specifications unless otherwise indicated on the Construction Drawings.

B. Furnish trench backfill material for culverts and drainage structures that meets the material requirements for general fill as specified in Section 02200.

C. Furnish trench backfill material for anchor trenches meeting the requirements for general fill as specified in Section 02220.

2.02 EQUIPMENT

A. Furnish, operate, and maintain all equipment necessary to perform the work of this Section.

PART 3 EXECUTION

3.01 GENERAL

A. In areas of trenching and backfilling, maintain and protect existing above and below ground systems.

B. Do not damage or disturb above and below grade systems that are to remain.

3.02 TRENCHING

A. Trench soils for placement of pipes, culverts, drainage structures, and anchor trenches to the depths and minimum dimensions indicated on the Construction Drawings. Where required, fill material shall be placed and compacted to an elevation a minimum of 2 feet above pipes and culverts prior to trenching.

B. Use sheeting and bracing where and whenever necessary to maintain the safety and stability of all slopes and trenches and to protect adjacent structures. Satisfy all applicable local, state, and federal requirements for slope and trench sheeting and bracing, including requirements of the Occupational Safety and Health Administration (OSHA) Construction Standards. Provide required sheeting and bracing materials on site prior to the start of trenching. Adjust spacing and arrangement of sheeting and bracing as required by conditions encountered. Remove sheeting and bracing as backfill progresses. Fill any voids left from sheeting or bracing withdrawal with general fill or other approved material.

C. Protect and maintain the trench bottom. Remove rock fragments or raveled materials that collect on the trench bottom. Backfill excess excavation with embedment fill. Excavate any soft subgrade encountered at the trench bottom and backfill to subgrade elevation with embedment fill or general fill.

D. Dewater trenches (including anchor trenches during geosynthetics installation) and drainage structure excavations. Perform dewatering in accordance with Section 02200.

E. Stockpile excess material from trenching in accordance with Section 02200.

3.03 BACKFILLING

A. General:
1. do not backfill with saturated material;
2. do not backfill over wet or soft subgrade;
3. do not disturb or damage culverts, geosynthetics, or drainage structures in trenches and excavations during backfilling; and
4. do not use heavy compaction equipment which exerts greater than 5 pounds per square inch ground pressure over piping or geosynthetics that is covered by less than 12 inches of backfill material.

B. Placement of embedment fill for pipes, culverts, and drainage structures:
   1. Place embedment fill in 7-inch ±1-inch thick loose lifts to the elevation of the bottom of the pipe, culvert, or drainage structure.
   2. Compact embedment fill with a minimum of 4 passes of a vibratory plate compactor prior to placing pipe or culvert.
   3. Place pipe, culvert, or drainage structure on top of the compacted embedment fill.
   4. For pipes or culverts 12 inches in diameter or less, place additional pipe embedment fill on the sides and hand tamp the fill around the sides as needed to insure that intimate contact between the pipe or culvert and the embedment fill is maintained below the spring line. Continue placing embedment fill until it is even with the top of the pipe or culvert. Compact the embedment fill with a minimum of 4 passes of a vibratory plate compactor. Do not compact on top of the pipe or culvert unless a minimum of 12 inches of trench backfill separates the compactor from the top of the pipe or culvert.
   5. For pipes or culverts greater than 12 inches in diameter, place embedment fill in 7-inch ±1-inch thick loose lifts to the limits shown on the Construction Drawings. Compact each lift with a minimum of 4 passes of a vibratory plate compactor.

C. Placement of backfill material for pipes, culverts, and drainage structures:
   1. After placement and compaction of embedment fill, place the first lift of backfill material in a 12-inch loose lift. Place subsequent lifts of trench backfill material in 8-inch ±1-inch loose lifts.
   2. Compact each lift to 95 percent of the maximum standard Proctor dry unit weight and at a moisture content generally within ±3 percent of the optimum moisture content as determined by ASTM D 698.

D. Trench backfill material for anchor trenches:
   1. Place the anchor trench backfill material in 8-inch thick (±1 inch) loose lifts, if mechanized compaction equipment will be used, and in 4-inch thick (±1 inch) loose lifts if hand compaction equipment will be used.
   2. Compact the anchor trench backfill material to the minimum dry density and within a range of acceptable moisture contents required for general fill in Section 02200.

3.04 SURVEY CONTROL

A. Survey the limits and invert elevations of all pipes, culverts, and drainage structures in accordance with Section 02100.

B. Survey the limit and elevations of the top of all pipes, culverts, and drainage structures at each change in grade and every 50 feet between changes in grades in accordance with Section 02100.

C. Survey the limits and elevations of the bottom of the liner system and the final cover system anchor trench in accordance with Section 02100.

3.05 TOLERANCES

A. Install pipes, culverts, and drainage structures to within ±0.1 ft of the elevations and within 10 percent of the slopes indicated on the Construction Drawings.

B. Excavate anchor trenches within 0 to +0.2 feet of the depth indicated on the Construction Drawings.

[END OF SECTION]

SECTION 02225

LOW-PERMEABILITY SOIL LAYER

PART 1 GENERAL

1.01 SCOPE

A. This section includes low-permeability soil and placement for construction of the soil component of the composite liner system beneath sump areas. The low-permeability soil specified in this section may be either a natural clayey soil or a bentonite-soil mixture. Unless specific to one or the other soil option, the requirements of this section are applicable to both soil options.

1.02 RELATED SECTIONS AND PLANS

A. Section 02200 - Earthwork

B. Section 02770 – Geomembranes

C. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) Standards:
1. ASTM D 422 Standard Method for Particle-Size Analysis of Soils.
2. ASTM D 698 Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 5.5 pound Rammer and 12-inch Drop.
3. ASTM D 2487 Standard Test Method for Classification of Soils for Engineering Purposes.
4. ASTM D 4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
5. ASTM D 5084 Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter.
6. ASTM D 2922 Standard Test Method for Density of Soil and Soil-Aggregte in Place by Nuclear Methods (Shallow Depth)
7. ASTM D 3017 Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

8. ASTM E 946 Standard Test Method for Water Adsorption of Bentonite by the Porous Plate Method.

1.04 SUBMITTALS AND NOTIFICATIONS

A. Submit a list of the equipment and plan of procedures to be used for placement and compaction of low-permeability soil within the composite liner system to the Engineer for review with the Earthwork Work Plan as specified in Section 02200. For the bentonite-soil option, include a list of equipment and procedures for batching, mixing, and placement.

B. For each source and/or variation of low-permeability soil material proposed, the Contractor shall submit the following information and samples to the Engineer a minimum of 28 days prior to the start of construction of the composite liner system:

1. the proposed material source or sources;
2. the results of grain-size analyses, to include hydrometer analysis, conducted on the proposed material in accordance with ASTM D 422;
3. the results of Atterberg limits analyses conducted on the proposed material in accordance with ASTM D 4318;
4. the results of moisture-density relation test conducted on the proposed material in accordance with ASTM D 698;
5. the results of hydraulic conductivity testing performed in accordance with ASTM D 5084 for a minimum of 8 data points at a water content and dry density varying between 90 and 110 percent and ± 4 percent of the standard Proctor maximum dry density and optimum water content, respectively; and
6. a 50-pound sample of each proposed soil.

C. The Contractor shall test the low-permeability soil at the source at a frequency of one test per 5,000 cubic yards. Testing shall include grain-size analyses conducted in accordance with ASTM D 422 and Atterberg limits conducted in accordance with ASTM D 4318. The Contractor shall submit the results of these tests to the CQA Consultant.

D. Submit to the Engineer for review not less than 30 days prior to use a specification sheet for the proposed bentonite powder or granules and a 5-pound representative sample of the material.

E. The Contractor shall notify the Engineer in writing a minimum of 7 days in advance of intention to perform the work of this section.

F. If work is interrupted for reasons other than inclement weather, the Contractor shall notify the Engineer a minimum of 24 hours prior to the resumption of work.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The low-permeability soil work will be monitored and tested by the CQA Consultant as required in the CQA Plan.

B. The CQA Consultant will perform soil conformance testing on low-permeability soil to establish compliance with this Section. Conformance testing on low-permeability soil will be performed on materials obtained both from the source and after placement in the composite liner system. Provide equipment and labor to assist the CQA Consultant in obtaining conformance samples from excavations, stockpiles, and borrow areas. Identify source(s) of low-permeability soil material at least 21 calendar days prior to use.

C. The CQA Consultant will perform soil performance testing on low-permeability soil lifts to evaluate compliance with this section. The CQA Consultant will indicate any portion of the low-permeability soil that does not meet the requirements of this section and will delineate the extent of the nonconforming area.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

E. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for these activities in the construction schedule.

PART 2 PRODUCTS

2.01 LOW-PERMEABILITY SOILS

A. The materials comprising the natural low-permeability soil component of the composite liner system shall consist of relatively homogeneous, fine grained, natural soils, which are free of materials, which, due to its nature or size, are deleterious to the intended use as determined by the Engineer. At least 50 percent by weight shall pass the Number 200 sieve and no particles larger than 0.75 in. shall be allowed. The soils shall be classified according to the Unified Soil Classification System (USCS) as a CL or CH material.

B. Regardless of classification of the soil material comprising the low-permeability soil components of the liner system, the compacted soil shall be capable of achieving an in-situ hydraulic conductivity less than or equal to 1.0×10^{-7} cm/sec at a confining stress of 20 psi when tested in accordance with ASTM D 5084.

C. The soil materials for the low-permeability soil components shall be supplied from off-site sources approved by the Engineer. All low-permeability soil material taken from these sites shall be uniform and shall not contain any substandard materials. Substandard materials shall be segregated at the source and will not be permitted on the job site. Any material that is found by the Engineer to be substandard will be removed from the site. Notwithstanding the Engineer's approval of these sites, the Contractor shall be entirely responsible for meeting the requirements of this section. The laboratory test results on which approval of a site is based shall be provided by the Contractor and the CQA Consultant.

2.02 LOW-PERMEABILITY SOIL OPTION

A. In the event that the specified hydraulic conductivity cannot be achieved with off-site soils alone, the Contractor shall use a bentonite-soil mixture as an alternate material for the low-permeability soil.

B. Furnish bentonite powder or granules consisting of Wyoming-grade bentonite containing at least 85 percent sodium montmorillonite, and a water adsorption of at least 500 percent when tested in accordance with ASTM E 946.

C. Bentonite-Soil Mixture
1. The soil component of the bentonite-soil mixture shall consist of relatively homogeneous natural soils, which are free of materials, which due to its nature or size, are deleterious to the intended use as determined by the Engineer. No materials larger than 0.75 in. shall be allowed. The soil shall classify as an SP, SM, SC, or ML, according to the USCS.
2. The Contractor shall employ an approved independent testing laboratory to design the bentonite-soil mixture to meet the requirement of an in-situ hydraulic conductivity of less than 1×10^{-7} cm/s at a confining stress of 20 psi when tested in accordance with ASTM 5084.
3. The Contractor shall present in writing the proposed procedure to mix the soil and bentonite in the field, the equipment that will be used, and the quality control procedures that will be implemented.
4. The final approval of the proposed bentonite-soil mixture will be at the sole discretion of the Engineer.

2.03 ESTABLISHMENT OF THE COMPACTION CRITERIA

A. The data from Contractor testing required by this section and conformance testing by the CQA Consultant will be used by the Engineer to establish the acceptable range of soil water contents and dry densities for field compaction, referred to herein as the acceptable permeability zone (APZ).

B. Using the actual low-permeability soil and actual compaction equipment proposed by the Contractor, a test pad will be constructed on the base of cell to be constructed.

C. Based on the laboratory testing and test pad construction, the Engineer will establish, at his sole discretion, the criteria to achieve the required hydraulic conductivity in the field.

2.04 EQUIPMENT

A. For the low-permeability soil option, use batching, mixing, and conveying equipment as approved by the Engineer.

B. Use suitable hauling and placing equipment to spread low-permeability soil material in uniform loose lift thicknesses.

C. Use tank trucks, pressure distributors, and other equipment designed to apply water uniformly and in controlled quantities to moisture condition the low-permeability soil material. After adding water, the low-permeability soil must be processed to uniformly distribute the moisture with a soil scarifier or other equipment as approved by the Engineer.

D. Use the following equipment for compacting the low-permeability soil lifts in the composite liner system:
   1. Caterpillar 815-F; or
   2. equivalent self-propelled equipment approved by the Engineer.

PART 3 EXECUTION

3.01 FAMILIARIZATION

A. Prior to implementing any work of this section, the Contractor shall become thoroughly familiar with the site, the site conditions, and all portions of the work falling within this Section.

B. Prior to implementing any work of this section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all such work is complete to the point where the installation of this Section may properly commence without adverse impact.

3.02 LOW-PERMEABILITY SOIL PERFORMANCE CRITERIA

A. The moisture content and dry density of low-permeability soil material shall be within the APZ defined as those combinations of moisture content and dry density that, through pre-construction laboratory testing by the Contractor and the CQA Consultant, result in a low-permeability soil hydraulic conductivity (measured in laboratory using ASTM D 5084) of not more than 1 x 10^{-7} cm/s. The APZ will also meet the following three criteria: (i) moisture content that results in a degree of soil saturation of at least 90 percent; (ii) moisture content not greater than 4 percentage points wet of the standard Proctor optimum moisture content (ASTM D 698); and (iii) dry unit weight of at least 95 percent of the standard Proctor maximum dry unit weight (ASTM D 698). The CQA Consultant will provide the Contractor with specific moisture contents and dry unit weights that satisfy these criteria for each material used in compacted soil liner construction.

3.03 TEST PAD CONSTRUCTION

A. The purpose of the test pad is to establish the placement and compaction methods and procedures to be used to construct the low-permeability soil component of the liner system, and to verify that compaction in the APZ produces a layer having a hydraulic conductivity of less than or equal to 1 x 10^{-7} cm/s. The test pad program shall allow all parties (including the Engineer, Contractor, and CQA Consultant) to:
   1. familiarize themselves with the handling and compaction characteristics of the proposed low-permeability soil materials;
   2. develop correlations between numbers of passes, soil water content and soil dry density; and
   3. develop correlations between moisture content and moisture conditioning requirements.

B. The test pad shall be in an area of the project site designated by the Engineer and shall be constructed and tested as specified in this section or by an alternate procedure as approved by the Engineer.

C. The surface of the subgrade shall be proof-rolled to identify soft zones, irregularities, and abrupt changes in grade. The finished subgrade surface shall be graded to final slopes as indicated in the Construction Drawings. No standing water or excessive moisture shall be allowed to accumulate on the surface of the subgrade. The surface of the subgrade shall be examined by the CQA Consultant prior to commencement of construction of the test pad.

D. The test pad shall be constructed in a rectangular shape to a minimum plan area of 30 ft wide by 80 ft long. The test pad should consist of at least four lifts of low-permeability soil or as determined by the Engineer. Each lift shall be of uniform thickness with a maximum compacted thickness of 6 in.

E. Soil Placement

1. The test pad shall be constructed in horizontal lifts in accordance with methods and procedures outline below. The compaction parameters that will be evaluated in the test pad include:
   a. compaction equipment;
   b. number of passes and speed of the compaction equipment;
   c. soil moisture content;
   d. bonding between lifts; and
   e. quality control procedures.
2. First Lift:
   a. The placement, compaction, and testing of the soils in the first lift of the test pad shall be in accordance with the following requirements:
      i. the Contractor will, by trail and error, determine the method to break down soil clods to the maximum diameter of 3 in.
      ii. the Contractor shall, by trial and error, determine the loosely-placed soil thickness, which will result in a compacted lift thickness of 6 in. and upon determining this, place the first lift of soil;
      iii. the soil moisture content shall be adjusted by the Contractor, as required, to meet the required moisture content established during the laboratory testing;
      iv. the soil shall be compacted with two one-way passes, using the same compaction equipment intended for the actual construction;
      v. the soils CQA Consultant will perform in-situ water content and dry density tests using the ASTM D 2922 and D 3017;
      vi. all perforations made as a result of sampling or testing shall be filled;
      vii. the lift shall be further compacted (second sequence) by applying two additional one-way passes with the same construction equipment as for the first two passes;
      viii. the testing, sampling and repair outlined in (v) and (vi) above shall be repeated at locations adjacent to the first set of tests;
      ix. the lift shall be further compacted (third sequence) by applying two additional one-way passes with the same construction equipment as for the previous passes;
      x. the testing, sampling, and repair outlined in (v) and (vi) above shall be repeated at locations adjacent to the first two sets of tests; and
      xi. additional sequences of compaction, testing, sampling, and repair shall be carried out until the specified criteria for compaction are attained; at that

point, a final set of two passes shall be carried out, followed by a final sampling and patching.

3. Subsequent Lifts:
   a. The placement, compaction, and testing of the soils in the second lift of the test pad and subsequent lifts, if required, shall be in accordance with the following requirements:
      i. the Contractor shall place a second loose soil lift, which will result in a compacted lift thickness of 6 in. (150 mm);
      ii. the Contractor shall ensure that a good bond exists between the two lifts, and the CQA Consultant shall verify that the two lifts are intermixed; and
      iii. sequences of compaction, testing, sampling, and repair shall be carried out in a manner identical to the first lift until the specified criteria for compaction are attained.

3.04 MATERIAL PLACEMENT

A. The Contractor shall construct the low-permeability soil component of the liner system by over-building to compactable lines and grades and then by the controlled excavation to the grades, slopes and elevations indicated on the Construction Drawings.

B. The Contractor shall place the low-permeability soil on a subgrade meeting the compaction requirements of Section 02200.

C. The low-permeability soil shall be spread and compacted in lifts not to exceed 6 in. compacted thickness. The soil prior to compaction shall not have soil clods larger than 3 inches in maximum dimension.

D. The Contractor shall use, as a minimum, the compaction equipment used in the construction of the test pad and construction methods based on the results of the test pad to achieve the compaction criteria.

E. The moisture content of the low-permeability soil material shall be within the range of the moisture content established by the CQA Consultant. If the soil is too dry for proper compaction, the Contractor shall spray the soil with a sufficient quantity of clean water and thoroughly mix with the soil to bring the soil to the proper moisture content.

F. Prior to compaction, the Contractor shall spread the low-permeability soil to a uniform thickness. Each lift shall be compacted to the required minimum dry density, within the acceptable range of water contents, as established by the CQA Consultant.

G. At the beginning of each day's work, the previously placed low-permeability soil shall be inspected by the CQA Consultant. The surface shall be scarified before commencement of the day's work. The CQA Consultant may specify recompaction of the top surface of soil and recompaction, as necessary in the judgment of the CQA Consultant, to meet the specified criteria and provide a suitable surface for the next lift. This work will be performed at no additional cost to the Owner.

H. No low-permeability soil shall be placed over a lift that has not been tested and approved by the CQA Consultant. Should the field tests indicate that the density of any layer of low-permeability soil or portion thereof is below the required dry density, the particular layer or portion thereof shall be reworked at no additional cost to the Owner.

I. No frozen or thawing low-permeability soil shall be placed, spread or compacted.

J. No low-permeability soil material shall be placed, spread, or compacted while the subgrade is frozen or thawing, during unfavorable weather conditions, or periods of precipitation.

K. Hand compaction at the proper moisture content shall be used in all places around penetrations, corners, appurtenances, etc., in order to achieve the specified criteria. Care shall be taken to protect piping, geomembranes, and other structures. Damage to any materials or work caused by hand compaction shall be replaced by the Contractor at no additional cost to the Owner.

L. The same material and compaction methods as outlined in these specifications shall be used to replace unacceptable zones detected as part of the Construction Quality Assurance program.

M. The low-permeability soil surface must be made free from ruts or indentations at the end of every working day.

N. The Contractor shall finish each day's work with a smooth roller to create a smooth surface, which will minimize moisture penetration.

O. Each low-permeability soil lift will be covered with a temporary plastic cover as necessary to prevent drying or cracking immediately after the lift has passed the testing requirements and been approved by the Engineer, and at the end of each day.

3.05 MATERIAL COMPACTION

A. Compact loose lifts using a minimum of six passes of the compaction equipment. Provide as many additional passes as required to achieve the performance criteria specified in this section.

B. For a dual-drum compactor with laterally-separated front and rear drums, a compaction pass is defined as one trip up and a staggered trip back to cover the uncompacted area between the drums (i.e., one full coverage)

C. Compact areas inaccessible to driven compaction equipment using hand operated equipment.

D. Avoid crusting and desiccation of the lift surface. In the event crusting or desiccation occurs, rework the soil in accordance with this section.

E. Prepare the last lift of the compacted soil liner to meet the minimum thicknesses and grades indicated on the Construction Drawings. Meet the construction tolerance requirements given in this section.

F. Prepare the surface of the last lift or excavated surface to be acceptable for placement of the overlying geosynthetic clay liner as required by Section 02780. The surface shall be compact, uniform, and free of debris, rock, and other foreign materials. Any loose soil on the surface of the last lift shall have a maximum particle size of 0.25 inches.

3.06 PERFORATIONS

A. Backfill perforations in the low-permeability soil layer lifts resulting from sand-cone tests, drive cylinders, survey stakes, or other activities. The CQA Consultant will identify perforations requiring backfill. Perforations resulting from nuclear density tests will be filled by the CQA Consultant.

B. Prepare soil-bentonite mix for use in backfilling of perforations consisting of a minimum of 10 percent by weight bentonite powder or granules mixed with soil liner material by dry weight basis.

C. Backfill perforations with soil-bentonite mix. Place soil-bentonite mix in these perforations in approximately 3-inch thick loose lifts and thoroughly compact.

D. Perforations in the low-permeability soil layer lifts resulting from nuclear density testing will be backfilled with bentonite powder or granules or the soil-bentonite mix furnished by the Contractor and compacted by hand tamping by the CQA Consultant.

3.07 PROTECTION OF THE WORK

A. The Contractor shall use all means necessary to protect all prior work, including all materials and completed work of other sections.

B. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

3.08 SURVEY CONTROL

A. Survey the limits and elevations of the low-permeability soil layer in accordance with Section 02100.

3.09 TOLERANCES

A. Construct the low-permeability soil layer to a thickness greater than 2 feet and ± 0.1 feet of the elevations indicated on the Construction Drawings.

B. Construct low-permeability soil layer to within 10 percent of the slopes indicated on the Construction Drawings unless otherwise indicated by the Engineer.

[END OF SECTION]

SECTION 02230

ROAD CONSTRUCTION

PART 1 GENERAL

1.01 SCOPE

A. This section includes products and procedures for construction of the access road, haul road, and landfill perimeter maintenance road.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 - Surveying

B. Section 02200 - Earthwork

C. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Society of Testing and Materials (ASTM) Standards.
1. ASTM D 698. Standard test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm Drop.
2. Standard Test Method for Classification of Soils for Engineering Purposes

B. Standard Specifications for Road and Bridge Construction (SSRBC), Florida Department of Transportation, 2001 Edition (FDOT Specifications).

1.04 SUBMITTALS

A. At least 14 days prior to the start of road construction, the Contractor shall provide the Engineer for review a letter describing the proposed source of the material to be used and the placement, processing, compaction, and other equipment to be used to construct the roads. The letter shall also contain the proposed schedule for this component of the work.

B. For each source of base material, submit the following to the Engineer for review at least 21 calendar days prior to road construction.
1. the source of the material;

2. test results conducted on each of three samples of the material (taken from three different locations within the material stockpile such that the material is fully represented) which demonstrates the material meets the requirements of the FDOT Specifications;
3. a 50-pound representative sample of the proposed material; and
4. Certification from the supplier that the material meets the material requirements of this Section.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The construction of the roads will be monitored by the CQA Consultant as required by the CQA Plan.

B. The CQA Consultant will perform material conformance testing and installation quality control testing during road construction as required by the CQA Plan.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and account for these activities in the construction schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Furnish asphalt pavement meeting the requirements of Sections 320, 330, and 331 of the FDOT Specifications

B. Furnish base material meeting the requirements of Subbase Course in Section 200 of the FDOT Specifications Alternatively, base material may consist of a crushed concrete aggregate as approved by the Engineer.

C. Furnish roadway subbase material meeting the requirements of general fill material in Section 02200.

2.02 EQUIPMENT

A. Furnish, operate, and maintain equipment necessary to construct roads in accordance with the requirements of this section.

B. Use the following equipment for compaction of the subgrade, general fill, and base material:
   1. Caterpillar CS 563; or
   2. equivalent self-propelled vibratory compactor as approved by the Engineer.

PART 3 EXECUTION

3.01 GENERAL

A. The access road for the OHD facility shall be constructed in phases. The first road section is shown on the Construction Drawings. Initial construction shall consist of the final road section without asphalt pavement. Contractor shall construct asphalt pavement at a time to be determined by the Owner. Contractor shall restore access road base to design section prior to construction of asphalt pavement. The addition of base material shall be anticipated in order to meet final grade requirements.

3.02 HAUL ROAD

A. Construct haul road to the thickness, grades, and limits as indicated on the Construction Drawings.

B. Compact subgrade to 100 percent of the maximum density determined by ASTM D 698. Prior to the placement of the subbase, any areas that fail to meet compaction shall be reworked and recompacted. Any areas that show instability shall be removed, replaced recompacted, and tested.

C. Subbase shall be compacted in 6-inch lifts to 100 percent of the maximum density determined by ASTM D 698.

D. Base shall be compacted to 100 percent of the maximum density determined by ASTM D 1557. Base course shall be placed and compacted in two lifts.

E. The shoulder shall be installed to match the elevation of the base course compacted to 95 % of maximum density determined by ASTM D 1557.

3.03 MAINTENANCE ROAD

A. Construct the maintenance road to the thickness grades and limits shown on the Construction Drawings.

B. Subbase shall be compacted in 6-inch lifts to 100 percent of the maximum density determined by ASTM D 1557.

C. Base shall be compacted to 100 percent of the maximum density determined by ASTM D 1557. Base course shall be placed and compacted in two lifts.

3.04 ACCESS ROAD

A. Construct access road to the thickness, grades, and limits shown on the Construction Drawings. Shoulder of initial access road shall match base elevations.

B. Subbase shall be compacted in 6-inch lifts to 100 percent of the maximum density determined by ASTM D 1557.

C. Base shall be compacted to 100 percent of the maximum density determined by ASTM D 1557. Base course shall be placed and compacted in two lifts.

D. Construction of the access road consists of placing a compacted 3-inch type S-1 asphaltic concrete, on the base course of the initial access road. The 6-foot wide shoulders on both sides of the road shall be raised to match the edge of pavement.

E. Prior to placing the type S-1 asphalt any defects in the base course shall be repaired. Proof rolling shall be performed using a tandem-wheeled dump truck fully loaded with soil. The proofrolling truck shall make multiple passes so that the rear tires overlap their edges on each pass. Any areas of instability shall be reworked or removed and replaced with base material. All areas which have been reworked and/or replaced shall be tested and have a compaction value no less than 100 percent of maximum density as determined by ASTM D 1557.

3.05 COMPACTION REQUIREMENTS AND TEST FREQUENCIES

A. Subgrade: 100 percent of maximum density determined by ASTM D 698. One test for every 1000 linear feet, per lane, or as determined by the Engineer.

B. Subbase: 100 percent of maximum density determined by ASTM D 698. One test per 1000 linear feet, or as determined by the Engineer.

C. Base: 100 percent maximum density as determined by ASTM D 698. One test per 1000 linear feet, or as determined by the Engineer.

D. Type 5-1, Asphaltic Concrete: One test per 1000 linear feet with not less than 98 % marshal density as determined by AASHTO T245 .

3.06 SURVEY CONTROL

A. Survey the locations and elevations of road construction in accordance with Section 02100.

3.07 TOLERANCES

A. Construct subbase and base to ± 0.1 ft of the thickness indicated on the Construction Drawings.

B. Construct asphalt pavement to the minimum thickness indicated n the Construction Drawings.

C. Construct the roads to within ±0.1 ft of the final grades indicated on the Construction Drawings.

[END OF SECTION]

SECTION 02235

GRANULAR DRAINAGE MATERIAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section includes granular drainage material in the primary leachate collection corridors, and in the primary and secondary leachate collection sumps.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 - Surveying

B. Section 02720 - Geotextiles

C. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) Standards:
1. ASTM C 136. Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D 448. Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
3. ASTM D 2434. Standard Test Method for Permeability of Granular Soils (Constant Head).
4. ASTM D 3042 Standard Test Method for Insoluble Residue in Carbonate Aggregate

1.04 SUBMITTALS

A. For each source of granular drainage material, submit the following to the Engineer not less than 21 calendar days prior to use for review:
1. the source of the material;

2. test results conducted on each material such that the material is fully represented in accordance with ASTM C 136 and ASTM D 2434; and
3. a 50-pound representative sample of the material.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The installation of the granular drainage material will be monitored by the CQA Consultant as required in the CQA Plan.

B. The CQA Consultant will perform material conformance testing and installation quality control testing of the granular drainage materials as required in the CQA Plan.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for these activities in the construction schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Furnish granular drainage materials consisting of homogeneous crushed or natural stones material that is free of material which, due to its nature or size, is deleterious to the intended use as determined by the Engineer.

B. Furnish granular drainage material having a gradation (per ASTM C 136) that meets the gradation requirements for a No. 57 stone (per ASTM D 448), having a minimum hydraulic conductivity of 1 cm/s based on laboratory permeability testing conducted in accordance with the ASTM D 2434.

C. Furnish granular drainage material having a gradation (per ASTM C 136) that meets the gradation requirements for a No. 4 stone (per ASTM D 448), having a minimum hydraulic conductivity of 10 cm/s based on laboratory permeability testing conducted in accordance with the ASTM D 2434.

D. Furnish granular drainage material having less than 5 percent loss by weight when tested in accordance with ASTM D 3042.

2.02 EQUIPMENT

A. Furnish, operate, and maintain equipment necessary to transport, place, and spread the granular drainage materials without damage to adjacent geosynthetics.

PART 3 EXECUTION

3.01 MATERIAL PLACEMENT

A. Do not commence placement of the granular drainage material until the CQA Consultant has completed conformance evaluation of the material and evaluation of previous work, including evaluation of the Contractor's survey results for previous work.

B. Place the granular drainage material to the minimum thicknesses and limits indicated on the Construction Drawings.

C. Surround granular drainage material with geocomposite draining layer or geotextiles material as indicated on the Construction Drawings. Care shall be taken to avoid damage to geosynthetics during granular drainage material placement.

3.02 SURVEY CONTROL

A. Survey the limits and elevations of the top of the granular drainage material in accordance with Section 02100.

3.03 TOLERANCES

A. Construct the granular drainage material to the minimum thicknesses indicated on the Construction Drawings.

[END OF SECTION]

SECTION 02240

PROTECTIVE SOIL LAYERS

PART 1 GENERAL

1.01 SCOPE

A. This Section includes protective soil layer products for the liner system and final cover system and their placement.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 - Surveying

B. Section 02200 - Earthwork

C. Section 02740 - Geocomposites

D. Section 02770 - Geomembranes

E. Section 02920 - Vegetative Soil Layer

F. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) Standards:

1. ASTM D 698 — Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 5.5 pound Rammer and 12-inch Drop.
2. ASTM D 2434 — Standard Test Method for Permeability of Granular Soils (Constant Head)
3. ASTM D 2487 — Standard Test Method for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
4. ASTM C 136 — Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
5. ASTM D 3042 — Standard Test Method for Insoluable Residue in Carbonate Aggregate.

1.04 SUBMITTALS

A. For each source of protective soil layer material, submit the following to the Engineer 15 calendar days prior to use for review:
   1. the source of the material;
   2. test results conducted on each liner protective soil layer material such that the material is fully represented in accordance with ASTM C 136, ASTM D 2434, ASTM D 2487, and ASTM D 3042.
   3. if processed tire chips are used as part of the liner protective layer, then the material is to meet requirements of Section 62-701.400(3)(d)3 of the F.A.C.;
   3. test results conducted on each cover protective soil layer material such that the material is fully represented in accordance with ASTM C 136, ASTM D 698, and ASTM D 2487; and
   4. a 50-pound representative sample of the protective soil layer material.

B. The Contractor shall submit a plan to the Engineer for how the liner protective soil layer and how the cover protective soil layer will be placed in an upslope manner for approval 30 calendar days prior to the start of protective soil layer construction.

C. Identify source(s) of protective soil layer material at last 21 calendar 21 days prior to use.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The protective soil layer construction will be monitored and tested by the CQA Consultant as required in the CQA Plan.

B. The CQA Consultant will perform soil conformance testing on the protective soil material to establish compliance with this Section. Conformance testing on protective soil layer will be performed on materials obtained from the source and after placement in the liner system or the final cover system. Provide equipment and labor to assist the CQA Consultant in obtaining conformance samples from excavation, stockpile, and borrow areas.

C. The CQA Consultant will perform soil performance testing on compacted lifts of the cover protective soil material to evaluate compliance with this Section. The CQA Consultant will indicate any portion of the protective soil layer that does not meet the requirements of this section and will delineate the extent of the nonconforming area.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

E. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for these activities in the construction schedule.

PART 2 PRODUCTS

2.01 MATERIALS

A. Obtain material for protective soil layers from on-site sources approved by the Engineer.

B. Protective soil layer material shall consist of relatively homogeneous, natural soils that are free of materials, which due to nature or size, are deleterious to the intended use as determined by the Engineer. No particles larger than 0.75 inches shall be allowed.

C. For liner protective soil layer, the material shall be classified according to the United Soil Classification System (per ASTM D 2487) as SP or SW.

D. For cover protective soil layer, the material shall be classified according to the United Soil Classification System (per ASTM D 2487) as SW, SP, SC, or SM.

E. Liner protective soil layer material shall have:
1. less than 5 percent loss of weight passing through a standard U.S. No. 200 sieve (per ASTM D 422);
2. less than 5 percent loss of weight when tested according to ASTM D 3042; and
3. hydraulic conductivity of not less than $1x10^{-3}$ cm/s when tested according to ASTM D 2434.

2.02 EQUIPMENT

A. Furnish, operate, and maintain equipment necessary to transport, place, and compact the protective soil layer material.

PART 3 EXECUTION

3.01 PLACEMENT

A. Construct the protective soil layers to the thickness, elevations, and limits indicated on the Construction Drawings and as specified in this section.

B. All lifts of the protective soil layers shall be placed upslope where the slopes exceed 10 percent. The Contractor may deliver material downslope on specially constructed ramps as approved by the Engineer.

C. Prior to placing the protective soil layers, the Contractor shall verify by visual inspection that the underlying geosynthetic layer is free of holes, tears, wrinkles, or foreign objects. Material shall be spread over the underlying geosynthetics to cause the material to cascade over the geosynthetics rather than be shoved across the geosynthetics. The Contractor shall "work out" wrinkles in the geosynthetic layers to the satisfaction of the CQA Consultant prior to placement of the protective soil layer. In all cases, wrinkles shall not be of a size that they could fold back on themselves.

D. The protective soil layers shall be placed directly on top of the geomembrane or geocomposite as indicated on the Construction Drawings. The liner protective soil layer shall be placed in one full lift if only soil is to be used and two if tire chips are used. The first lift of cover protective soil shall be placed to a 12-inch depth. A low ground-pressure dozer shall be used for spreading in accordance with the requirements of Sections 02740 and 02770. The tracked equipment shall operate only over previously placed protective soil material. The Contractor shall not operate equipment directly on the geomembrane or geocomposite.

E. The remaining cover protective soil layer shall be placed in loose lift which results in a minimum thickness of 18 inches after placement and compaction. After the initial 12-inch lift, the cover protective soil shall be placed in one loose lift which results in a compacted lift thickness of 6 inches ±1 inch and an in-place density of 95 percent of the maximum dry density as determined by ASTM D 698.

F. The initial 12-inch cover protective soil layer shall be compacted by tracking with the low ground-pressure dozer or other relatively light-weight compaction equipment. Manually operated compaction equipment may be required in constricted locations and directly adjacent to structures. Soil lifts above the initial 12-inch lift shall be compacted with equipment suitable to the type soil and which will not damage underlying geosynthetic layers.

G. The equipment used to spread and compact the protective soil layers shall comply with minimum cover requirements of Sections 02740 and 02770.

H. In any area where compaction is to be performed using hand-operated equipment, place the fill material with a loose thickness of 4 inches ±1 inch.

I. Prior to placing a succeeding lift of the protective cover soil layer material over a previous lift, thoroughly scarify the previous lift to a depth of 2 inches by discing, raking, or tracking with a dozer.

J. The trafficking of scarified surfaces by trucks or other equipment, except compaction equipment, is not permitted.

3.02 COMPACTION

A. Do not compact the liner protective soil layer.

B. Cover protective soil layer lifts after the initial 12-inch lift shall be compacted to a dry unit weight of at least 95 percent of the standard Proctor maximum dry unit weight (ASTM D 698).

C. Moisture condition the soil if the moisture content of the material to be used as the cover protective soil layer is not appropriate to achieve the compaction requirements. The acceptable range of placement moisture contents will be determined by the CQA Consultant. Use a water truck and spray nozzle for wetting. Use discing, raking, or other appropriate methods to dry the material as required. During wetting or drying, regularly disc, rake, or otherwise mix the material to thoroughly blend the moisture throughout the lift.

3.03 SURVEY CONTROL

A. Survey the limits and elevation of the top of the protective soil layers in accordance with Section 02100.

3.04 TOLERANCE

A. Construct the protective soil layers to within +0.2 feet of the thickness shown on the Construction Drawings.

B. Construct the protective soil layers to within +0.5 feet of the elevations and within 10 percent of the slopes indicated on the Construction Drawings.

[END OF SECTION]

SECTION 02245

RIPRAP

PART 1 GENERAL

1.01 SCOPE

A. This section includes riprap products and placement.

1.02 RELATED SECTIONS AND PLANS

A. Section 02615 - Drainage Swales, Structures and Downchutes

B. Section 02720 - Geotextiles

C. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Standard Specifications for Road and Bridge Construction (SSRBC), Florida Department of Transportation, 2001 Edition (FDOT Specifications).

1.04 SUBMITTALS

A. Submit the following to the Engineer for review no less than 30 calendar days prior to riprap use.
1. the source of the riprap; and
2. certification from the supplier that the riprap meets the material requirements of this section.

1.05 CONSTRUCTION QUALITY ASSURANCE

A The placement of riprap will be monitored by the CQA Consultant as required by the CQA Plan.

B The CQA Consultant will perform material conformance testing as required by the CQA Plan.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and account for these activities in the construction schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Riprap shall consist of hard, durable, angular field or quarry stone.

B. Riprap for drainage swales shall conform to Section 530-2.2.2 of the FDOT Specifications and conform to a size designation of 4 on Table 5302.2.2 of the FDOT Specifications.

PART 3 EXECUTION

3.01 PLACEMENT

A. Place riprap to the thickness, elevations, and locations indicated on the Construction Drawings.

B. Place riprap upon geotextile separator or geocomposite meeting requirements of Section 02720 or Section 02740, respectively, and over prepared layers as indicated on the Construction Drawings.

C. Carefully place riprap to avoid segregation or disturbance or damage of the underlying material. Place the material in such a manner as to produce a well graded mass of riprap with the minimum practicable percentage of voids. Distribute the larger pieces throughout the entire mass such that the finished riprap is free from objectionable pockets of small or large pieces.

D. Do not place riprap by dumping into chutes or by similar methods likely to cause segregation of various sizes.

E. Do not place riprap in a manner that causes damage to an underlying geotextile separator or geocomposite. Repair damaged geotextile as directed by the Engineer and in accordance with Section 02720 or Section 02740.

3.02 SURVEY CONTROL

A. Survey the location of riprap placement in accordance with Section 02100.

3.03 TOLERANCES

A. Place the riprap to the minimum thicknesses as indicated on the Construction Drawings.

[END OF SECTION]

SECTION 02290

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish all labor, materials, tools, and incidentals required to install permanent erosion and sediment controls.

B. The Contractor shall furnish all labor, materials, tools, and incidentals required to install and maintain all temporary erosion and sediment control measures and structures including, but not limited to silt fence, straw bales, check dams, and sediment traps, throughout the duration of the project and remove temporary measures and structures, where necessary.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 – Surveying

B. Section 02110 – Clearing, Grubbing, and Stripping

C. Section 02200 – Earthwork

D. Section 02245 – Riprap

E. Section 02615 – Drainage Swales, Structures, and Downchutes

F. Section 02720 – Geotextiles

G. Section 02920 – Vegetative Soil Layer

H. Construction Quality Assurance (CQA) Plan

1.03 COMPLIANCE WITH REGULATIONS

A. It is the sole responsibility of the Contractor to be completely familiar with and to follow all local, state, and federal regulations pertaining to the work required in this section.

1.04 CONSTRUCTION QUALITY ASSURANCE

A. Erosion and sediment control activities shall be monitored as outlined in the CQA Plan.

B. The Contractor shall be aware of the activities set forth in the CQA Plan and shall account for these activities in the construction schedule.

C. The Contractor shall assist CQA personnel in every manner necessary for the proper performance of activities set forth in the CQA Plan.

D. CQA testing or inspections does not relieve the Contractor of the responsibility to construct all work in conformance with the Construction Drawings and Technical Specifications.

E. If quality control or quality assurance tests indicate Work does not meet specified requirements, the Contractor shall remove Work, replace and retest at no additional cost to the Owner.

1.05 SUBMITTALS

A. The Contractor shall submit samples and manufacturer's product data and recommended methods of installation for the proposed silt fence to the Engineer at least 14 days prior to starting installation. The manufacturer's product data shall provide documentation and certification that the silt fence products meet or exceeds the requirements specified in Part 2.01.

PART 2 PRODUCTS

2.01 SILT FENCE

A. Furnish silt fence with either woven or nonwoven fabric. Silt fence shall:

1. be woven fabric consisting of slit films of polypropylene treated with ultraviolet light stabilizers;
2. be nonwoven fabric consisting of long chain polymeric filaments or polyester yarns;
3. be inert to chemicals commonly found in soils and to hydrocarbons;
4. be resistant to mildew, rot, insects, and rodent attack; and
5. have fence post of minimum 2" x 2" lumber and minimum length of 36 inches spaced a maximum of 6 ft along fabric; and
6. have fabric f minimum 36-inch width.

2.02 RIPRAP

A. Riprap shall be as specified in Section 02245 of these Specifications.

B. The geotextile placed beneath the riprap, as shown on the Construction Drawings, shall meet the requirements of geotextile separator as per Section 02720 of these Specifications.

2.03 VEGETATION

A. Vegetation shall be as specified in Section 02930 of these Specifications.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Silt fence shall be installed in accordance with the manufacturer's recommendations in all areas as indicated on the Construction Drawings prior to any other construction activities. Minimum fabric burial depth shall be 6 inches or manufacturer's recommendation, whichever is greater.

B. The outside slope of all perimeter and roadway storm water management berms shall be sodded immediately after final grading and shaping.

C. The Contractor shall use straw bales to contain sediment and water from dewatering operations and promote infiltration. Accumulated sediment shall be removed and stockpiled for reuse.

3.02 PROTECTION OF WORK

A. The Contractor shall use all means necessary to protect all prior work, including materials and completed work of other sections.

B. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary, to the approval of the Engineer at no additional cost to the Owner.

[END OF SECTION]

SECTION 02615

DRAINAGE SWALES AND STRUCTURES

PART 1 GENERAL

1.01 SCOPE

A. This section includes products and installation of drainage swales and precast concrete drainage structures.

1.02 RELATED SECTIONS AND PLANS

A. Section 02200 - Earthwork

B. Section 02215 - Trenching and Backfilling

C. Section 02235 - Granular Drainage Materials

D. Section 02245 - Riprap

E. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Standard Specifications for Road and Bridge Construction (SSRBC), Florida Department of Transportation, 2001 Edition (FDOT Specifications).

1.04 SUBMITTALS

A. Submit shop drawings of all precast concrete drainage structures to the Engineer for approval a minimum of 30 days prior to use on this project.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The drainage swale and structure construction will be monitored by the CQA Consultant as required by the CQA Plan.

B. The CQA Consultant will perform material conformance testing and installation quality control testing during drainage swale and structure construction as required by the CQA Plan.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and account for these activities in the construction schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Drainage structures shall conform to Section 604 of the FDOT Specifications.

C. Riprap shall be as specified in Section 02245.

D. Geotextile separator shall be as specified in Section 02720.

PART 3 EXECUTION

3.01 PREPARATION

A. All excavation, shoring, and stormwater control required for the construction of drainage structures shall be performed in accordance with Section 02200.

B. Excavation shall be to the required depth. Over-excavated areas shall be backfilled with general fill material, properly compacted as specified in Sections 02200 and Section 02215.

3.02 INSTALLATION

A. Drainage Structures
   1. Set drainage structures at the proper elevation with proper bearing on a suitable foundation.
   2. Pipe openings shall be neatly cut two inches larger than the outside diameter of the incoming pipe. Fill openings around pipe with non-shrink grout to provide a smooth watertight joint between structure and pipe.

3. Cut pipe entering the structure to the correct length prior to installation. Removal of excess pipe in structure after installation will not be acceptable.
4. All backfilling required for the installation of drainage structures shall be performed in accordance with Section 02215.

3.03 SURVEY CONTROL

A. Survey the location and elevation of all drainage swales and structures and the lines, slopes, and grades in accordance with Section 02100.

3.04 TOLERANCE

A. Install drainage swales and structures to within ±0.1 ft of elevations indicated on the Construction Drawings or as directed by the Engineer.

[END OF SECTION]

SECTION 02620

CULVERTS

PART 1 GENERAL

1.01 SCOPE

A. This section includes culverts and related appurtenances, products, and installation.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 - Surveying

B. Section 02200 - Earthwork

C. Section 02215 - Trenching and Backfilling

D. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Association of State Highway Transportation Officials (AASHTO) Standards.

1. AASHTO M 36. Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains.
2. AASHTO M 170. Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
3. AASHTO M 198. Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets.
4. AASHTO M 273. Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less than 2 feet of Cover Subject to Highway Loadings.
5. AASHTO M 274. Standard Specification for Steel Sheet, Aluminum-Coated (Type 2) for Corrugated Steel Pipe.

B. Standard Specifications for Road and Bridge Construction (SSRBC), Florida Department of Transportation, 2001 Edition (FDOT Specifications).

1.04 SUBMITTALS

A. Submit the following to the Engineer for not less than 30 calendar days prior to use:
   1. culvert manufacturer's product data and recommended methods of storage, handling, and proposed installation;
   2. shop drawings showing the layout and details of joints, special connections, and fittings;
   3. culvert manufacturer's written certification that culverts and joint material meet the material requirements of this section.

PART 2 PRODUCTS

2.01 GENERAL

A. Furnish corrugated metal pipe (CMP), reinforced concrete pipe (RCP) circular, or box culverts at the locations and with the dimensions indicated on the Construction Drawings and in accordance with FDOT Specifications.

2.02 CMP CULVERTS

A. Furnish CMP culverts meeting the requirements of AASHTO M 36.

2.03 RCP CIRCULAR AND BOX CULVERTS

A. Furnish RCP circular culverts meeting the requirements of AASHTO M 170 for Class IV and V Reinforced Concrete Pipe with Wall B.

B. Furnish RCP box culverts meeting the requirements of AASHTO M 273 for Precast Reinforced Concrete Box Sections with Less Than 2 Feet of Cover Subjected to HS20 Loading.

2.04 JOINTS

A. Seal RCP circular joints with Type A culvert gaskets meeting the requirements of AASHTO M 198.

B. Seal RCP box culvert joints with bituminous pipe joint filler meeting the requirements of the FDOT Specifications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Examine culverts and joint materials before installation for workmanship. Do not install any culvert or joint material that shows poor workmanship.

B. Prior to culvert installation, complete trench excavation and install embedment fill in accordance with the requirements of Section 02215 unless otherwise indicated on the Construction Drawings.

C. Install CMP, RCP circular, and box culverts to the lines and grades indicated on the Construction Drawings, to the survey tolerances specified in this section.

D. Install joints for RCP circular and box culverts in accordance with manufacturer's recommendations and at the locations indicated on the Construction Drawings.

E. After placement of the culverts, perform backfilling as specified in Section 02215 unless otherwise indicated on the Construction Drawings.

3.02 SURVEY CONTROL

A. Survey the final locations and invert elevations of the culverts in accordance with Section 02100.

3.03 TOLERANCE

A. Construct culverts to within ±0.1 ft of the invert elevations shown on the Construction Drawings, and to provide positive drainage at all times.

B. Construct culverts to within ±0.1 ft of the lines and grades as indicated on the Construction Drawings.

[END OF SECTION]

SECTION 02715

HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE

A. This section includes high-density polyethylene (HDPE) pipe and fittings installation and products.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 - Surveying

B. Section 02215 - Trenching and Backfilling

C. Section 02235 - Granular Materials

D. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of the American Society for Testing and Materials (ASTM) standards:

1.	ASTM D 638.	Test Method for Tensile Properties of Plastics.
2.	ASTM D 790.	Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
3.	ASTM D 1238.	Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
4.	ASTM D 1248.	Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
5.	ASTM D 1505.	Test Method for Density of Plastics by the Density-Gradient Technique.
6.	ASTM D 1603.	Standard Test Method for Carbon Black in Olefin Plastics.
7.	ASTM D 1693.	Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
8.	ASTM D 2122.	Method for Determining Dimensions of Thermoplastic Pipes and Fittings.

9. ASTM D 2657. Standard Practice for Heat Joining Polyolefin Pipe and Fittings.
10. ASTM D 2837. Standard Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
11. ASTM D 3350. Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
12. ASTM F 714. Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
13. ASTM F 1055. Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.

B. Latest version of the American National Standards Institute (ANSI) standards:
   1. ANSI B16.1. Standard Specifications for Cast-Iron Pipe Flanges and Flange Fittings.

C. Latest version of the American Society of Mechanical Engineers (ASME) standard:
   1. ASME B31.9 Building Services Piping. §937.1 through 937.3

1.04 SUBMITTALS

A. Submit the following to the Engineer for review not less than 30 calendar days prior to first installation of material under this section:
   1. detailed shop drawings of all HDPE pipes, fittings, supports, and other appurtenances;
   2. a list of materials to be furnished;
   3. the names of the suppliers and the proposed dates of delivery of the materials to the site;
   4. detailed procedures to be used for hydrostatic testing of the pipes and fittings;
   5. documentation demonstrating that the manufacturer has adequate quality control procedures to ensure that fabrication of the HDPE pipes and fittings complies with the requirements of this Section;
   6. origin (resin supplier's name, resin production plant) and identification (brand name, number) of the polyethylene resin used; and
   7. certification of minimum values and the corresponding test procedures for HDPE material properties listed in Tables 02605-1 and 02605-2.

B. Submit at least 30 calendar days prior to installation of any material covered by this section, manufacturer's written certification of compliance with these Specifications for that material.

C. Submit at least 14 calendar days prior to installation, documentation of training and certification of personnel qualified for performing HDPE pipe joining operations.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The installation of HDPE pipe and fittings shall be monitored by the CQA Consultant as required by the CQA Plan.

B. The CQA Consultant may perform material conformance testing and installation quality assurance evaluations of the HDPE pipe and fittings.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for these activities in the installation schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 GENERAL

A. Design and proportion all parts to have adequate strength and stiffness and to be adapted for the purposes shown on the Construction Drawings.

B. Furnish each HDPE manhole completely assembled with all pipes, valves, fittings, supports, gussets, and appurtenances such that field work involves only installation and connection of external products.

C. Furnish each HDPE manhole with watertight construction of welds and pipe penetrations.

2.02 HDPE COMPOUND

A. Furnish HDPE flat stock manufactured from new HDPE resin conforming to ASTM D 1248 (Type III, Class C Category 5, Grade P34), ASTM D 3350 (minimum cell classification as shown in Table 02605-1), and having a Plastic Pipe Institute (PPI) Rating of PE 3408. Furnish material having minimum certifiable property values listed in Table 02605-1.

B. Furnish HDPE pipe and fittings manufactured from new HDPE resin conforming to ASTM D 1248 (Type III, Class C Category 5, Grade P34), ASTM D 3350 (minimum cell classification as shown in Table 02605-2), and having a Plastic Pipe Institute (PPI) Rating of PE 3408. Furnish material having minimum certifiable property values listed in Table 02605-2.

2.03 HDPE PIPES AND FITTINGS

A. Unless otherwise shown on the Construction Drawings, furnish HDPE pipe and fittings that have a SDR of 11 and conform to ASTM F 714.

B. Furnish HDPE pipes in standard laying lengths not exceeding 50 feet.

C. Furnish HDPE pipes and fittings that are homogeneous throughout and free of visible cracks, holes (other than intentional manufactured perforations), foreign inclusions, or other deleterious effects, and are uniform in color, density, melt index, and other physical properties.

D. Furnish HDPE end caps at the end of pipes as shown on the Construction Drawings.

E. Furnish electrofusion couplings meeting the requirements of ASTM F 1055 and as recommended by the electrofusion coupling manufacturer.

F. Perforate pipe by factory drilling at locations shown on the Construction Drawings.

2.04 HDPE JUNCTION BOXES

A. Furnish junction boxes of the types, and to the dimensions, shown on the Construction Drawings.

B. Furnish junction boxes having exterior and interior surfaces that are smooth with no sharp projections, homogeneous throughout with respect to resin compound, and free of foreign inclusions and surface defects. Furnish HDPE manholes that are as uniform as commercially achievable in color, opacity, density, and other physical properties.

C. Shop fabricate junction boxes from HDPE pipe meeting the requirements of this Section. Shop fabricate 24-inch diameter manholes using an HDPE Standard Dimension Ratio (SDR) of 32.5 conforming to ASTM F 714.

D. Shop fabricate junction box pipe stub-outs with the same pipe SDR as the HDPE pipe entering the junction box. Fabricate with a minimum stub-out length of 12 inches, or more if necessary for thermal butt fusion of external pipes.

E. Shop fabricate cover and supports from minimum 1-inch thick HDPE flat stock.

F. Shop weld components of the HDPE junction box weld pipes and fittings to each other by thermal butt fusion. Weld other components, including supports, to the junction box by extrusion welding. Hot air welding is not acceptable. Do not join the pipe supports with the pipes unless specifically called for on the Construction Drawings.

2.05 IDENTIFICATION

A. Continuously indent print on the HDPE pipe, or space at intervals not exceeding 5 feet the following:
   1. name and/or trademark of the HDPE pipe manufacturer;
   2. nominal HDPE pipe size;
   3. standard dimension ratio (e.g., SDR-11);
   4. the letters PE followed by the polyethylene grade per ASTM D 1248, followed by the Hydrostatic Design Stress in 100's of psi (e.g., PE 3408);
   5. Manufacturing Standard Reference (e.g., ASTM F 714); and
   6. a production code from which the date and place of manufacture can be determined.

2.06 EMBEDMENT FILL AND BACKFILL MATERIALS

A. Furnish embedment fill materials in accordance with Section 02215.

B. Furnish trench backfill materials in accordance with Section 02215.

PART 3 EXECUTION

3.01

A. Perform HDPE junction box installation and pipe joining operations with trained and certified personnel.

3.02 HDPE PIPE, FITTINGS, AND APPURTENANCES

A. Deliver HDPE pipe, fittings, and appurtenances to the site at least 10 calendar days prior to the planned installation date.

B. Provide proper handling and storage of the HDPE pipe, fittings, and appurtenances at the site. Protect materials from excessive heat or cold, dirt, moisture, cutting, or other damaging or deleterious conditions. Provide any additional storage procedures required by the Manufacturer.

C. Exercise care when transporting, handling, and placing HDPE pipe and fittings. Use rope, fabric, or nylon slings and straps when handling HDPE pipe. Do not position slings, straps, at butt-fusion joints or at fittings.

D. The maximum allowable depth of cuts, gouges or scratches on the exterior surface of HDPE pipe, fittings, or appurtenances is 10 percent of the wall thickness. The interior of the pipe and fittings shall be free of cuts, gouges and scratches. Replace any HDPE pipe and fittings that become gouged, twisted, or crimped. Remove from the work area damaged pipes and fittings.

E. Whenever pipe laying is not actively in progress, close the open ends of all installed pipes using watertight plugs.

F. Perform trenching and backfilling of all installed pipe, fittings, and appurtenances in accordance with Section 02215.

G. Perform testing of all installed pipe, fittings, and appurtenances in accordance with this section.

3.03 HDPE PIPE AND FITTINGS INSTALLATION

A. Carefully examine HDPE pipe and fittings for cracks, damage or defects before installation. Do not use cracked, damaged, or defective material.

B. Inspect the interior of all pipe and fittings and remove any foreign material from the pipe interior before the pipe is moved into final position.

C. Perform field-cutting of pipes, where required, with a machine specifically designed for cutting pipe. Make cuts carefully without damage to pipe, so as to leave a smooth end at right angles to the axis of pipe. Taper cut ends and smooth sharp edges. Flame cutting is not allowed.

D. Do not lay pipe until the CQA Consultant has verified the bedding conditions.

E. Install HDPE pipe and fittings in accordance with the Manufacturer's recommendations and the requirements of this Section.

F. Install pipe and fittings to the lines and grades shown on the Construction Drawings.

G. Place and compact embedment fill and trench backfill material as shown on the Construction Drawings and in accordance with Section 02215.

H. Provide all necessary adapters and/or fittings required when connecting different types and sizes of pipe or when connecting pipe made by different manufacturers.

3.04 HDPE PIPE, FITTINGS, AND APPURTENANCES CONNECTIONS

A. Personnel performing joining operations shall demonstrate proficiency to the satisfaction of the CQA Consultant.

B. Weather Conditions for Joining:
1. Do not join HDPE pipes and fittings at ambient temperatures below 40 degrees Fahrenheit (°F) or above 104°F, unless authorized in writing by the Construction Manager. For cold (<40°F) or hot (>104°F) weather joining, use the additional procedures authorized in writing by the Construction Manager.
2. Measure ambient temperatures at fusion machine.
3. Do not join HDPE pipe and fittings during any precipitation, in the presence of heavy fog or dew, or in areas of ponded water.

C. Prior to joining, clean the joint area to be free of moisture, dust, dirt, debris of any kind, and foreign material.

D. Joining equipment shall be approved for the applicable field joining processes. Fusion-welding apparatus shall be an automated device equipped with gauges giving the applicable temperatures and pressures.

E. Join HDPE pipe with thermal butt-fusion joints or electrofusion adapters. Fabricate joints in compliance with ASTM D 2657, ASTM F 1055, the manufacturer's recommendations, and the requirements of this section.

F. Install flanged connections of HDPE pipe and fittings as shown on the Construction Drawings and as follows:
   1. Thermally butt-fuse HDPE flange connection (flange adapter) to HDPE pipe.
   2. Use Type 316 stainless steel lap joint flange. Outside diameter and drillings shall comply with American National Standards Institute (ANSI) B16.1.
   3. Use Type 316 stainless steel flange bolts, nuts and washers that meet the requirements of ANSI B16.1. Lubricate bolt threads prior to attaching nuts. Tighten bolts to a torque of 100 ±5 foot-pounds.

G. Bolt HDPE flange adapter and stainless steel lap joint flanges at the ambient temperature of the surrounding soil to prevent relaxation of the flange bolts and loosening of the joint due to thermal contraction of the polyethylene. Draw bolts up evenly and in line. Retighten bolts 1 and 4 hours after initial tightening.

3.05 FIELD TESTING AND INSPECTION

A. Notify the CQA Consultant a minimum of 24 hours in advance of pipe testing or pipe inspection.

B. HDPE Pipe and Fittings Hydrostatic Testing:
   1. Provide testing apparatus, including pumps, hoses, gauges, taps, plugs, drains, temporary connections, and fittings to perform testing in accordance with this Section.

   2. HDPE Pipe and Fittings Hydrostatic Testing:
      a. Pressure test all installed HDPE solid wall pipe prior to placing fill over the pipes.
      b. Perform tests in the presence of the CQA Consultant and in accordance with the detailed test procedure submitted by the Contractor in accordance with this section.

c. Test HDPE solid wall pipes at 130 psi internal pressure. Test pipes in accordance with ASME B31.9 §937.1 through §937.3.
d. Test pipes at the required internal pressure for a minimum of one hour after the pressure in the pipe has stabilized. The test duration does not include the initial expansion phase after the pipe is first pressurized. The duration of the expansion phase shall be as recommended by the manufacturer.
e. Identify any leaks, remove the water, and make repairs to the pipe.
f. Retest the pipe until acceptance criteria are achieved in accordance with the approved procedures for testing prior to placing backfill over the pipe.
g. Test gauges shall be calibrated within one year of date of test. Calibration shall be traceable to national or industry standards where possible.
h. Acceptance criteria for hydrostatic testing is zero leakage for the stabilized pressure for the minimum duration of the test.

C. HDPE Pipe Inspection
1. Inspect fusion joints for evidence of excess or insufficient bead size, contamination, offset, or any other evidence of inadequate joining. The surface of the HDPE pipe shall be clean at the time of inspection. Wipe or wash the HDPE pipe surface if surface contamination inhibits inspection.
2. Repair any pipe sections where greater than 4 percent pipe diameter deflection from vertical is observed.

D. Defects and Repairs:
1. Repair Procedures:
   a. Repair any portion of the HDPE pipe exhibiting a flaw, or poor quality fusion joint by removing bad joint or pipe section and replacing with a new pipe section.
   b. When making repairs, satisfy the following:
      (1) clean and dry all pipe surfaces immediately prior to repair; and
      (2) only use approved fusion equipment or electrofusion fitting.
2. Repair Verification:
   a. Inspect each repair using the methods described in the this Section. Repair areas that fail the inspection.

3.06 SURVEY CONTROL

A. Survey the top of HDPE pipe at each change in direction or grade and on no greater than 50-foot centers and at all manhole inlets and outlets in accordance with Section 02100.

3.07 TOLERANCES

A. Install all HDPE pipes to within ±0.1 feet of bottom of pipe elevations as indicated on the Construction Drawings.

B. Provide positive slope of gravity lines at all locations to within ±10 percent of the values indicated on the Construction Drawings.

TABLE 02715-1

REQUIRED HDPE FLAT STOCK PROPERTIES
ASTM D 3350 CELL CLASSIFICATION PROPERTIES AND RANGES

Properties	Cell Range	Qualifiers	Units	Specified Values	Test Method
Specific Gravity	3	minimum	N/A	0.94	ASTM D 1505
Melt Flow Index	3 to 5	maximum	g/10 min	<0.4	ASTM D 1238 (Condition E)
Flexural Modulus	5	minimum	lb/in^2	110,000	ASTM D 790
Tensile Strength	4 or 5	minimum	lb/in^2	3,000	ASTM D 638
Environmental Stress Crack	3	minimum	hrs	$F_{20} > 192$	ASTM D 1693
Hydrostatic Design Basis at 73°F	4	minimum	lb/in^2	1,600	ASTM D 2837
UV Stabilizer	C	minimum	% Carbon Black	2	ASTM D 1603

TABLE 02715-2

REQUIRED HDPE PIPE AND FITTINGS PROPERTIES
ASTM D 3350 CELL CLASSIFICATION PROPERTIES AND RANGES

Properties	Cell Range	Qualifiers	Units	Specified Values	Test Method
Specific Gravity	3	minimum	N/A	0.94	ASTM D 1505
Melt Flow Index	4 or 5	maximum	g/10 min	<0.15	ASTM D 1238 (Condition E)
Flexural Modulus	5	minimum	lb/in^2	110,000	ASTM D 790
Tensile Strength	4 or 5	minimum	lb/in^2	3,000	ASTM D 638
Environmental Stress Crack	3	minimum	hrs	$F_{20} > 192$	ASTM D 1693
Hydrostatic Design Basis at 73°F	4	minimum	lb/in^2	1,600	ASTM D 2837
UV Stabilizer	C	minimum	% Carbon Black	2	ASTM D 1603

[END OF SECTION]

SECTION 02720

GEOTEXTILES

PART 1 GENERAL

1.01 SCOPE

A. This section includes geotextile products and installation.

1.02 RELATED SECTIONS AND PLANS

A. Section 02215 - Trenching and Backfilling

B. Section 02235 - Granular Drainage Materials

C. Section 02245 - Riprap

D. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) Standards:

1. ASTM D 3786. Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabric-Diaphragm Bursting Strength Test Method.
2. ASTM D 4355. Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water.
3. ASTM D 4491. Standard Test Method for Water Permeability of Geotextiles by Permittivity.
4. ASTM D 4533. Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
5. ASTM D 4632. Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
6. ASTM D 4751. Standard Test Method for Determining Apparent Opening Size of a Geotextile.
7. ASTM D 4833. Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
8. ASTM D 4873. Standard Guide for Identification, Storage, and Handling of Geotextiles.

9. ASTM D 5261. Standard Test Method for Measuring Mass Per Unit Area of Geotextiles.

B. Federal Standard No. 751a - Stitches, Seams, and Stitching.

1.04 SUBMITTALS

A. Submit the following to the Engineer for review not less than 21 calendar days prior to use.
   1. geotextile Manufacturer and product name;
   2. certification of minimum average roll values and the corresponding test procedures for all geotextile properties listed in Tables 02720-1 and 02720-2; and
   3. projected geotextile delivery dates.

B. Submit to the Engineer for review at least 14 calendar days prior to geotextile placement, manufacturing quality control certificates for each roll of geotextile as specified in this section.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The installation of geotextiles will be monitored by the CQA Consultant as required in the CQA Plan.

B. The CQA Consultant will perform material conformance testing of the geotextiles as required in the CQA Plan.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for these activities in the construction schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 GEOTEXTILE

A. Furnish geotextile products with minimum average roll values (95 percent lower confidence limit) meeting or exceeding the required property values in Tables 02720-1 (for geotextile filters) and 02720-2 (for geotextile separators).

B. Furnish geotextiles that are stock products.

C. Furnish geotextiles that are manufactured from first quality polymers, with not more than 20 percent reclaimed polymer used in production.

D. Furnish polymeric threads for stitching that are ultra-violet (UV) light stabilized to at least the same requirements as the geotextile to be sewn. Furnish polyester or polypropylene threads that have a minimum size of 2,000 denier.

2.02 MANUFACTURING QUALITY CONTROL

A. Sample and test the geotextile to demonstrate that the material conforms to the requirements of this section.

B. Perform manufacturing quality control tests to demonstrate that the geotextiles properties conform to the values specified in Tables 02720-1 and 02720-2. Perform as a minimum, the following manufacturing quality control tests at a minimum frequency of once per 50,000 square feet:

Test	Procedure
Mass per unit area	ASTM D 5261
Grab strength	ASTM D 4632
Tear strength	ASTM D 4533
Puncture strength	ASTM D 4833
Burst strength	ASTM D 3786

C. Perform additional manufacturing quality control tests on the geotextile filter at a minimum frequency of once per 100,000 square feet, to demonstrate that its apparent opening size (ASTM D 4751) and permittivity (ASTM D 4491) conform to the values specified in Table 02720-1.

D. Submit quality control certificates signed by the geotextile manufacturer quality control manager. The certificates shall state that the geotextiles are continuously inspected and are needle-free. The quality control certificates shall also include: lot, batch, and roll number and identification; and results of manufacturing quality control tests including description of test methods used.

E. Do not supply any geotextile roll that does not comply with the manufacturing quality control requirements.

F. If a geotextile sample fails to meet the quality control requirements of this section, sample and test rolls manufactured at the same time or in the same lot as the failing roll.

Continue to sample and test the rolls until the extent of the failing rolls are bracketed by passing rolls. Do not supply failing rolls.

2.03 PACKAGING AND LABELING

A. Supply geotextiles in rolls wrapped in relatively impermeable and opaque protective wrapping. Wrapping which becomes torn or damaged shall be repaired with similar materials.

B. Mark or tag geotextile rolls in accordance with ASTM D 4873 with the following information:
1. manufacturer's name;
2. product identification;
3. lot or batch number;
4. roll number; and
5. roll dimensions.

C. Geotextile rolls not labeled in accordance with this section or on which labels are illegible upon delivery to the site shall be rejected and replaced at no expense to the Owner.

2.04 TRANSPORTATION

A. Deliver geotextiles to the site at least 14 calendar days prior to the planned deployment date to allow the CQA Consultant adequate time to perform conformance testing on the geotextile samples as described in the CQA Plan.

2.05 HANDLING AND STORAGE

A. Protect geotextiles from sunlight, moisture, excessive heat or cold, puncture, mud, dirt, and dust or other damaging or deleterious conditions. Follow all geotextile manufacturer recommendations for handling and storage.

B. Store geotextile rolls on palates or other elevated structures. Do not store geotextile rolls directly on the ground.

C. Outdoor storage of geotextile rolls shall not exceed the manufacturer's recommendation or longer than 6 months, whichever is less.

PART 3 EXECUTION

3.01 PLACEMENT

A. Do not commence geotextile installation until the CQA Consultant completes conformance evaluation of the geotextiles and performance evaluation of previous work, including evaluation of Contractor's survey results for previous work.

B. Handle geotextiles so as to ensure they are not damaged in any way.

C. Take necessary precautions to prevent damage to underlying layers including rutting during placement of the geotextiles.

D. After unwrapping the geotextiles from its opaque cover, do not leave them exposed for a period in excess of 30 calendar days.

E. If white colored geotextiles are used, take precautions against "snowblindness" of personnel.

F. Examine the geotextile surface after installation to ensure that no potentially harmful foreign objects are present. Remove any such objects and replace any damaged geotextiles.

3.02 SEAMS AND OVERLAPS

A. Continuously overlap a minimum of 6 inches and sew filter geotextiles (i.e., spot sewing is not allowed) using a "single prayer" seam. Sew seams using Stitch Type 401 as per Federal Standard No. 751a. In lieu of sewing, geotextile filters may be overlapped a minimum of two feet.

B. Do not install horizontal seams on slopes that are steeper than 10 horizontal to 1 vertical. Seams shall be along, not across, the slopes.

C. Overlap separator geotextiles a minimum of 12 inches and ensure that the overlap is maintained.

3.03 REPAIR

A. Repair any holes or tears in the geotextiles using a patch made from the same geotextile material. Extend geotextile patches a minimum of 1 foot beyond the damaged area. Sew geotextile patches into place no closer than 1 inch from any panel edge. Should any tear exceed 50 percent of the width of the roll, remove and replace that roll.

B. Remove any soil or other material that may have penetrated the torn geotextiles.

3.04 PLACEMENT OF SOIL MATERIALS

A. Place soil materials on top of geotextiles in such a manner as to ensure that:
   1. the geotextiles and the underlying materials are not damaged; and
   2. slippage does not occur between the geotextile and the underlying layers during placement.

B. Spread soil on top of the geotextile to cause the soil to cascade over the geotextile rather than be shoved across the geotextile.

C. Place aggregate over geotextile separators as indicated on the Construction Drawings prior to trafficking.

D. Place soil over geotextile filters as indicated on the Construction Drawings prior to trafficking.

TABLE 02720-1

REQUIRED PROPERTY VALUES FOR GEOTEXTILE FILTER

PROPERTIES	QUALIFIER	UNITS	SPECIFIED[1] VALUES	TEST METHOD
Type				
nonwoven needlepunched				(-)
Polymer composition	minimum	%	95 polypropylene or polyester by weight	(-)
Mass per unit area	minimum	oz/yd^2	7	ASTM D 5261
Filter Requirements				
Apparent opening size (Θ_{95})	maximum	mm	0.21	ASTM D 4751
Permittivity	minimum	sec^{-1}	0.5	ASTM D 4491
Mechanical Requirements				
Grab strength	minimum	lb	180	ASTM D 4632[2]
Tear strength	minimum	lb	75	ASTM D 4533[3]
Puncture strength	minimum	lb	75	ASTM D 4833[4]
Burst strength	minimum	psi	350	ASTM D 3786
Durability				
Ultraviolet Resistance	minimum	%	70	ASTM D 4355

Notes:

(1) All values represent minimum average roll values.
(2) Minimum of values measured in machine and cross machine directions with 1 inch clamp on Constant Rate of Extension (CRE) machine.
(3) Minimum value measured in machine and cross machine direction.
(4) Tension testing machine with a 1.75-inch diameter ring clamp, the steel ball being replaced with 0.31-inch diameter solid steel cylinder with flat tip centered within the ring clamp.
(5) mm = millimeter
% = percent
oz/yd^2 = ounce per square yard
sec = second
lb = pound
psi = pound per square inch

TABLE 02720-2

REQUIRED PROPERTY VALUES FOR GEOTEXTILE SEPARATOR

PROPERTIES	QUALIFIER	UNITS	SPECIFIED[1] VALUES	TEST METHOD
Type				
nonwoven needlepunched				(-)
Polymer composition	minimum	%	95 polypropylene or polyester by weight	(-)
Mass per unit area	minimum	oz/yd^2	8	ASTM D 5261
Mechanical Requirements				
Grab strength	minimum	lb	180	ASTM D 4632[2]
Tear strength	minimum	lb	75	ASTM D 4533[3]
Puncture strength	minimum	lb	75	ASTM D 4833[4]
Burst strength	minimum	psi	350	ASTM D 3786
Durability				
Ultraviolet Resistance	minimum	%	70	ASTM D 4355

Notes:

(1) All values represent minimum average roll values.
(2) Minimum of values measured in machine and cross machine directions with 1 inch clamp on Constant Rate of Extension (CRE) machine.
(3) Minimum value measured in machine and cross machine direction.
(4) Tension testing machine with a 1.75-inch diameter ring clamp, the steel ball being replaced with 0.31-inch diameter solid steel cylinder with flat tip centered within the ring clamp.
(5) % = percent
oz/yd^2 = ounce per square yard
lb = pound
psi = pound per square inch

[END OF SECTION]

SECTION 02740

GEOCOMPOSITES

PART 1 GENERAL

1.01 SCOPE

A. This section includes geocomposite drainage layer products and installation.

1.02 RELATED SECTIONS AND PLANS

A. Section 02240 – Protective Soil Layers

B. Section 02770 – Geomembranes

C. Section 02780 – Geosynthetic Clay Liner

D. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) standards:

1. ASTM D 1505. Standard Test Method for Density of Plastics by the Density-Gradient Technique.
2. ASTM D 1603. Standard Test Method for Carbon Black in Olefin Plastics.
3. ASTM D 1777. Standard Method for Measuring Thickness of Textile Materials.
4. ASTM D 3786. Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabric - Diaphragm Bursting Strength Tester Method.
5. ASTM D 4491. Standard Test Method for Water Permeability of Geotextiles by the Permittivity Method.
6. ASTM D 4533. Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
7. ASTM D 4632. Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).

8.	ASTM D 4716.	Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
9.	ASTM D 4751.	Standard Test Method for Determining Apparent Opening Size of a Geotextile.
10.	ASTM D 4833.	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
11.	ASTM D 5261.	Standard Test Method for Measuring Mass Per Unit Area of Geotextiles.
12.	ASTM F 904.	Standard Test Method for Comparison of Bond Strength or Ply Adhesion of Similar Laminates Made from Flexible Materials.

B. Federal Standard No. 751a - Stitches, Seams, and Stitching.

1.04 SUBMITTALS

A. Submit the following to the Engineer for review at least 21 calendar days prior to use:
1. geocomposite Manufacturer and product names;
2. certification of minimum average roll values and the corresponding test procedures for all geocomposite properties listed in Tables 02740-1 and 2; and
3. projected geocomposite delivery dates.

B. Submit to the Engineer for review at least 14 calendar days prior to geocomposite placement, manufacturing quality control certificates for each roll of geocomposite as specified in this section.

C. For each proposed geocomposite material, the Contractor shall submit to the Engineer for review at least 14 calendar days prior to transporting the geocomposite to site the results of manufacturing quality control testing and certification that the geocomposite is manufactured to meet the minimum interface shear strength criteria when tested in compliance with requirements of this section.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The installation of the geocomposite drainage layers will be monitored by the CQA Consultant as required by the CQA Plan.

B. The CQA Consultant will perform material conformance testing of the geocomposites as required by the CQA Plan.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for these activities in the installation schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

PART 2 PRODUCT

2.01 GEOCOMPOSITE

A. Furnish geocomposite drainage layer materials consisting of a two or more strand polyethylene geonet core with a needle-punched nonwoven geotextile heat laminated to each side of the geonet core.

B. Furnish geocomposite for the primary and secondary leachate collection and final cover drainage layer having properties meeting the required property values shown in Table 02740-1. Required geocomposites properties shall be considered minimum average roll values (95 percent lower confidence limit).

C. Furnish geocomposites that are stock products.

D. In addition to the property values listed in Tables 02740-1 and 02740-2, the geocomposites shall:
1. retain their structure during handling, placement, and long-term service; and
2. be capable of withstanding outdoor exposure for a minimum of 30 days with no measurable deterioration.

E. Furnish geocomposite that meets the shear strength requirements of this section as tested by an approved testing laboratory. Tests will be performed in accordance with ASTM D 5321 and as specified below on representative samples of geosynthetics and soil destined for use on this project. The source of the representative samples will be provided with the test results. The geocomposite shall be tested for interface shear strength of representative samples of geocomposite with each geosynthetic or soil component in contact with the geocomposite (i.e., geocomposite and liner protective soil, geocomposite and 60-mil textured HDPE geomembrane, geocomposite and cover protective soil, and geocomposite and 40-mil textured PE geomembrane).

Note: geocomposite and geosynthetic clay liner interface is to be tested in accordance with Section 02780. The certified testing laboratory shall follow the specific procedures and conditions listed below:

1. Place the materials to be tested with their machine directions aligned in the direction of shear in the shear box. For the interface shear strength tests,
    a. Case 1: use a test specimen configuration of (from bottom to top): rigid substrate with textured gripping surface, 60-mil textured HDPE geomembrane, geocomposite, and rigid substrate with textured gripping surface.
    b. Case 2: use a test specimen configuration of (from bottom to top): rigid substrate with textured gripping surface, 40-mil textured PE geomembrane, geocomposite, and rigid substrate with textured gripping surface.
    c. Case 3: use a test specimen configuration of (from bottom to top): rigid substrate with textured gripping surface, 60-mil textured HDPE geomembrane, geocomposite, liner protective soil, and rigid substrate with textured gripping surface.
    d. Case 4: use a test specimen configuration of (from bottom to top): rigid substrate with textured gripping surface, 40-mil textured PE geomembrane, geocomposite, cover protective soil, and rigid substrate with textured gripping surface.
2. Perform the direct shear tests for Cases 1 and 3 at normal stresses of 50, 125, and 175 pounds per square inch. For Cases 2 and 4, perform the direct shear tests at normal stresses of 100, 250, and 500 pounds per square foot. Report the peak and large-displacement (2-inch displacement) shearing resistance for each test.
3. Use fresh specimens for each normal stress.
4. Repeat any tests for which the shear displacements do not occur along the desired interface
5. Cases 1 and 3 shall have an effective interface shear strength envelope that exceeds that characterized by an average effective friction angle of 10° and an effective adhesion of zero when tested according to ASTM D 5321 using the materials proposed for this project. Cases 2 and 4 shall have an effective interface shear strength envelope that exceeds that characterized by an effective friction angle of 27° and an effective adhesion of zero when tested according to ASTM D 5321 using the materials proposed for this project.

F. Furnish polymeric threads for stitching that are ultra-violet (UV) light stabilized to at least the same requirements as the geotextile to be sewn. Furnish polyester or polypropylene threads that have a minimum size of 2,000 denier.

G. Furnish geocomposite meeting the transmissivity requirements in Table 02740-1 as tested by an approved testing laboratory. The transmissivity of the geocomposites for liner system construction shall be tested in accordance with ASTM D 4716 to demonstrate that the design transmissivity will be maintained for the design period of the facility. The testing of the liner system geocomposites shall be conducted using the actual boundary materials intended for the geocomposite at the normal load of 25,000 pounds per square foot and the normal design load of 500 pounds per square foot. The testing of the cover system geocomposite shall be conducted using the actual boundary materials intended for the geocomposite at the normal load of 500 psf. At the normal loads, testing shall be conducted for a minimum period of 100 hours unless data equivalent to the 100-hour period is provided in which case the test shall be conducted for a minimum period of 1 hour.

2.02 MANUFACTURING QUALITY CONTROL

A. Sample and test the geotextile and geonet components of the geocomposite to demonstrate that these materials conform to the requirements of this section.

B. Perform manufacturing quality control tests to demonstrate that the geotextile properties conform to the values specified in Tables 02740-1 and 02740-2. Perform as a minimum, the following manufacturing quality control tests at a minimum frequency of once per 50,000 square feet:

Test	Procedure
Mass per unit area	ASTM D 5261
Grab strength	ASTM D 4632
Tear strength	ASTM D 4533
Puncture strength	ASTM D 4833
Burst strength	ASTM D 3786

C. Perform additional manufacturing quality control tests on the geotextile, at a minimum frequency of once per 100,000 square feet, to demonstrate that its apparent opening size (per ASTM D 4751) and permittivity (per ASTM D 4491) conform to the values specified in Tables 02740-1 and 02740-2.

D. Perform manufacturing quality control tests to demonstrate that the geonet drainage core properties conform to the values specified in Tables 02740-1 and 02740-2. Perform as a minimum, the following manufacturing quality control tests at a minimum frequency of once per 50,000 square feet:

Test	Procedure
Polymer density	ASTM D 1505
Carbon black	ASTM D 1603
Thickness	ASTM D 1777

E. Perform additional manufacturing quality control tests, at a minimum frequency of once per 100,000 square feet, to demonstrate that the geocomposite drainage layers conform to the hydraulic transmissivity (per ASTM D 4716) and peel strength (per ASTM F 904) requirements of Tables 02740-1 and 02740-2.

F. Submit quality control test certificates signed by the geotextile, geonet, and geocomposite manufacturer quality control manager. The quality control certificates shall include:
1. lot, batch, and roll number and identification; and
2. results of manufacturing quality control tests including description of test methods used.

G. Do not supply any geocomposite roll that does not comply with the manufacturing quality control requirements.

H. If a geotextile, geonet, or geocomposite sample fails to meet the quality control requirements of this section, sample and test rolls manufactured at the same time or in the same lot as the failing roll. Continue to sample and test the rolls until the extent of the failing rolls are bracketed by passing rolls. Do not supply failing rolls.

2.03 PACKING AND LABELING

A. The geocomposite shall be supplied in rolls wrapped in relatively impermeable and opaque protective covers.

B. Geocomposite rolls shall be labeled with the following information.
1. Fabricator's name;
2. product identification;
3. lot or batch number;
4. roll number; and
5. roll dimensions.

C. Geocomposite rolls not labeled in accordance with this section or on which labels are illegible upon delivery to the site shall be rejected and replaced with properly labeled rolls at no additional cost to the Owner.

D. If any special handling is required, it shall be so marked on the geotextile component e.g., "This Side Up" or "This Side Against Soil To Be Retained".

2.04 TRANSPORTATION

A. Geocomposites shall be delivered to the site at least 21 days prior to the planned deployment date to allow the CQA Consultant adequate time to perform conformance testing on the geocomposite samples as required by the CQA Plan.

2.05 HANDLING AND STORAGE

A. The Contractor shall be responsible for storage of the geocomposite at the site.

B. Handling and care of the geocomposite prior to and following installation at the site, is the responsibility of the Contractor. The Contractor shall be liable for all damage to the materials incurred prior to final acceptance by the Owner.

C. The geocomposite shall be stored off the ground and out of direct sunlight, and shall be protected from excessive heat or cold, mud, dirt, and dust. Any additional storage procedures required by the manufacturer shall be the Contractor's responsibility.

PART 3 EXECUTION

3.01 PLACEMENT

A. The Contractor shall not commence geocomposite installation until the CQA Consultant completes conformance evaluation of the geocomposite and quality assurance evaluation of previous work, including evaluation of Contractor's survey results for previous work.

B. For geocomposite with directional hydraulic transmissivity, the Contractor shall install the geocomposite with the high transmissivity direction (usually the roll direction) in the downgradient direction and perpendicular to elevation contours.

C. The Contractor shall handle the geocomposite in such a manner as to ensure the geocomposite is not damaged in any way.

D. The Contractor shall take any necessary precautions to prevent damage to underlying layers during placement of the geocomposite.

E. The geocomposite shall only be cut using manufacturer's recommended procedures.

F. In the presence of wind, all geocomposite panels shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with cover material.

G. Care shall be taken during placement of geocomposite not to entrap dirt or excessive dust in the geocomposite that could cause clogging of the drainage system, and/or stones that could damage the adjacent geomembrane. Care shall be exercised when handling sandbags, to prevent rupture or damage of the sandbags.

H. If necessary, the geocomposite shall be positioned by hand after being unrolled over a smooth rub sheet.

I. Tools shall not be left on, in, or under the geocomposite.

J. After unwrapping the geocomposite from its opaque cover, the geocomposite shall not be left exposed for a period in excess of 30 days.

K. If white colored geotextile is used in the geocomposite, precautions shall be taken against "snowblindness" of personnel.

3.02 SEAMS AND OVERLAPS

A. The components of the geocomposite (i.e., geotextile, geonet, and geotextile) are not bonded together at the ends and edges of the rolls. Each component will be secured or seamed to the like component of adjoining panels.

B. Geotextile Components:
   1. The bottom layers of geotextile shall be overlapped. The top layers of geotextiles shall be continuously sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped a minimum of 6 inches prior to seaming.
   2. No horizontal seams shall be allowed higher than one-third the slope height on slopes steeper than 10 horizontal to 1 vertical.
   3. Polymeric thread, with chemical resistance properties equal to or exceeding those of the geotextile component, shall be used for all

sewing. The seams shall be sewn using Stitch Type 401 per Federal Standard No. 751a. The seam type shall be Federal Standard Type SSN-1.

3.03 REPAIR

A. Any holes or tears in the geocomposite shall be repaired by placing a patch extending 2 ft beyond the edges of the hole or tear. The patch shall be secured by tying fasteners through the bottom geotextile and the geonet of the patch, and through the top geotextile and geonet on the slope. The patch shall be secured every 6 inches with approved tying devices. The top geotextile component of the patch shall be heat sealed to the top geotextile of the geocomposite needing repair. If the hole or tear width across the panel is more than 50 percent of the width of the panel, the damaged area shall be cut out and the two portions of the geonet shall be joined in accordance with this section.

B. All repairs shall be performed at no additional cost to the Owner.

3.04 PLACEMENT OF SOIL MATERIALS

A. The Contractor shall place all soil materials in such a manner as to ensure that:
   1. the geocomposite and underlying geosynthetic materials are not damaged;
   2. minimal slippage occurs between the geocomposite and underlying layers; and
   3. excess tensile stresses are not produced in the geocomposite.

B. Spread soil on top of the geocomposite from the bottom of slopes upward to cause the soil to cascade over the geocomposite rather than be shoved across the geocomposite.

C. For geocomposites overlying the geomembrane, do not place overlying soil material at ambient temperatures below 40 degrees Fahrenheit (F) or above 104°F, unless authorized in writing by the Engineer. For cold (<40°F) and hot (>104°F) weather placement operations, use the additional procedures authorized in writing by the Engineer.

D. Do not drive equipment directly on the geocomposite. Only use equipment above a geocomposite overlying a geomembrane that meets the following ground pressure requirements above the geomembrane:

Maximum Allowable Equipment Ground Pressure (pounds per square inch)	Minimum Thickness of Overlying Soil (inches)
<5	12
<10	18
<20	24
>20	36

TABLE 02740-1
PRIMARY AND FINAL COVER GEOCOMPOSITE PROPERTY VALUES

PROPERTIES	QUALIFIER	UNITS	SPECIFIED VALUES (1)	TEST METHOD
Geonet Component:				
Polymer composition	Minimum	%	95 polyethylene by weight	--
Polymer density	Minimum	g/cm^3	0.93	ASTM D 1505
Carbon black content	Range	%	2 - 3	ASTM D 1603
Nominal thickness	Minimum	Mil	200	ASTM D 1777
Geotextile Component:				
Type	None	none	needlepunched nonwoven	--
Polymer composition	Minimum	%	95 polyester or polypropylene	
Mass per unit area	Minimum	oz/yd^2	6	ASTM D 5261
Apparent opening size	Maximum	mm	$O_{95} \leq 0.21$ mm	ASTM D 4751
Permittivity	Minimum	sec^{-1}	0.5	ASTM D 4491
Grab strength	Minimum	lb	180	ASTM D 4632 (2)
Tear strength	Minimum	Lb	75	ASTM D 4533 (2)
Puncture strength	Minimum	Lb	75	ASTM D 4833 (3)
Geocomposite				
Transmissivity	Minimum	m^2/s	See notes 4, 5, and 6	ASTM D 4716
Peel strength	Minimum	g/in.	500	ASTM F 904

Notes:
1. All values represent minimum average roll values.
2. Minimum value measured in machine and cross-machine direction.
3. Tension testing machine with a 1.75-inch diameter ring clamp, the steel ball being replaced with 0.31-inch diameter solid steel cylinder with flat tip centered within the ring clamp.
4. The design transmissivity of the geocomposite drainage layer used for the primary leachate collection layer is measured using water at 68°F with a gradient of 0.02 under compressive stresses of 500 psf and of 25,000 psf for 100 hours. For the test, the geocomposite shall be sandwiched between 60-mil textured HDPE geomembrane and soil actually used for the liner protective layer. The minimum required transmissivities are 7.8×10^{-3} m^2/s and 2.6×10^{-3} m^2/s under the compressive stresses of 500 psf and 25,000 psf, respectively.

TABLE 02740-1 (Continued)

5. The design transmissivity of the geocomposite drainage layer used for the secondary leachate collection layer is measured using water at 68°F with a gradient of 0.02 under compressive stresses of 500 psf and 25,000 psf for 100 hours. For the test, the geocomposite shall be sandwiched between geosynthetic clay liner (GCL) and 60-mil textured HDPE geomembrane. The minimum required transmissivities are 2.4 x 10^{-3} m^2/s and 3.5 x 10^{-4} m^2/s under the compressive stresses of 500 psf and 25,000 psf, respectively.
6. The design transmissivity of the geocomposite drainage layer used for the final cover drainage layer is measured using water at 68°F with gradient of 0.25 under a compressive stress of 500 psf for 100 hours. For the test, the geocomposite shall be sandwiched between 40-mil textured PE geomembrane and soil actually used for the cap protective layer. The minimum required transmissivity is 4.5 x 10^{-3} m^2/s under the compressive stress of 500 psf.

[END OF SECTION]

SECTION 02770

GEOMEMBRANES

PART 1 GENERAL

1.01 SCOPE

A. The section includes geomembrane products and installation.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 - Surveying

B. Section 02200 - Earthwork

C. Section 02215 - Trenching and Backfilling

D. Section 02740 - Geocomposites

E. Section 02780 - Geosynthetic Clay Liner (GCL)

F. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of the American Society for Testing and Materials (ASTM) standards:

1. ASTM D 638. Standard Test Method for Tensile Properties of Plastics.
2. ASTM D 746. Standard Test Method for Brittleness, Temperature of Plastics and Elastomers by Impact.
3. ASTM D 792. Standard Test Methods for Specific Gravity (Relative Density) and Density of Plastics by Displacement.
4. ASTM D 1004. Standard Test Method of Initial Tear Resistance of Plastic Film and Sheeting.
5. ASTM D 1204. Standard Plastics Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.

6. ASTM D 1238. Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
7. ASTM D 1505. Standard Test Methods for Density of Plastics by Density-Gradient Technique.
8. ASTM D 1603. Standard Test Method for Carbon Black in Olefin Plastics.
9. ASTM D 1693. Standard Test Method for Environmental Stress Cracking of Ethylene Plastics
10. ASTM D 4437. Standard Test Methods for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Geomembranes.
11. ASTM D 5199. Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.
12. ASTM D 5321. Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
13. ASTM D 5397. Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.
14. ASTM D 5596. Recommended Practice for Microscopical Examination of Pigment Dispersion in Plastic Compounds.
15. ASTM D 5994. Standard Test Method for Measuring the Core Thickness of Textured Geomembranes.
16. ASTM D 6392. Standard Test Methods for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
17. ASTM E96-00. Standard Test Methods for Water Vapor Transmission of Materials (Procedure BW).

B. Latest version of the Geosynthetic Research Institute (GRI) test methods:
   1. GRI-GM13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.

C. Latest version of Federal Test Method Standard (FTMS).
   1. FTMS 101/2065 Federal Test Method Standard for Puncture Resistance and Elongation Test (1/8 Inch Radius Probe Method).

D. Latest version of National Sanitation Foundation (NSF) 54, Flexible Membrane Liners, Annex A.

1.04 WARRANTY

A. Furnish a 20-year written warranty against defects in materials. Warranty conditions concerning limits of liability will be evaluated by, and be acceptable to, the Engineer.

1.05 SUBMITTALS

A. Submit the following information to the Engineer for review not less than 45 calendar days prior to geomembrane use.
   1. Geomembrane manufacturer capabilities, including:
      a. daily production capacity available for this Contract; and
      b. manufacturing quality control procedures.
   2. A list of 10 completed facilities for which the manufacturer has supplied a minimum total of 10,000,000 square feet of polyethylene geomembrane. Provide the following information for each facility:
      a. name, location, purpose of facility, and date of installation;
      b. names of owner, project manager, design engineer, and installer; and
      c. thickness and surface area of geomembrane provided.
   3. Origin (resin supplier's name, resin production plant) and identification (brand name, number) of the polyethylene resin used.
   4. Certification of minimum average roll values (95 percent lower confidence limit) for physical, mechanical, and environmental properties and the corresponding test procedures for the geomembrane properties listed in Table 02770-1. Submit values that are specific to the resin used in manufacture.
   5. Certification that welding rod or granules are compatible with the specifications and the resin of the geomembrane furnished for this project
   6. Manufacturer warranty as specified in this section.

B. Submit to the Engineer for review not less than 30 calendar days prior to geomembrane use the following documentation on the resin used to manufacture the geomembranes:
   1. Copies of quality control certificates issued by the resin supplier including the production dates and origin of the resin used to manufacture the geomembrane for this Contract.
   2. Results of tests conducted by the manufacturer to verify the quality of the resin used to manufacture the geomembrane rolls assigned to the project.
   3. Certification that no reclaimed polymer is added to the resin during the manufacturing of the geomembrane to be used for this project.

C. Submit to the Engineer for review the following documentation on geomembrane roll production at least 14 calendar days prior to transporting any geomembrane to the site.
   1. Manufacturing certificates for each shift's production of geomembrane, signed by the manufacturer quality control manager.

2. Certificate shall include:
   a. roll numbers and identification;
   b. sampling procedures; and
   c. results of manufacturer quality control tests, including descriptions of the test methods used (the manufacturer quality control tests to be performed are given in Part 2 of this section).

D. Submit to the Engineer for review the following information from the installer at least 14 calendar days prior to mobilization of the installer to the site.
   1. Layout drawings showing the installation layout identifying geomembrane panel configurations, dimensions, details, locations of seams, as well as any variance or additional details which deviate from the Construction Drawings. The layout drawings shall be adequate for use as a construction plan and shall include dimensions, details, etc. The layout drawings, as modified and/or approved by the Engineer, shall become part of the contract.
   2. Installation schedule.
   3. Copy of installer's letter of approval or license by the manufacturer.
   4. Installation capabilities, including:
      a. information on equipment proposed for this project;
      b. average daily production anticipated for this project; and
      c. quality control procedures to include quality control organization.
   5. A list of 10 completed facilities for which the installer has installed a minimum of 5,000,000 square feet of polyethylene geomembrane. The following information shall be provided for each facility:
      a. the name and purpose of the facility, its location, and dates of installation;
      b. the names of the owner, project manager, and geomembrane manufacturer;
      c. name and qualifications of the supervisor of the installation crew;
      d. thickness and surface area of installed geomembrane;
      e. type of seaming and type of seaming apparatus used; and
      f. duration of installation.
   6. Resumes of the installer superintendent and quality control chief to be assigned to this project, including dates and duration of employment.
   7. Resumes of all personnel who will perform seaming operations on this project, including dates and duration of employment.
   8. Evidence that the installation crew has the following experience.
      a. The superintendent shall have supervised the installation of a minimum of 2,000,000 square feet of polyethylene geomembrane.
      b. At least one seamer shall have experience seaming a minimum of 500,000 square feet of polyethylene geomembrane using the same type of seaming apparatus to be used at this site. Seamers with such experience will be designated "master seamers" and shall provide direct supervision over less experienced seamers.

c. All other seaming personnel shall have seamed at least 100,000 square feet of polyethylene geomembrane using the same type of seaming apparatus to be used at this site. Personnel who have seamed less than 100,000 square feet of seams shall be allowed to seam only under the direct supervision of the master seamer or Superintendent.

E. Submit to the Engineer for review at least 14 days prior to geomembrane placement, a certificate of calibration less than 12 months old for the field tensiometer. Tensiometer shall be calibrated within one year of date of test. Calibration shall be traceable to national or industry recognized standards where possible.

F. Submit subgrade acceptance certificates, signed by the Installer, for each area to be covered by the geomembrane prior to that area being covered by geomembrane.

G. Within 14 calendar days of completion of the geomembrane installation, submit to the Engineer the executed installation warranty as specified in this section.

1.06 CONSTRUCTION QUALITY ASSURANCE

A. The construction of the geomembrane component of the liner system and final cover system will be monitored by the CQA Consultant as required in the CQA Plan.

B. The CQA Consultant will perform material conformance testing of geomembrane materials and installation quality assurance testing of the geomembrane liner and cover seams.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for these activities in the construction schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 RESIN

A. Provide geomembrane manufactured from new, first-quality polyethylene resin. Do not add reclaimed polymer to the resin. The use of polymer recycled during the manufacturing process is permitted if performed with appropriate cleanliness and if the recycled polymer during the manufacturing process does not exceed 2 percent by weight of the total polymer weight.

B. Use high density polyethylene (HDPE) resin for liner system geomembranes having the following properties:
   1. Specific Gravity: 0.935 minimum (ASTM D 792 Method A, or ASTM D 1505)
   2. Melt Index: 1.0 g/10 min., maximum (ASTM D 1238 Condition E)

C. Use polyethylene (PE) resin for final cover geomembrane having the following properties:
   1. Specific Gravity: 0.915 minimum (ASTM D 792 Method A, or ASTM D 1505)
   2. Melt Index: 1.0 g/10 min., maximum (ASTM D 1238 Condition E)

2.02 GEOMEMBRANE PROPERTIES

A. Furnish 60-mil HDPE textured geomembranes having properties that comply with the required values shown in Table 02770-1.

B. Furnish 40-mil PE smooth and textured geomembranes having properties that comply with the required values shown in Table 02770-3.

C. The geomembrane for the liner system construction shall have an effective interface (i.e., geomembrane to GCL and geomembrane to geocomposite) shear strength envelope that exceeds that characterized by an effective friction angle of 10° and an effective adhesion of zero when tested according to ASTM D 5321 at a confining stresses of 50, 125 and 200 pounds per square inch.

D. The geomembrane for the final cover system construction shall have an effective interface (i.e., geomembrane to soil and geomembrane to geocomposite) shear strength envelope that exceeds that characterized by an effective friction angle of 27° and an effective adhesion of zero when tested according to ASTM D 5321 at a confining stresses of 100, 250 and 500 pounds per square foot.

E. In addition, furnish geomembrane that:
   1. contains a maximum of 1 percent by weight of additives, fillers, or extenders not including carbon black;
   2. does not have striations, pinholes, bubbles, blisters, nodules, undispersed raw materials, or any sign of contamination by foreign matter on the surface or in the interior;
   3. is free of holes, blisters, modules, undispersed raw materials, or any sign of contamination by foreign matter; and
   4. is manufactured in a single layer (thinner layers shall not be welded together to produce the final required thickness).

2.03 MANUFACTURING QUALITY CONTROL

A. Resin:

1. Sample and test resin at a minimum frequency of one test per rail car to demonstrate that the resin complies with the requirements of this section. Perform tests on resin after the addition of additives to the virgin resin. Certify in writing that the resin meets the requirements of this section.
2. Do not use any noncomplying resin.

B. Rolls:

1. Continuously monitor for geomembrane defects during manufacture. Geomembranes shall be subjected to continuous spark testing by the Manufacturer at the factory.
2. Do not supply geomembrane that exhibits any defects.
3. Regularly monitor for geomembrane thickness during manufacture.
4. Do not supply geomembrane that fails to meet the specified thickness.
5. Sample and test the geomembrane, to demonstrate that its properties conform to the values specified in Table 02770-1 and 02770-3. Perform the following quality control tests at a minimum of once every 50,000 square feet, with the exception of thickness, which shall be measured for each roll:

Test	Procedure
thickness	ASTM D 5199 (smooth) or ASTM D 5994 (textured)
yield strength	ASTM D 638
yield elongation	ASTM D 638
tensile strength	ASTM D 638
tensile elongation	ASTM D 638
tear resistance	ASTM D 1004
carbon black	ASTM D 1603
carbon black dispersion	ASTM D 5596
specific gravity	ASTM D 792, Method A or ASTM D 1505

6. If a geomembrane sample fails to meet the quality control requirements of this Section, sample and test rolls manufactured, in the same resin batch, or at the same time, as the failing roll. Continue to sample and test the rolls until the extent of the failing rolls are bracketed by passing rolls. Do not supply any failing rolls.
7. The following tests shall be run a minimum of once per every 400,000 square feet. Provide written certification that the geomembrane meets the material requirements as per the following test procedures. Provide written certification that these tests

have been performed on geomembrane samples representative of rolls delivered to the site.

Test	Procedure
environmental stress crack	ASTM D 5397
low temperature brittleness	ASTM D 746, Procedure B
dimensional stability	ASTM D 1204
water vapor transmission rate	ASTM E96-00

C. Permit the CQA Consultant and/or Engineer to visit the manufacturing plant for project specific visits. If possible, such visits will be prior to, or during, the manufacturing of the geomembrane rolls for this project.

2.04 LABELING

A. Label the geomembrane rolls with the following information.
   1. thickness of the material;
   2. length and width of the roll;
   3. name of Manufacturer;
   4. product identification;
   5. lot number; and
   6. roll number.

B. Geomembrane rolls not labeled in accordance with this Section or on which labels are illegible upon arrival at the site will be rejected and replaced at no additional expense to the Owner.

2.05 TRANSPORTATION, HANDLING AND STORAGE

A. Deliver geomembranes to the site at least 14 calendar days prior to the planned deployment date to allow the CQA Consultant adequate time to perform conformance testing on the geomembrane samples as described in the CQA Plan.

B. Provide proper handling and storage of the geomembrane at the site. Protect the geomembrane from excessive heat or cold, dirt, puncture, cutting, or other damaging or deleterious conditions. Provide any additional storage procedures required by the Manufacturer.

C. Store geomembrane rolls on pallets or other elevated structures. Do not store geomembrane rolls directly on the ground surface. Do not store more than 3 rolls high.

PART 3 EXECUTION

3.01 FAMILIARIZATION

A. Prior to implementing any of the work described in this section, the Contractor shall become thoroughly familiar with all portions of the work falling within this section.

B. Inspection:
   1. Prior to implementing any of the work in this section, the Contractor shall carefully inspect the installed work of all other sections and verify that all work is complete to the point where the installation of this section may properly commence without adverse impact.
   2. If the Contractor has any concerns regarding the installed work of other sections, the Contractor shall immediately notify the Engineer in writing. Failure to inform the Engineer in writing or continuance of installation of the geomembrane will be construed as the Contractor's acceptance of the related work of all other sections.

3.02 SUBGRADE SURFACE PREPARATION

A. The Contractor shall provide certification in writing that the surface on which the geomembrane will be installed is acceptable. Where a GCL is installed on the subgrade prior to the geomembrane, the Contractor shall inspect the subgrade prior to GCL installation. This certification of acceptance shall be given to the CQA Consultant prior to commencement of geomembrane installation in the area under consideration.

B. Special care shall be taken to maintain the prepared surface.

C. No geomembrane shall be placed onto areas of standing water or hydrated GCL

D. Any damage to the GCL or prepared subgrade caused by installation activities shall be repaired at the Contractor's expense.

3.03 GEOMEMBRANE DEPLOYMENT

A. General:

1. Textured geomembrane is to be used for all liner construction and on the side slopes of the final cover system as indicated on the Construction drawings. Smooth geomembrane will be used on top of landfill and for the secondary containment for the leachate storage containers as indicated on the Construction Drawings.
2. The Contractor shall produce layout drawings prior to geomembrane deployment. These drawings shall indicate the geomembrane configuration, dimensions, details, locations of seams, etc. The layout drawings must be approved by the Engineer prior to the installation of any geomembranes. The layout drawings, as modified and/or approved by the Engineer, shall become part of these specifications.
3. Do not deploy geomembrane until the layout drawings are approved by the Engineer.
4. Do not deploy a geomembrane panel in an area until the CQA Consultant has been provided with a certificate of subgrade acceptance for that area.
5. Do not deploy geomembranes until CQA Consultant completes conformance evaluation of the geomembrane and performance evaluation of previous work, including evaluation of Contractor's survey results for previous work.
6. Deploy each geomembrane panel in accordance with the approved layout drawings.

B. Field Panel Identification:

1. A geomembrane field panel is a roll or a portion of roll cut in the field.
2. Give each field panel an identification code (number or letter-number). This identification code shall be agreed upon by the CQA Consultant and the Installer.

C. Field Panel Placement:

1. Place each geomembrane panel one at a time and seam each panel immediately after its placement.
2. Use temporary rub sheets as required to prevent displacement or damage to underlying geosynthetics. High spots in geomembrane-backed geosynthetic clay liners shall be covered by a temporary rub sheets during placement of geomembrane.
3. Do not place geomembrane panels when the ambient temperature is below 40° Fahrenheit (F), unless authorized in writing by the Engineer. For cold weather (<40°F) deployment, use the additional procedures authorized in writing by the Engineer.
4. Do not place geomembranes during any precipitation, in the presence of heavy fog or dew, in an area of ponded water, or in the presence of high wind.
5. Ensure that:
   a. No vehicular traffic drives directly on the geomembrane.

b. Equipment used does not damage the geomembrane by handling, trafficking, or leakage of hydrocarbons (i.e., fuels).
c. Personnel working on the geomembrane do not smoke, bring glass onto the geomembrane, or engage in other activities that could damage the geomembrane.
d. The method used to unroll the panels does not scratch or crimp the geomembrane and does not damage lower geosynthetics or the supporting soil.
e. The method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels). The method used to place the panels results in intimate contact with geosynthetic clay liner. Adjust or repair any area of geomembrane wrinkles where the wrinkle height, measured perpendicular to the slope during the hottest portion of the day, is more than 4 inches.
f. The method used to place the panels does not cause the panels to lift up or trampoline during the coolest portion of the day.
g. The geomembrane is anchored or weighted with sandbags, or the equivalent, to prevent damage or uplift from wind. Install sufficient anchoring or weighting to prevent uplift and maintain such system until overlying material is placed.

6. Replace any field panel or portion thereof that becomes damaged (torn, twisted, or crimped). Remove from the work area damaged panels or portions of damaged panels.

D. Do not install geomembrane between one hour before sunset and one hour after sunrise unless approved by the Engineer.

3.04 FIELD SEAMING

A. Personnel shall be experienced as specified in this section. Do not perform seaming unless a "master seamer" and the CQA Consultant are on-site.

B. Orient seams parallel to the line of maximum slope (i.e., oriented down, not across, the slope). Minimize the number of seams in corners and at odd-shaped geometric locations. No horizontal seam shall be less than 10 feet from the toe of the slope, except where approved by the Engineer. Do not locate seams at an area of potential stress concentration.

C. Weather Conditions for Seaming:

1. Do not seam geomembrane at ambient temperatures below 40°F or above 104°F, unless authorized in writing by the Engineer. For cold (<40°F) or hot (>104°F) weather seaming, use the additional procedures authorized in writing by the Engineer.

2. Measure ambient temperatures between 0 to 6 inches above the geomembrane surface.
3. In all cases the geomembrane seam areas shall be dry and protected from wind.

D. Overlapping and Temporary Bonding:
1. Sufficiently overlap geomembrane panels for welding and to allow peel tests to be performed on the seam. Any seams that cannot be destructively tested because of insufficient overlap are failing seams.
2. Control the temperature of the air at the nozzle of heat bonding apparatus such that the geomembrane is not damaged.

E. Seam Preparation:
1. Prior to seaming, clean the seam area and ensure that area to be bonded is free of moisture, dust, dirt, debris of any kind, and foreign material.
2. If seam overlap grinding is required, complete the process according to the Manufacturer's instructions or within 60 minutes of the seaming operation. Do not grind to a depth that exceeds ten percent of the geomembrane thickness. Grinding marks shall not appear beyond 0.25 inch of the extrudate after it is placed.
3. Align seams with the fewest possible number of wrinkles and "fishmouths".

F. General Seaming Requirements:
1. Extend seams to the outside edge of panels to be placed in the anchor trench.
2. If required, place a firm substrate such as a flat board or similar hard surface directly under the seam overlap to achieve proper support.
3. Cut fishmouths or wrinkles at the seam overlaps along the ridge of the wrinkle to achieve a flat overlap. Seam the cut fishmouths or wrinkles and patch any portion where the overlap is less than 6 inches with an oval or round patch of geomembrane that extends a minimum of 6 inches beyond the cut in all directions.
4. Place the electric generator used for power supply to the welding machines outside the area to be lined or mount it on soft tires such that no damage occurs to the geomembrane. Properly ground the electric generator. Place a smooth insulating plate or fabric beneath the hot welding apparatus after use.

G. Seaming Process:
1. Approved processes for field seaming are extrusion welding and fusion welding. The primary method of welding shall be fusion. Seaming equipment shall not damage the geomembrane. Use only geomembrane Manufacturer-approved equipment.
2. Extrusion Equipment and Procedures:
   a. Maintain at least one spare operable seaming apparatus on site.
   b. Equip extrusion welding apparatus with gauges giving the temperature in the apparatus and at the nozzle.

c. Prior to beginning a seam, purge the extruder until all heat-degraded extrudate has been removed from the barrel. Whenever the extruder is stopped, purge the barrel of all heat-degraded extrudate.

3. Fusion Equipment and Procedures:
   a. Maintain at least one spare operable seaming apparatus on site.
   b. Fusion-welding apparatus shall be automated self-propelled devices equipped with gauges giving the applicable temperatures and pressures.
   c. Fusion-welding apparatus shall produce a double-track seam.
   d. Abrade the edges of cross seams to a smooth incline (top and bottom) prior to extrusion welding.

H. Trial Seams:

1. Make trial seams on excess pieces of geomembrane to verify that seaming conditions are adequate. Conduct trial seams on the same material to be installed and under similar field conditions as production seams. Conduct trial seaming at the beginning of each seaming period, and at least once each five hours, for each seaming apparatus used that day prior to seaming. Also, each seamer shall make at least one trial seam each day, for each day that seaming is performed by that seamer. Conduct trial seaming under the same conditions as the actual seaming. Prepare trial seams that are at least 15 feet long by 1 foot wide (after seaming) with the seam centered lengthwise for fusion equipment and at least 3 feet long by 1 foot wide for extrusion equipment. Prepare seam overlap as indicated in the "Overlapping and Temporary Bonding" Article of this Part.
2. Cut four specimens, each 1.0 inch wide, from the trial seam sample. Test two specimens in shear and two in peel, using a field tensiometer. The test specimens shall not fail in the seam. If a specimen fails, repeat the entire operation. If the additional specimen fails, do not accept the seaming apparatus or seamer until the deficiencies are corrected and two consecutive successful trial seams are achieved. A seamer may start production seaming prior to testing of the trial seams. In the event the trial seam fails, all production seams by the seamer are failed seams.

I. Nondestructive Seam Continuity Testing:

1. Nondestructively test field seams for continuity over their full length. Perform continuity testing as the seaming work progresses, not at the completion of field seaming. Complete any required repairs in accordance with the "Defects and Repairs" Article of this Part. Apply the following procedures:
   a. use vacuum testing for extrusion welds; and
   b. use air pressure testing for double-track fusion seams.

2. Vacuum Testing:
   a. Use the following equipment:
      i. A vacuum box assembly consisting of a stiff housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.
      ii. A system for applying 5 pound per square inch (psi) gauge suction to the box.
      iii. A bucket of soapy solution and applicator.

   b. Follow these procedures:
      i. Energize the vacuum pump and reduce the tank pressure to 5 ±1 psi gauge.
      ii. Wet an area of the geomembrane seam larger than the vacuum box with the soapy solution.
      iii. Place the box over the wetted area.
      iv. Close the bleed valve and open the vacuum valve.
      v. Ensure that a leak tight seal is created.
      vi. Examine the geomembrane through the viewing window for the presence of soap bubbles for not less than 20 seconds.
      vii. If no bubbles appear after 20 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inch overlap, and repeat the process.
      viii. Mark all areas where soap bubbles appear with a marker that will not damage the geomembrane and repair in accordance with the "Defects and Repairs" Article of this Part.
3. Air Pressure Testing:
   a. Use the following equipment:
      i. an air pump (manual or motor driven) or air reservoir, equipped with a pressure gauge, capable of generating and sustaining a pressure between 25 and 30 pounds per square inch;
      ii. a rubber hose with fittings and connections; and
      iii. a hollow needle, or other approved pressure feed device..
   b. Follow these procedures:
      i. Seal both ends of the seam to be tested.
      ii. Insert needle, or other approved pressure feed device, into the tunnel created by the fusion weld.
      iii. Insert a protective cushion between the air pump and the geomembrane.
      iv. Energize the air pump to a pressure between 25 and 30 pounds per square inches, close valve, and sustain the pressure for not less than 5 minutes.

v. If loss of pressure exceeds 3 pounds per square inches, or does not stabilize, locate faulty area and repair in accordance with the "Defects and Repairs" Article of this Part.

vi. Cut opposite end of air channel from pressure gauge and observe release of pressure to ensure air channel is not blocked.

vii. Remove needle, or other approved pressure feed device, and seal both ends in accordance with the "Defects and Repairs" Article of this Part.

J. Destructive Testing:

1. Perform destructive seam tests to evaluate seam strength and integrity. Perform destructive testing as the seaming work progresses, not at the completion of field seaming.
2. Sampling and Testing:
   a. Collect destructive test samples at a minimum average frequency of one test location per 500 feet of seam length and at additional locations of suspected nonperformance. The CQA Consultant will select test locations, including locations with evidence of excess geomembrane crystallinity, contamination, offset seams, or any other evidence of inadequate seaming.
   b. Cut samples at the locations designated by the CQA Consultant at the time the locations are designated. Number each sample and identify the sample number and location on the panel layout drawing. Immediately repair all holes in the geomembrane resulting from the destructive seam sampling in accordance with the repair procedures described in the "Defects and Repairs" Article of this Part. Test the continuity of the new seams in the repaired areas according to "Nondestructive Seam Continuity Testing" Article of this Part.
   c. Cut two strips 1 inch wide and 12 inch long with the seam centered parallel to the width from either side of the sample location. Test the two 1-inch wide strips in the field tensiometer in the peel mode. The CQA Consultant may request an additional test in the shear mode. If these samples pass the field test, prepare a laboratory sample at least 1 foot wide by 3.5 feet long with the seam centered lengthwise. Cut the laboratory sample into three parts and distribute as follows:
      i. one portion 1 foot long to the Installer;
      ii. one portion 1.5 feet long to the CQC Consultant for testing; and
      iii. one portion 1 foot long to the Engineer for archival storage.
3. In the event of failing field or laboratory test results, the Contractor may reconstruct the entire seam between two passing destructive tests; otherwise, the CQA Consultant will identify the extent of the nonconforming area following the procedures given in the CQA Plan. Obtain additional samples for testing as requested by the CQA Consultant.

K. Defects and Repairs:

1. Inspect the geomembrane before and after seaming for evidence of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of inspection. Sweep or wash the geomembrane surface if surface contamination inhibits inspection.
2. Test each suspect location, both in seam and non-seam areas, using the methods described in the "Nondestructive Seam Continuity Testing" Article of this Part. Repair each location that fails nondestructive testing.
3. Cut and reseam wrinkles not conforming with Part 2 of this Section. Test the seams thus produced like any other seam.
4. Repair Procedures:
   a. Repair any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test. Use the most appropriate of the available procedures:
      i. patching, used to repair large holes, tears, undispersed raw materials, and contamination by foreign matter;
      ii. abrading and reseaming, used to repair small sections of extruded seams;
      iii. spot seaming, used to repair minor, localized flaws;
      iv. capping, used to repair long lengths of failed seams;
      v. topping, used to repair areas of inadequate seams, which have an exposed edge less than 4 inches in length; and
      vi. removing bad seam and replacing with a strip of new material seamed into place (used with long lengths of fusion seams).
   b. When making repairs, satisfy the following:
      i. abrade surfaces of the geomembrane that are to be repaired no more than 60 minutes prior to the repair;
      ii. clean and dry all geomembrane surfaces immediately prior to repair;
      iii. only use approved seaming equipment;
      iv. extend patches or caps at least 6 inches beyond the edge of the defect, and round corners of patches to a radius of at least 3 inches; and
      v. cut the geomembrane below large caps to avoid potential for water or gas collection between the two sheets.
5. Repair Verification:
   a. Test each repair using the methods described in the "Nondestructive Seam Continuity Testing" Article of this Part. Repairs that pass the nondestructive test are adequate unless the CQA Consultant elects to also perform destructive tests. Re-repair and retest failed tests.

3.04 ANCHORAGE SYSTEM

A. The anchor trench shall be excavated prior to geomembrane placement to the lines, grades, and configuration indicated on the Construction Drawings.

B. Slightly rounded corners shall be provided in the trench where the geomembrane adjoins the trench to avoid sharp bends in the geomembrane.

C. Temporarily anchor each geomembrane panel in the anchor trench at the crest of the slope as soon as the panel is deployed or positioned.

D. Do not entrap loose soil, sand bags, or other materials between or beneath the geosynthetic layers.

E. Do not backfill the anchor trench until all geosynthetic layers are installed in the anchor trench. Backfill in accordance with the Construction Drawings and Section 02215.

F. Do not damage any geosynthetic layer when backfilling the anchor trench.

3.05 MATERIALS IN CONTACT WITH THE GEOMEMBRANE

A. Take all necessary precautions to prevent damage to the geomembrane during the installation of other components of the liner and final cover system.

B. Do not drive equipment directly on the geomembrane. Only use equipment above the geomembrane that meets the following ground pressure requirements.

Maximum Allowable Equipment Ground Pressure (pounds per square inches)	Minimum Thickness of Overlying Material (inches)
<5	12
<10	18
<20	24
>20	36

3.06 SURVEY CONTROL

A. Survey the installed geomembrane liner and final cover in accordance with Section 02100.

3.07 GEOMEMBRANE ACCEPTANCE

A. The Contractor shall retain all ownership and responsibility for the geomembrane until accepted by the Owner.

B. The geomembrane shall be accepted by the Owner when:
  1. the installation is finished;
  2. all documentation of installation is completed including the CQA Consultant's final report; and
  3. verification of the adequacy of all field seams and repairs, including associated testing, is complete.

3.08 PROTECTION OF WORK

A. The Contractor shall use all means necessary to protect all prior work and all materials and completed work of other sections.

B. In the event of damage, the Contractor shall make all repairs and replacements necessary at no additional cost to Owner.

TABLE 02770-1
REQUIRED HDPE GEOMEMBRANE PROPERTIES

Properties	Qualifiers	Units[(1)]	Specified Values Textured	Test Method
Physical Properties				
Thickness	Nominal	mils	60	ASTM D 5199 (S) ASTM D 5994 (T)
Specific Gravity	Minimum	N/A	0.94	ASTM D 792 Method A or ASTM D 1505
Carbon Black Content	Range	%	2-3	ASTM D 1603
Carbon Black Dispersion	N/A	none	8 of 10 in Category 1 or 2 and all in Category 1, 2, or 3	ASTM D 5596
Mechanical Properties				
Tensile Properties				
1. Force Per Unit Width at Yield	Minimum	lb/in	132	ASTM D 638 (Modified by NSF 54 Annex A)
2. Tensile Strength (force per unit width at break)	Minimum	lb/in	72	ASTM D 638 (Modified by NSF 54 Annex A)
3. Elongation at Yield	Minimum	%	12	ASTM D 638 (Modified by NSF 54 Annex A)
4. Elongation at Break	Minimum	%	100	ASTM D 638 (Modified by NSF 54 Annex A)
Tear Resistance	Minimum	lb	40	ASTM D 1004 Die C Puncture
Puncture Resistance	Minimum	lb	80	FTMS 101/2065

TABLE 02770-1 (continued)

Properties	Qualifiers	Units[1]	Specified Values Textured	Test Method
Environmental Properties				
Low Temperature Brittleness	Maximum	°C	-60	ASTM D 746 Procedure B
Dimensional Stability (each direction)	Maximum change	%	±2	ASTM D 1204 212°F, 15 min.
Environmental Stress Crack	Minimum	hrs	200[2]	ASTM D 5397

Notes: 1.
% = percent
g = grams
min = minutes
lb/in = pounds per inch
lb = pound
°C = degrees Celsius
hrs = hours

2. Time-to-failure at a tensile stress of 30 percent of the tensile yield strength. For textured geomembrane, test is conducted on smooth geomembrane from the same resin lot (batch) as the textured geomembrane furnished.

TABLE 02770-2

REQUIRED HDPE GEOMEMBRANE SEAM PROPERTIES

Properties	Qualifiers	Units[3]	Specified Values		Test Method
			Smooth	Textured	
Shear Strength[1]					
fusion	Minimum	lb/in	120	120	ASTM D 6392
extrusion	Minimum	lb/in	108	108	ASTM D 6392
Peel Adhesion					
			FTB[2]	FTB[2]	
fusion	Minimum	lb/in	78	78	ASTM D 6392
extrusion	Minimum	lb/in	70	70	ASTM D 6392

Notes:
1. Also called "Bonded Seam Strength". Value is at material yield point and failure shall occur in material outside of seam area.
2. FTB = Film Tear Bond. (Maximum 10 percent seam separation)
3. lb/in = pounds per inch

TABLE 02770-3
REQUIRED PE GEOMEMBRANE PROPERTIES

Properties	Qualifiers	Units(1)	Specified Values		Test Method
			Smooth	Textured	
Physical Properties					
Thickness	Nominal	mils	40	40	ASTM D 5199 (S) ASTM D 5994 (T)
Specific Gravity	Minimum	N/A	0.94	0.94	ASTM D 792 Method A or ASTM D 1505
Carbon Black Content	Range	%	2-3	2-3	ASTM D 1603
Carbon Black Dispersion	N/A	none	8 of 10 in Category 1 or 2 and all in Category 1, 2, or 3		ASTM D 5596
Mechanical Properties					
Tensile Properties					
1. Force Per Unit Width at Yield	Minimum	lb/in	150	150	ASTM D 638 (Modified by NSF 54 Annex A)
2. Tensile Strength (force per unit width at break)	Minimum	lb/in	152	60	ASTM D 638 (Modified by NSF 54 Annex A)
3. Elongation at Yield	Minimum	%	10	10	ASTM D 638 (Modified by NSF 54 Annex A)
4. Elongation at Break	Minimum	%	800	250	ASTM D 638 (Modified by NSF 54 Annex A)
Tear Resistance	Minimum	lb	22	22	ASTM D 1004 Die C Puncture
Puncture Resistance	Minimum	lb	50	44	ASTM D 4883

Properties	Qualifiers	Units[1]	Specified Values		Test Method
			Smooth	Textured	
Environmental Properties					
Low Temperature Brittleness	Maximum	°C	<-94	<-94	ASTM D 746 Procedure B
Dimensional Stability (each direction)	Maximum change	%	±2	±2	ASTM D 1204 212°F, 15 min.
Environmental Stress Crack	Minimum	hrs	200[2]	200[2]	ASTM D 5397

Notes: 1. % = percent
g = grams
min = minutes
lb/in = pounds per inch
lb = pound
°C = degrees Celsius
hrs = hours

2. Time-to-failure at a tensile stress of 30 percent of the tensile yield strength. For textured geomembrane, test is conducted on smooth geomembrane from the same resin lot (batch) as the textured geomembrane furnished.

TABLE 02770-4

REQUIRED PE GEOMEMBRANE SEAM PROPERTIES

Properties	Qualifiers	Units[3]	Specified Values		Test Method
			Smooth	Textured	
Shear Strength[1]					
fusion	Minimum	lb/in	58	53	ASTM D 6392
extrusion	Minimum	lb/in	58	44	ASTM D 6392
Peel Adhesion					
			FTB[2]	FTB[2]	
fusion	Minimum	lb/in	50	44	ASTM D 6392
extrusion	Minimum	lb/in	50	44	ASTM D 6392

Notes: 1. Also called "Bonded Seam Strength". Value is at material yield point and failure shall occur in material outside of seam area.
2. FTB = Film Tear Bond. (Maximum 10 percent seam separation)
3. lb/in = pounds per inch

[END OF SECTION]

SECTION 02780

GEOSYNTHETIC CLAY LINER

PART 1 GENERAL

1.01 SCOPE

A. This section includes geosynthetic clay liner (GCL) products and placement.

1.02 RELATED SECTIONS AND PLANS

A. Section 02200 - Earthwork

B. Section 02740 - Geocomposites

C. Section 02770 - Geomembranes

D. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest Version American Society of Testing and Materials (ASTM) Standards:

1. ASTM D 638. Standard Test Method for Tensile Properties of Plastics.
2. ASTM D 792. Standard Test Methods for Specific Gravity (Relative Density) and Density of Plastics by Displacement.
3. ASTM D 1004. Standard Test Method of Initial Tear Resistance of Plastic Film and Sheeting.
4. ASTM D 1238. Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
5. ASTM D 1505. Standard Test Method for Density of Plastics by the Density Gradient Technique.
6. ASTM D 1603. Standard Test Method for Carbon Black in Olefin Plastics.
7. ASTM D 4595. Standard Test Method for Tensile Properties of Geotextiles by Wide-Width Strip Method.
8. ASTM D 4632. Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
9. ASTM D 4643. Determination of Water (Moisture) Content of Soil by Microwave Oven Method
10. ASTM D 4833. Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

11.	ASTM D 5321.	Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
12.	ASTM D 5596.	Standard Test Method for Microscopical Examination of Pigment Dispersion in Plastic Compounds.
13.	ASTM D 5887.	Standard Test Method for Measurement of Index Flux through Saturated GCL Specimens Using a Flexible Wall Permeameter
14.	ASTM D 5890.	Standard Test Method for Swell Index of Clay Mineral Component of GCLs.
15.	ASTM D 6243.	Standard Test Method for Determining the Internal and Interface Shear Resistance of GCL by the Direct Shear Method.

1.04 SUBMITTALS

A. Submit to the Engineer for review not less than 21 calendar days prior to use the following information regarding the GCL proposed for use.
   1. manufacturer and product name;
   2. evidence that the manufacturer has more than two years of experience in the manufacturing of GCL;
   3. manufacturer's quality control procedures;
   4. manufacturer's requirements for any geotextile component of the GCL to include a minimum, mass per unit area, grab strength, and grab elongation are to be required;
   5. certification that manufacturer's requirements for geotextile component of GCL are met;
   6. certification of minimum average roll values (95 percent lower confidence limit) and the corresponding test procedures for all GCL properties listed in Table 02780-1; and
   7. manufacturer's recommended procedures for overlapping adjacent GCL panels.

B. Submit to the Engineer for review at least 14 days prior to GCL placement manufacturing quality control certificates for each roll of GCL as specified in this section. Submit certificates signed by the manufacturer quality control manager. The quality control certificates shall include:
   1. lot, batch, or roll numbers and identification;
   2. sampling procedures; and
   3. results of Manufacturer quality control tests.

C. For each proposed GCL material, the Contractor shall submit for review by the Engineer at least 14 calendar days prior to transporting the GCL to the site the

7. Needlepunching is used to bind geotextile backings and bentonite core.
8. Bentonite is contained by the geotextiles in a manner that prevents more than nominal dislodgment of bentonite during GCL transportation, handling, and installation.

D. Furnish GCL that meets the shear strength requirements of this section as tested by an approved testing laboratory. Tests will be performed in accordance with ASTM D 6243 and as specified below on representative samples of geosynthetics destined for use on this project. The source of the representative samples will be provided with the test results. The GCL will be tested for:
   1. internal shear strength of representative sample; and
   2. interface shear strength of representative samples of GCL with each geosynthetic component in contact with the GCL (i.e., GCL and subbase soil, GCL and 60-mil textured HDPE geomembrane, and GCL and geocomposite).

E. The testing laboratory will follow the specific procedures and conditions listed below:
   1. Place the materials to be tested with their machine directions aligned in the direction of shear in the shear box. For the internal shear strength test, use a test specimen configuration of (from bottom to top): rigid substrate with textured gripping surface, GCL, and rigid substrate with textured gripping surface. For the interface shear strength tests:
      a. use a test specimen configuration of (from bottom to top): bedding sand, GCL with woven geotextile in contact with geomembrane, 60-mil textured HDPE geomembrane, and rigid substrate with textured gripping surface; and
      b. use a test specimen configuration of (from bottom to top): rigid substrate with textured gripping surface, geocomposite, GCL with woven geotextile in contact with geocomposite, 60-mil textured HDPE geomembrane, and rigid substrate with textured gripping surface.

   2. Perform the direct shear tests at normal stresses of 50, 125, 150 pounds per square inch, and report the peak and large-displacement (2-inch displacement) shearing resistance for each test.
   3. Use fresh specimens for each normal stress.
   4. Repeat any tests for which the shear displacements do not occur within the desired material (internal strength) or along the desired interface (interface strength).
   5. The testing laboratory shall report peak and large-displacement shear strengths for each of the respective tests in terms of secant friction angles. The GCL shall have a shear strength envelope that exceeds that characterized by an effective friction angle of 10° and an effective adhesion of zero. The GCL shall also meet or exceed the following large-displacement shear strength secant friction angle:

Normal Stress (psi)	Large-Displacement Shear Strength Secant Friction Angle (degrees)
50	5.5
100	3.0
150	3.0

2.02 MANUFACTURING QUALITY CONTROL

A. Sample and test the GCL to demonstrate that the material complies with the requirements of this section.

B. Perform manufacturing quality control tests to demonstrate that GCL properties conform to the stated requirements. Perform the following tests at a minimum frequency of once per 40,000 square feet, except for hydraulic conductivity which shall be performed at a minimum frequency of once per 100,000 square feet.

Test	Procedure
bentonite content	ASTM D 5261
bentonite moisture content	ASTM D 4643
bentonite free swell	ASTM D 5890
hydraulic conductivity	ASTM D 5887
peel	ASTM D 4632

C. Comply with the certification and submittal requirements of this section.

D. If a GCL sample fails to meet the quality control requirements of this section, sample and test rolls fabricated at the same time and in the same lot as the failing roll. Continue to sample and test the rolls until the extent of the failing rolls are bracketed by passing rolls. Do not supply any failing rolls.

2.03 PACKING AND SHIPPING

A. Supply GCL in rolls wrapped in impermeable and opaque protective covers.

B. Mark or tag GCL rolls with the following information:
1. manufacturer's name;
2. product identification;

3. lot number;
4. roll number;
5. roll weight; and
6. roll dimensions.

C. GCL rolls not labeled in accordance with this section or on which labels are illegible upon delivery to the project site will be rejected and replaced at no additional expense to the Owner.

D. Deliver the GCL to the site at least 14 calendar days prior to the scheduled installation date to allow the CQA Consultant to obtain conformance samples and complete conformance testing as described in the CQA Plan.

2.04 HANDLING AND STORAGE

A. Handle, store, and care for the GCL in a manner that does not cause hydration or damage.

B. Protect the GCL from moisture, excessive heat or cold, puncture, or other damaging or deleterious conditions. Store the GCL rolls on pallets or other elevated structures. Do not store GCL rolls directly on the ground surface. Cover the GCL entirely with a tarp. Store GCL rolls out of direct sunlight. Follow any additional storage procedures required by the Manufacturer.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Provide certification in writing that the surface on which the GCL will be installed is acceptable as described below. Give this certification of acceptance to the CQA Consultant prior to commencement of GCL installation in the area under consideration.

B. Maintain the prepared soil surface until the GCL is placed. The subgrade should be rolled with a smooth-drum compactor to remove any wheel ruts, footprints, or other abrupt grade changes before placement of the GCL.

C. Do not place the GCL onto an area that has been softened by precipitation or that has cracked due to desiccation. Repair such areas in accordance with Section 02200 or Section 02225.

3.02 PLACEMENT

A. Do not commence GCL placement until the CQA Consultant completes conformance evaluation of this material and performance evaluation of previous work, including Contractor's survey results for previous work.

B. Weight GCL with sandbags or other means to prevent uplift or movement in wind. Immediately remove and replace any damaged or leaking sandbags.

C. Cut the GCL using a utility blade. Do not damage underlying material during cutting and fully repair any such damage.

D. Do not entrap stones or other foreign objects under the GCL. Do not drag equipment across the exposed GCL.

E. Replace any GCL that is damaged by any means including foreign objects, or installation activities.

F. Install GCLs that are internally-reinforced with the nonwoven geotextile backing down.

G. Do not install the GCL on a wet subgrade or in standing water. Prevent hydration of the bentonite core prior to completion of construction of the liner system.

H. Do not install the GCL during precipitation or other conditions that may cause hydration of the GCL.

I. Install the overlying geomembrane as soon as possible following GCL installation. Cover all GCL that is placed during a workday with overlying geomembrane. Cover and protect the edges of GCL from hydration due to stormwater runon.

J. Remove and replace GCL that becomes hydrated. Hydration is defined by a moisture content of 40 percent or greater when measured in accordance with ASTM D 4643.

K. Place earthen and other geosynthetics material components of the liner system over the GCL as soon after installation of the GCL as possible, but in no case longer than 7 days after the first GCL is placed.

3.03 OVERLAPS

A. On slopes steeper than 5 horizontal to 1 vertical, install GCLs continuously down the slope; that is, allow no horizontal seams on the slope.

B. Allow no horizontal seams on the base of the landfill within 5 feet of the toe of a slope.

C. Overlap GCL in strict accordance with the Manufacturer's recommended procedures. As a minimum, overlap adjacent panels at least 6 inches along the sides and 12 inches along the ends.

3.04 MATERIALS IN CONTACT WITH THE GCL

A. Perform installation of other components in a manner that prevents damage to the GCL.

B. Do not drive equipment directly on the GCL.

C. Install the GCL in appurtenant areas, and connect the GCL to appurtenances as indicated on the Construction Drawings. Do not damage the GCL while working around the appurtenances.

3.05 REPAIR

A. Repair any holes or tears in the GCL by placing a GCL patch over or under the hole. On slopes greater than 5 percent, the patch shall overlap the edges of the hole or tear by a minimum of 2 feet in all directions. On slopes 5 percent or flatter, the patch shall overlap the edges of the hole or tear by a minimum of 1 foot in all directions. Secure the patch with a water-based adhesive approved by the Manufacturer.

B. Remove any soil or other material that may have penetrated the torn GCL.

C. Do not nail or staple the patch.

TABLE 02780-1

REQUIRED GCL PROPERTY VALUES

PROPERTIES	QUALIFIERS	UNITS(6)	SPECIFIED(1) VALUES	TEST METHOD
GCL Properties				
Bentonite Content(2) (GCL)	Minimum	lb/ft^2	0.75	ASTM D 5261
Bentonite Moisture Content	Maximum	%	25	ASTM D 4643
Bentonite Free Swell	Minimum	ml/2g	24	ASTM D 5890
Hydraulic Conductivity(5)	Minimum	cm/s	5×10^{-9}	ASTM D 5887
Tensile Strength(3)	Minimum	lb/in	35	ASTM D 4595
Peel Strength(3)	Minimum	lb/in	15	ASTM D 4632
Geotextile Properties				
Polymer Composition	Minimum	%	95 polyester or polypropylene	

Notes:
1. All values represent minimum average roll values.
2. Measured at a moisture content not exceeding 25 percent.
3. For geotextile backed GCLs.
4. lb/ft^2 = pounds per square foot
   cm/s = centimeter per second
   % = percent
   lb = pound
   lb/in = pounds per inch
   ml/2g = milliliters per two grams
5. The GCL test specimen shall be hydrated with the fluid which is expected to cause hydration in the field, or similar fluid, for a minimum of 48 hours using sufficient backpressure to achieve a minimum B coefficient of 0.9 and using a confined effective consolidation stress not exceeding five pounds per square inch. Then, the hydraulic conductivity test on the GCL specimen shall be conducted, using the appropriate permeant fluid, at a confined effective consolidation stress not exceeding five pounds per square inch. The hydraulic conductivity test shall continue until steady state conditions are reached or a minimum of two pore volumes of permeant fluid have passed through the test specimen. The permeant fluid shall be either leachate from the landfill (or similar landfill) if the GCL is used in a liner system.

[END OF SECTION]

SECTION 02800

CHAIN LINK FENCING

PART 1 – GENERAL

1.01 SCOPE

A. This section includes chain-link fences and gates products and installation.

1.02 RELATED SECTIONS

A. Section 01065 – Health, Safety, and Emergency Response Requirements

B. Section 02100 – Surveying

1.03 REFERENCES

A. Latest version of the American Society for Testing and Materials (ASTM) Standards:
1. ASTM D 121. Standard for Zinc-Coated (Galvanized) Steel Barbed Wire.
2. ASTM D 123. Standard for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM D 153. Zinc-Coated (Hot Dip) in Iron and Steel Hardware.
4. ASTM A 392. Standard for Zinc-Coated Steel Chain-Link Fence Fabric.

1.04 SUBMITTALS

A. Submit the following to the Engineer for review within 30 calendar days from Notice to Proceed:
1. manufacturer's product data and shop drawings showing details for fence, gates, hardware, footings, grounding, and installation; and
2. specific size and wording for signs warning against unauthorized trespassing by unauthorized personnel.

PART 2 – PRODUCTS

2.01 GENERAL

A. Furnish 8-foot high chain-link fencing as indicated on the Construction Drawings. At gates, corners, and end posts, use vertical stretcher bars and horizontal and diagonal bracing rods which extend to the first adjacent line post. Use a fence with a top rail, 1 foot of three-strand barbed wire above the top rail, and a bottom tension wire as shown on the Construction Drawings.

B. Furnish gate posts spaced as indicated on the Construction Drawings.

2.02 FABRIC

A. Furnish 8-foot high chain-link fabric woven from 9-gauge steel wire galvanized in accordance with ASTM A 392 Class II in a 2-inch mesh. Use a wire with a minimum breaking strength of 1,200 pounds.

2.03 POSTS AND FITTINGS

A. Furnish hot-dip galvanized posts and rails conforming to ASTM A 123 with ASA Schedule 40 steel pipe sizes as follows:
   1. line posts are 2.375-inch outside diameter (O.D.);
   2. end, corner, and pull posts are 2.875-inch O.D.; and
   3. top brace rails are 1.66-inch O.D.

B. Furnish cylindrical concrete footings with a minimum diameter of 9 inches, extending a minimum of 6 inches below the bottom of the posts. Use cast-in-place concrete as specified in this section.

C. Furnish brace bands, tension bands, tie-rods, and turn-buckles manufactured from malleable iron or pressed steel and coated in accordance with ASTM A 153.

D. Furnish galvanized stretcher bars in one piece lengths equal to the full height of the chain-link fabric with a minimum cross section of 0.1875 inches by 0.75 inches and coated in accordance with ASTM A 153. Provide stretcher bars for gate posts, end posts, and corner posts.

E. Furnish 9-gauge steel tie wire and 7-gauge steel tension wire galvanized in accordance with ASTM A 123.

2.04 LABELING

A. Furnish supporting arms:
   1. coated in accordance with ASTM A 153;
   2. oriented at 45 degrees to vertical; and
   3. manufactured from malleable iron or pressed steel.

B. Furnish supporting arms with caps which securely fit to the tops of posts to exclude moisture and have openings to receive top rail.

C. Furnish three rows of barbed wire manufactured from two-strand, 12.5-gauge wire with 14-gauge, 4-point barbs spaced at 5 inches on center and galvanized in accordance with ASTM A 121, Class 3.

2.05 GATES

A. Furnish gates manufactured with:
   1. 1.90-inch O.D. frames;
   2. welded fittings;
   3. braces and 0.375-inch truss rod fabrication; and
   4. fabric and barbed wire in accordance with this Section.

B. Furnish gates which are the same height as the adjacent fence.

C. Furnish 2.875-inch O.D. gate posts for gates with up to 6-feet leaf widths. Use 4.0-inch O.D. gate posts for gates with 6-feet to 13-feet leaf widths. Provide gate posts with securely fitting caps to exclude moisture. Supply each gate with:
   1. a locking bar and locking device;
   2. non lift-off type malleable iron hinges; and
   3. plunger-bar type latch.

2.06 CONCRETE FOOTINGS

A. Furnish concrete for setting posts having a strength of 2500 psi at 28 days.

2.07 SIGNS

A. Furnish baked enamel 18-gauge steel signs warning against trespassing by unauthorized personnel.

PART 3 EXECUTION

3.01 INSTALLATION OF FENCES AND GATES

A. Perform all final grading prior to installation of permanent fencing. Install fencing as shown on the Construction Drawings and follow the general lines and grades of the finished ground

B. Installation:
   1. Set posts plumb in concrete as shown on the Construction Drawings. Posts shall be in a straight alignment, with temporary bracing until concrete has set. Trowel finish and slope exposed tops of concrete footings to promote drainage away from the posts.
   2. Install pull posts every 300 feet if no corner posts are encountered in that distance.
   3. Install corner posts at changes in direction of 30 degrees or more, and pull posts at changes in direction of 15 degrees or more. Install pull posts at abrupt changes in grade.
   4. Install supporting arms on each post.

C. Set post bracing as specified below after concrete in post bases has set.
   1. Install pull posts at gate posts, end posts, and at each side of corner posts; install so posts are plumb when diagonal rod is under tension.

D. Install top brace rails as specified below.
   1. Continuously run through barbed wire supporting arms.
   2. Install expansion couplings at each joint.

E. Install chain-link fabric as specified below:
   1. Stretch taut with equal tension on each side of line posts.
   2. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.
   3. Use U-shaped tie wire, conforming to diameter of pipe to which fabric is being attached, clasping pipe and fabric firmly with ends twisted at least two full turns. Bend ends of wire to minimize hazard to persons or clothing.
   4. Fasten fabric to line posts with tie wire spaced at a maximum of 12 inches on center.
   5. Fasten fabric to top rail with tie wire spaced at a maximum of 24 inches on center.
   6. Join roll of fabric together by weaving a single strand into the end of the roll to form a continuous piece.
   7. Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. (Peen ends of bolts or score threads to prevent removal of nuts.)

8. Attach tension wire and pull tension wire taut along the bottom of the fabric with ring-type fasteners spaced at a maximum of 24 inches on center.
9. Attach tension wire to line posts with brace bands and pull taut.

F. Install stretcher bars as described below.
   1. Thread through or clamp to fabric at a maximum of 4 inches on center.
   2. Secure to posts with metal bands spaced 15 inches on center maximum.
   3. Install at each gate, pull and end posts, and both sides of corner post.

G. Install barbed wire as described below.
   1. Attach 3 rows to each barbed wire supporting arm. Pull wire taut and fasten securely to each arm.
   2. Install 3 rows above fabric and on extended gate and members of swing gate.

H. Install manual-swing gates as described below.
   1. Install plumb, level, and free swinging through full opening without interference.
   2. Install all hardware.
   3. Install keepers, ground set items and flush place in concrete to engage gate stop.

I. Install fence grounding as indicated on the Drawings.

J. Repair any damaged coating in the shop or field by recoating with compatible and similar coating. Apply coating per manufacturer's recommendation.

K. Install signage at 4 feet above finished ground and spaced at a maximum of 50 feet on center.

3.02 TOLERANCE

A. Erect the chain-link fences and gates with a maximum variation from plumb of 0.25 inches.

B. Erect the chain-link fence with a maximum offset of 1 inch from true position.

3.03 MAINTENANCE

A. The Contractor shall repair any damage to the security fence and gates. The Contractor shall repair erosion loss beneath the fencing resulting in a space larger than one foot between the ground surface and the bottom of the fence. The post-construction maintenance shall continue for one year following acceptance of construction. The Contractor shall commence post-construction maintenance within two weeks of notification that maintenance is required. All maintenance shall be conducted to the satisfaction of the Engineer.

[END OF SECTION]

SECTION 02920

VEGETATIVE SOIL LAYER

PART 1 GENERAL

1.01 SCOPE

A. This section includes vegetative soil layer material and placement.

1.02 RELATED SECTIONS AND PLANS

A. Section 02200 - Earthwork

B. Section 02930 - Vegetation

C. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) Standards:
1. ASTM D 422. Standard Method for Particle-Size Analysis of Soils.
2. ASTM D 2487. Classification of Soils for Engineering Purposes (Unified Soil Classification System)
3. ASTM D 2974. Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soil.
4. ASTM D 4972. Standard Test Method for Determination of pH of Soils.

1.04 SUBMITTALS

A. For each on-site/off-site vegetative soil layer source, submit the following to the Engineer for review and approval within 30 calendar days from Notice to Proceed:
1. the source of the vegetative soil layer;
2. test results conducted on samples from borrow stockpile in accordance with ASTM D 422, ASTM D 2487, ASTM D 2974, and ASTM D 4972; and
3. a 50-pound representative sample of the vegetative soil layer.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The placement of the vegetative soil layer will be monitored by the CQA Consultant, as required by the CQA Plan

B. CQA Consultant will perform soil conformance testing on the vegetative soil layer material to establish compliance with this section. Conformance testing to be performed and testing frequencies are given in the CQA Plan.

C. The Contractor shall be aware of the activities required of the CQA Consultant by the CQA Plan and shall account for those activities in the construction schedule.

D. The Contractor shall correct all deficiencies and nonconformances identified by the CQA Consultant and shall do so at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Obtain vegetative soil layer material from on-site/off-site borrow sources. The CQA Consultant will perform conformance testing on material submitted under this section.

B. Furnish vegetative soil layer material meeting the following material requirements.
   1. Material shall be a loamy soil, classified as ML, SC, or SM (per ASTM D 2487), and be loose and friable. For vegetative soil layer to be considered loamy, that fraction passing the U.S. Standard No. 10 sieve shall contain not more than 40 percent clay-sized fraction, as determined in accordance with ASTM D 422.
   2. Vegetative soil layer shall be free of deleterious materials.
   3. Vegetative soil layer shall contain not less than 5 percent nor more than 20 percent organic matter as determined by loss on ignition of samples oven dried to constant weight (per ASTM D 2974, Method A for moisture content determination and Method C for ash content determination). The vegetative soil layer may be amended as approved in writing by the Engineer if the organic content is less than five percent.
   4. The pH of the vegetative soil layer material shall not be less than 5.5 and not more than 7.

C. Based on tests performed, the Engineer shall identify the vegetative soil layer as acceptable, acceptable with certain fertilizers and limestone applications, or unacceptable. If the vegetative soil layer is found acceptable, but requiring lime or fertilizer, the fertilizer and lime requirements will be met as specified in Section 02930 or as recommended by the Engineer. If the vegetative soil layer material is found unacceptable, the Contractor shall be responsible for identifying another source of vegetative soil layer material and shall incur all expenses associated with testing additional samples. All vegetative soil layer material incorporated into the site work shall match the sample provided to the Engineer for testing.

D. Obtain water for moisture conditioning vegetative soil layer from the on-site water source as directed by the Engineer.

2.02 EQUIPMENT

A. Furnish, operate, and maintain equipment necessary to transport, place, and prepare vegetative soil layer material.

PART 3 EXECUTION

3.01 PLACEMENT

A. Do not commence placement of vegetative soil layer material until CQA Consultant completes conformance evaluation of vegetative soil layer material and performance testing of previous work, including evaluation of the Contractor's survey results of previous work.

B. Prior to spreading the vegetative soil layer, scarify or otherwise loosen the top surface of the existing soil layer to a minimum depth of 1 inch. Scarify using a disc harrow, rake, dozer, or other suitable means.

C. Construct vegetative soil layer to the thickness, elevations, and limits indicated on the Construction Drawings. Round breaks between slopes.

D. Place vegetative soil layer material over approved areas, spread, and track lightly so that the equipment grouser marks are perpendicular to the direction of flow.

E. Place and spread vegetative soil layer material to a depth sufficiently greater than required so that after light tracking and natural settlement, the completed work will conform to the thickness requirement indicated on the Construction Drawings.

G. After vegetative soil layer has been placed and spread, remove stiff clods, lumps, roots, litter, and other foreign material. Remove stiff clods larger than 3 inches in diameter or reduce in size by raking, discing, or other processing.

H. Within 72 hours of the completion of the placement of vegetative soil layer in an area, vegetate the area in accordance with Section 02930.

I. Repair any erosion or washout of the vegetative soil layer prior to final acceptance of vegetation.

3.02 SURVEY CONTROL

A. Survey the limits and elevations of the top surface of the vegetative soil layer in accordance with Section 02100.

3.03 TOLERANCE

A. Construct the vegetative soil layer to within ±0.1 feet of the thickness shown on the Construction Drawings.

B. Construct the vegetative soil layer to within +0.5 feet of the elevations indicated on the Construction Drawings.

[END OF SECTION]

SECTION 02930

VEGETATION

PART 1 GENERAL

1.01 SCOPE

A. This section includes sodding, seeding, liming, fertilizing and maintaining vegetation until established and accepted.

1.02 RELATED SECTIONS AND PLANS

A. Section 02100 - Surveying

B. Section 02200 - Earthwork

C. Section 02920 - Vegetative Soil Layer

D. Construction Quality Assurance (CQA) Plan

1.03 REFERENCES

A. Standard Specifications for Road and Bridge Construction (SSRBC), Florida Department of Transportation, 2001 Edition (FDOT Specifications).

1.04 SUBMITTALS

A. Submit the following to the Engineer not less than 30 calendar days prior to use for review:
   1. proposed type and source of sod and seed; and
   2. manufacturer's product data for commercial fertilizer and lime and the recommended methods of application.

B. Submit a plan for handling and storage of materials to prevent damage by moisture, heat, or exposure. Include all recommendations of manufacturers and suppliers.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sod shall be live, thriving, and meet the requirements of Florida Department of Agriculture and Consumer Services.

B. Seeds shall be live seed and meet the requirements of Florida Department of Agriculture and Consumer Services.

C. The seed shall be have been harvested from the previous years crop.

D. All seed bags shall have a label attached stating the date of harvest, LOT number, percent purity, percent germination, noxious weed certification, and date of test

E. Use fertilizer that is dry or liquid commercial grade fertilizer uniform in composition that meets the requirements of all State and Federal regulations and standards of the Association of Agricultural Chemists. Deliver fertilizer to the site in original, properly labeled, unopened, clean, containers each showing the manufacturer's guaranteed analysis conforming to applicable fertilizer regulations and standards. Use fertilizer that is 16-4-8 or as modified by the Engineer based on testing of the topsoil by the CQA Consultant. Apply fertilizer to all sodded areas.

F. Use lime that is agricultural ground limestone with a minimum total neutralizing power of 90 percent. The lime shall have a gradation of at least 40 percent passing the U.S. Standard Number 100 sieve, and at 95 percent passing the U.S. Standard Number 8 sieve.

PART 3 EXECUTION

3.01 PLANTING AND APPLICATION OF FERTILIZER

A. Do not commence vegetation until the Engineer reviews the results of soil analyses.

B. Notify the Engineer 24 hours prior to laying sod, seeding, or fertilizing.

C. The seed and fertilizer shall be placed by hydro seeding, or other method approved by the Engineer.

D. The underlying vegetative soil layer should be graded to the lines and limits as indicated on the Construction Drawings. The vegetative soil layer surface shall be scarified and damp immediately prior to the seed placement.

E. Repair all gullies, washes, or disturbed areas that develop subsequent to final dressing of the prepared surface.

F. Seeded areas shall be watered after germination as necessary until the vegetation is well established.

G. Apply fertilizer and lime to all areas where sod is to be placed unless otherwise indicated by the Engineer.

H. Apply fertilizer and lime at the specified rates. If not applied hydraulically, thoroughly rake the fertilizer and lime into the prepared surface to a minimum depth of 2 inches.

I. Application rates:
   1. Application rates for seeding shall be according to manufacture/supplier recommendations or as directed by the Engineer.
   2. Application rates for fertilizer and lime in this section may be adjusted after the results of the site soil test results performed by the CQA Consultant are available.
   3. Base contract price on application rates for fertilizer and lime specified in this section. Contract price will be adjusted for any variations either decreasing or increasing the application rates

J. For areas to be covered with seed:
   1. Apply fertilizer at a uniform rate of 1,200 pounds per acre or as otherwise directed by the Engineer.
   2. Apply agricultural lime at a rate of two tons per acre or as otherwise directed by the Engineer.

3.03 MAINTENANCE

A. Maintain seed areas immediately after placement until vegetation is well established and exhibits a vigorous growing condition.

B. The Contractor shall supply and apply supplemental irrigation for the maintenance period following the placement of the seed. All seeded areas should receive a minimum of 1½ in. of water per week either by precipitation or supplemental irrigation.

C. Maintain the seeded areas in satisfactory condition. Maintenance of the seeded areas includes repairing eroded areas, revegetating, watering, and mowing (if applicable). A satisfactory condition of seeded area is defined as a 10,000 square feet section of turf that has no bare spots larger than three square feet.

D. The inspection will be performed by the Engineer, who will determine whether repair of sodded areas or revegetation is required.

3.04 ACCEPTANCE

A. The vegetated areas shall be accepted at the end of the warranty period if a satisfactory condition as defined in this Section exists.

3.05 WARRANTY PERIOD

A. Vegetated areas shall be subject to a warranty period of the completion of the Contract or not less than 2 full growing seasons from initial establishment of permanent vegetation, whichever is greater, over 100 percent of the areas seeded.

B. At the end of the warranty period, the Engineer will perform an inspection upon written request by the Contractor. Vegetated areas not demonstrating satisfactory condition of vegetation as outlined above, shall be repaired, resodded, and maintained to meet all requirements as specified herein at the Contractor's expense.

C. After all necessary corrective work has been completed, the Engineer will certify in writing the final acceptance of the vegetated areas.

[END OF SECTION]

Prepared for

Omni Waste

of Osceola County, LLC

100 Church Street

Kissimmee, FL, 34741

OAK HAMMOCK DISPOSAL FACILITY, HOLOPAW, FL

CONSTRUCTION QUALITY ASSURANCE

(CQA) PLAN

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Project Number FW0400

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1. INTRODUCTION

1.1 Overview

This Construction Quality Assurance (CQA) Plan describes the quality assurance and construction quality control (CQC) activities that will be undertaken during construction of the Oak Hammock Disposal facility (OHD) located south of Holopaw, Florida. The OHD facility is owned and operated by Omni Waste of Osceola County, LLC (Omni). The purpose of this document is to define the scope, formal organization, and procedures necessary to achieve a high level of quality and assure that the construction of the OHD landfill is constructed in compliance with the approved design as shown or indicated in the Construction Drawings and Technical Specifications. This plan addresses the CQA and CQC activities to be performed during construction.

1.2 Project Description

The design of the construction of OHD facility is presented in the Construction Drawings and Technical Specifications. The project includes the following:

- construction of a double-composite liner system;
- construction of the leachate collection, removal, transmission and storage systems;
- construction of a gas management system;
- construction of the final cover system components above the landfill surfaces;
- construction of surface water management system; and
- general site work including landfill grading and general earthwork.

1.3 CQA Plan Scope

The CQA Plan establishes the quality assurance and quality control monitoring and testing activities to be implemented during construction at the OHD facility. The CQA Plan was developed in consideration of the current Florida Department of Environmental Protection (FDEP) guidelines and regulations. The scope of the CQA Plan includes:

- defining the responsibilities of parties involved with the construction of the OHD facility;
- providing guidance in the proper construction of OHD facility components;
- establishing testing protocols for the evaluation of OHD facility components;
- establishing procedures for construction documentation; and
- providing the means for assuring that the overall construction conforms to the Construction Drawings and Technical Specifications.

The CQA Plan is intended to establish procedures for the CQA Consultant and to inform the Contractor of CQA activities during the construction at the OHD facility. The CQA Plan is considered a supplement to the Technical Specifications and a part of the construction contract. In the case of any conflict between the CQA procedures described in this plan and the requirements of the Technical Specifications, the Technical Specifications will govern.

1.4 CQA Plan Organization

The remainder of this CQA Plan is organized as follows:

- definitions of key terms are presented in Section 2;
- project organization and descriptions, responsibilities, and qualifications of key parties involved with the construction at the OHD facility are presented in Section 3;
- requirements for CQA documentation are described in Section 4;
- CQA activities for the soil components of the OHD facility, to include fill placement, liner system, final cover system, and general earthwork, are presented in Section 5;
- CQA activities for geomembranes, geosynthetic clay liner, geotextiles, and geocomposites are presented in Sections 6 through 9, respectively;
- CQA activities for piping and fittings are covered in Section 10;
- CQA activities for mechanical and electrical components are described in Section 11;
- CQA activities for concrete associated work are outlined in Section 12; and

- CQA activities for road construction and general civil site work are presented in Sections 13 and 14, respectively.

2. CQA PLAN DEFINITIONS

2.1 Construction Quality Assurance and Construction Quality Control

In the context of this document, construction quality assurance and construction quality control are defined as follows:

- Construction Quality Assurance (CQA) - The planned and systematic means and actions designed to assure adequate confidence that materials and/or services meet contractual and regulatory requirements and will perform satisfactorily in service.

- Construction Quality Control (CQC) - Those actions which provide a means to measure and regulate the characteristics of an item or service in relation to contractual and regulatory requirements.

- In the context of this document:

- CQA refers to means and actions employed by the CQA Consultant, Engineer, or Omni to assure conformity of the various components of the OHD facility construction project with the requirements of the Construction Drawings and Technical Specifications.

- CQC refers to those actions taken by the CQA Consultant, Contractor, Manufacturers, or Installers to ensure that the materials and the workmanship of the various components of the OHD facility construction project meet the requirements of the Construction Drawings and Technical Specifications. In the case of the geosynthetic components of these systems, CQC is provided by the CQA Consultant and/or Manufacturers and Installers of the various geosynthetics.

2.2 Plans and Specifications

In this CQA Plan, reference to Construction Drawings and Technical Specifications is understood to mean those plans and specifications issued as a part of a specific contract for construction of a component or phase at the OHD facility. In all cases, it is expected that this CQA Plan will conform to the Construction Drawings and Technical Specifications. In case of conflict, the approved Construction Drawings and Technical Specifications will govern.

2.3 Geosynthetics

Geosynthetics is the generic term for all synthetic materials used in geotechnical engineering applications; the term includes geotextiles, geogrids, geonets, geomembranes, geosynthetic clay liners (GCL), and geocomposites. There are four types of geosynthetic products referenced in this CQA Plan that are included in the OHD facility construction. These geosynthetics include: (i) high density polyethylene (HDPE) and polyethylene (PE) geomembranes used in the liner and final cover systems, respectively; (ii) GCL used in the double-composite liner system; (iii) geotextiles used as filters or separators; and (iv) geocomposite drainage layers used in the liner and the final cover systems.

2.4 Construction Activities

In the context of this CQA Plan, the OHD facility construction is understood to include:

- geosynthetic and soil components of the liner system;
- leachate collection, removal, transmission, and storage systems;
- geosynthetic and soil components of the final cover system above the landfill surfaces;
- gas management system;
- surface-water management system components;
- other site work including grading and general earthwork;
- road work; and
- other construction activities as assigned by Omni.

2.5 CQA Lines of Communications

Successful execution of this CQA Plan is dependent on open and continuous communication between all parties having a role in the project. The lines of communication between Omni, Engineer of Record, Design Engineer, Construction Manager, Contractor, and CQA Consultant are defined in the organization charts included in Section 3 of this CQA Plan.

3. PROJECT ORGANIZATION AND PERSONNEL

3.1 Overview

The OHD facility construction organization chart is shown in Figure 3-1. It is understood that the Project Manager will act on behalf of the Omni in all matters relating to the construction of the OHD facility. Day-to-day construction activities at the OHD facility will be managed through the direct interaction of several parties below Project Manager level including but not limited to the Construction Manager, Design Engineer, Contractor, and CQA Consultant. The organization chart for the OHD facility CQA Consultant is presented in Figure 3-2. The description, qualifications, and responsibilities of the parties responsible for construction and CQA at the OHD facility project are described below.

3.2 Construction Manager

The Construction Manager shall be an individual employed by the Project Manager and who is responsible for overall management of the construction project at the site. In this CQA plan the term "Construction Manager" shall refer specifically to an authorized representative of the Project Manager at the OHD facility. The Construction Manager will hold a baccalaureate degree in construction management, engineering, or related field or have 10 years of construction management experience. The Construction Manager will also have 3 years of landfill construction experience. The Construction Manager shall be responsible for coordination and oversight of all construction activities including: (i) contract administration; (ii) construction management; (iii) review of any modifications or changes to the construction contract documents; and (iv) final approval authority for contract or shop drawings and submittals.

3.3 Design Engineer

The Design Engineer is the individual representing the firm having responsibility for OHD facility design. The Design Engineer will hold a minimum of a baccalaureate degree in engineering, be a Professional Engineer registered in the state of Florida, and have 10 years experience in construction management, engineering, or related fields. The Design Engineer shall have expertise which demonstrates significant familiarity with geosynthetics and soils, as appropriate, including design and construction experience related to landfill liner system, and final cover system. The Design Engineer is responsible for approving all design and specification changes and making design clarifications that may be required during construction at the OHD facility. The Design

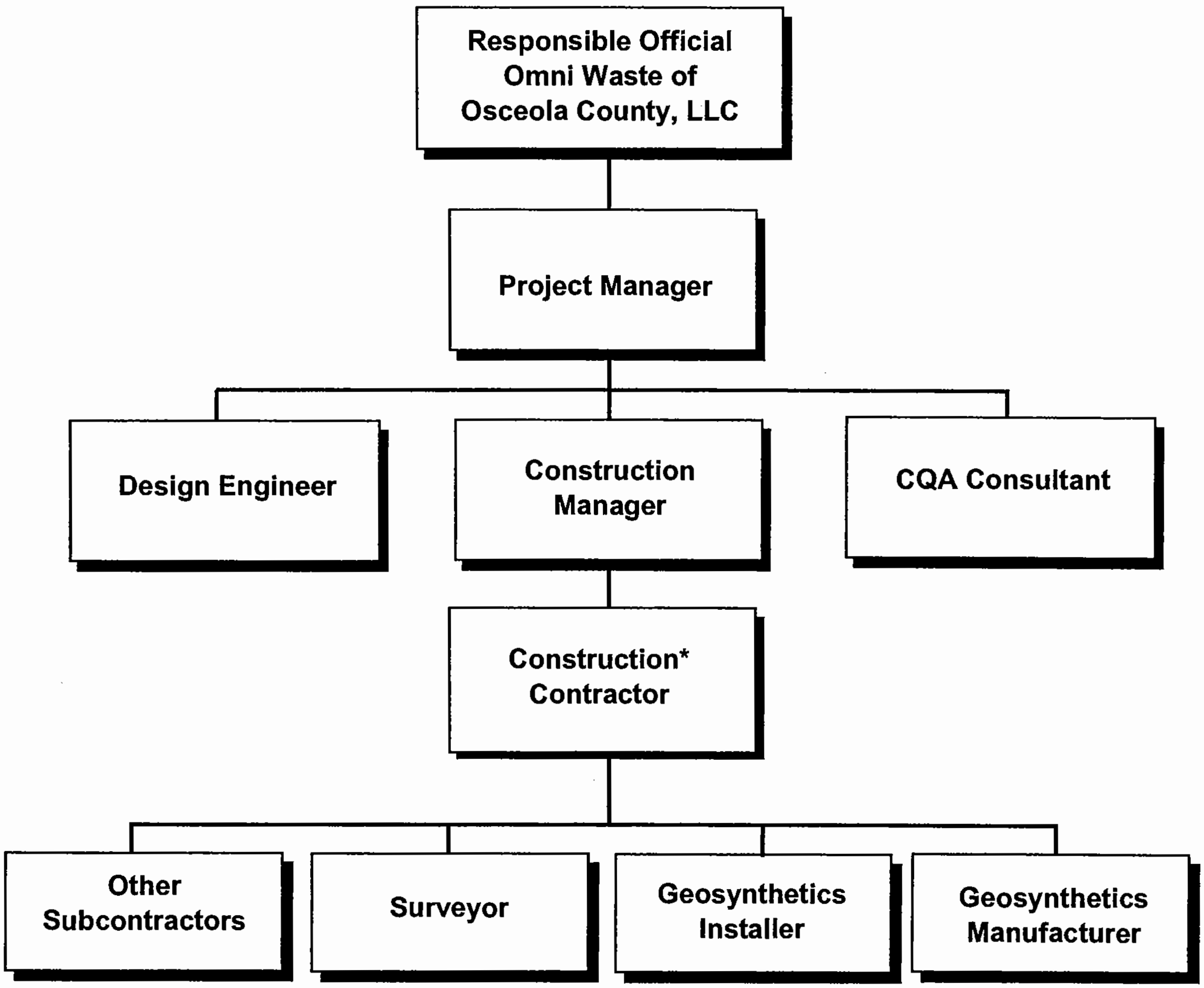
Engineer shall assist the Construction Manager in reviewing and approving the Contractor's shop drawings and submittals as necessary. The Design Engineer will not be present on-site but will visit the project during construction and attend the project coordination meetings as required to assure conformance with plans and specifications. The Design Engineer will be capable of discussing and interpreting all elements of the OHD facility design. The Design Engineer shall have the authority to recommend changes or modifications to the Construction Drawings and Technical Specifications for approval by Omni and FDEP, as required.

3.4 Contractor

The Contractor is the firm or corporation having a legally binding agreement to construct components of the OHD facility construction, or shall be qualified construction personnel hired directly by Omni and working under the direct supervision of a construction foreman and superintendent. The Contractor is represented on-site by a qualified individual who is authorized to act on behalf of the Contractor in all matters pertaining to the construction at the OHD facility. The Contractor shall be qualified as required by the contract to perform all aspects of work required to successfully construct the project. The Contractor shall be registered in accordance with applicable local, state, and federal requirements and shall demonstrate significant prior related experience. The Contractor's field representative shall be a qualified individual who is able to perform all tasks associated with OHD facility construction activities. The Contractor's field representative shall demonstrate experience similar to the Construction Manager. The Contractor's field representative shall have the authority to direct and instruct the Contractor's crews and its subcontractors.

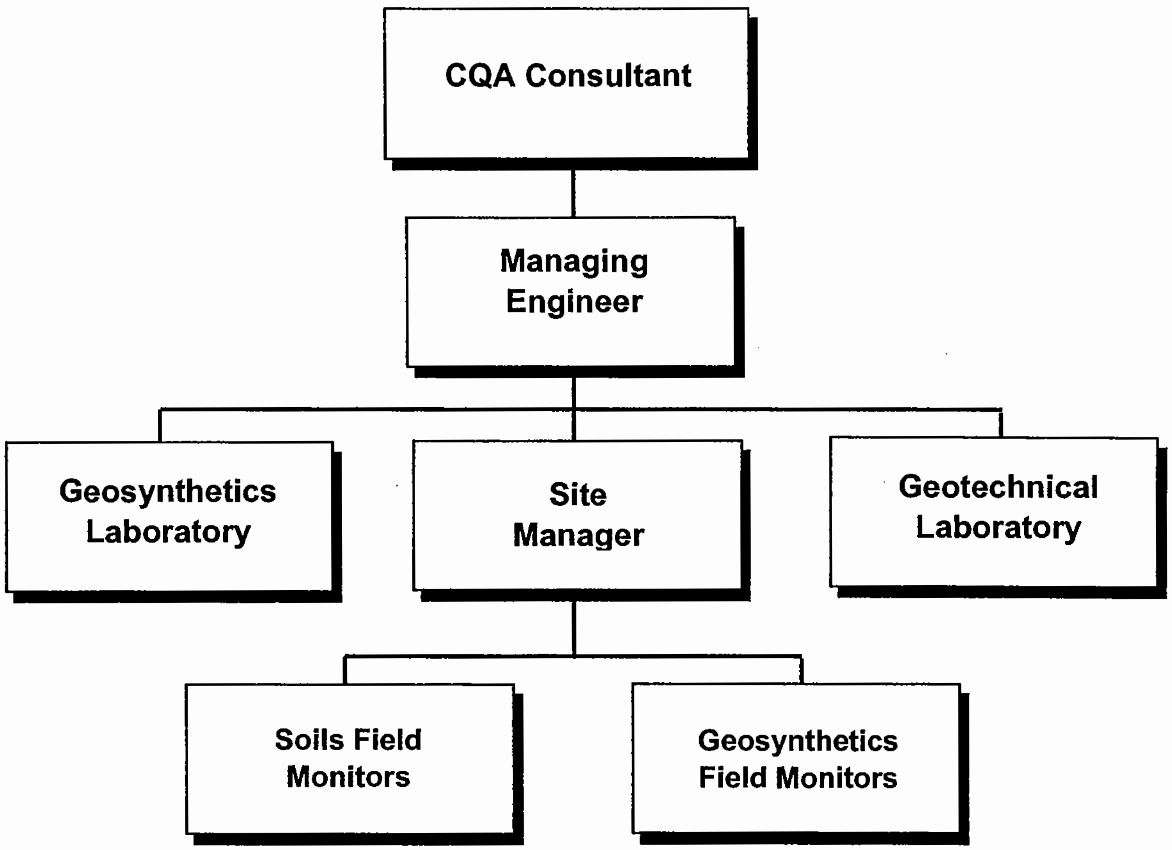
The Contractor is responsible for all construction materials and activities. The Contractor is also responsible for scheduling and coordination of the required work with its subcontractors to complete the project within the construction schedule approved by the Construction Manager. The Contractor shall provide an experienced supervisory representative at all times during any construction activity on-site. The Contractor is responsible for furnishing as-built record drawings and a copy of all documentation required during the construction at the OHD facility. The Contractor is also responsible for updating all construction drawings for any deviations from the original plans and specifications on a regular basis.

Figure 3-1
OHD Facility Construction Organization Chart



*The Construction Contractor is assumed to have earthwork capabilities as an integral part of the firm. Otherwise, the earthwork subcontractor is a major entity in this chart under the prime contractor.

Figure 3-2
OHD Facility CQA Organization Chart



The Contractor's field representative is responsible for coordinating and supervising the work of all subcontractors on site. At a minimum, the Contractor's field representative will be responsible for the following:

- informing the Construction Manager of any discrepancies between the plans and specifications and the field conditions;
- submitting all documentation required by the Construction Drawings and Technical Specifications in a timely manner;
- attending all project coordination meetings held on site;
- scheduling all phases of the construction;
- maintaining a daily log of all construction activities on site;
- implementing and verifying all QC procedures required of the Contractor and/or subcontractors; and
- submitting proposed alternative materials or construction methods to the Construction Manager for approval prior to acquisition and use.

3.5 CQA Consultant

3.5.1 Definition

The CQA Consultant is the party, independent from Omni and the Contractor, responsible for observing, testing, and documenting activities related to the CQA and CQC of the soil and geosynthetic components and other activities related to the construction at the OHD facility as described in this CQA Plan.

3.5.2 Qualifications

The CQA Consultant shall be a well-established firm specializing in geotechnical engineering, liner and final cover system design, construction management, and CQA. The CQA Consultant shall possess the equipment, personnel, and licenses necessary to conduct the monitoring and testing activities required by this CQA Plan and the OHD facility Construction Drawings and Technical Specifications. The CQA Consultant shall also be experienced in the installation and CQA of soil and geosynthetic materials similar to those materials to be used for the OHD facility construction. The CQA Consultant will be experienced in the preparation of CQA documentation including CQA plans, field documentation, field testing procedures, laboratory testing procedures, construction specifications for construction, construction plans, and CQA certification reports. The CQA Consultant shall provide qualified staff for the project.

In addition, the CQA Consultant shall provide the following, in writing, to Omni as required:

- corporate background and information;
- a detailed summary of the firm's CQA capabilities;
- a detailed summary of the firm's CQA experience; and
- a representative list of at least 10 completed facilities for which the CQA Consultant has provided CQA monitoring services for the installation of the corresponding geosynthetic material; for each facility, the following information will be provided:
    - name and purpose of facility, its location, and date of installation;
    - name of owner;
    - surface area of each geosynthetic material installed; and
    - telephone number of person familiar with the project.

The CQA Consultant shall provide resumes of personnel to be involved in the project including:

- the CQA Managing Engineer, who operates from the office of the CQA Consultant and who conducts periodic visits to the site as required;
- the CQA Site Manager, who is located at the site; and
- the CQA Field Monitors, who will be located at the site.

The CQA Consultant organization will be led by the CQA Managing Engineer, who will hold a baccalaureate degree in engineering and be a Professional Engineer registered to practice in the state of Florida. The CQA Site Manager will be the representative of the CQA Consultant on site and will have experience in similar construction and be specifically familiar with the construction of soil and geosynthetic components of the landfill.

3.5.3 Responsibilities

The CQA Consultant shall be responsible for monitoring and documenting the activities of the Contractor relative to the installation of the liner and final cover system components as well as various appurtenances related to the construction at the OHD facility. The CQA Consultant will be responsible for monitoring the compliance of construction materials delivered to the site with the submittals and/or shop drawings previously reviewed and approved by the Construction Manager. The CQA Consultant shall assure that the Contractor's construction methods and workmanship are performed in accordance with the Construction Drawings and Technical Specifications. The CQA Consultant shall be responsible for obtaining and testing samples of the various construction materials in accordance with the testing frequencies identified in this plan. The CQA Consultant shall also be responsible for obtaining, labeling, and shipping samples for off-site laboratory testing in accordance with the requirements of this plan and appropriate specifications.

The CQA Consultant shall be responsible for soils quality control testing to be performed by both the on-site and off-site testing laboratories. The CQA Consultant shall be responsible for staffing and operating the on-site soils laboratory, if required. Test results from the on-site and off-site laboratories shall be submitted to the Construction Manager within a time frame that will not impede or delay construction activities.

The on-site soils laboratory, if required, shall be equipped to perform routine index testing including, but not limited to:

- standard Proctor (ASTM D 698);
- particle-size analysis (ASTM D 422 and ASTM C 136);
- Atterberg limits (ASTM D 4318);
- moisture content (ASTM D 2216 and ASTM D 4643);
- soils classification (ASTM D 2487); and

- percent passing No. 200 sieve (ASTM D 1140).

The CQA Consultant shall also be responsible for conducting routine field tests during construction of the OHD facility, which shall include:

- moisture content by nuclear methods (ASTM D 3017);
- in-place density by nuclear methods (ASTM D 2922);
- lift thickness by direct measurement;
- sand cone (ASTM D 1556); and
- drive cylinder (ASTM D 2937).

The CQA Consultant will be responsible for the quality control of its on-site laboratory testing program and for documenting the calibration of the soils laboratory testing equipment. Equipment calibration certificates shall be maintained in the CQA Consultant's on-site project file. All tests will be conducted in accordance with ASTM or other applicable state or federal standards. Test results shall be submitted to the Construction Manager within a time frame that will not impede or delay construction of activities.

The duties of the CQA Personnel are discussed in the following subsections.

3.5.3.1 CQA Managing Engineer

The CQA Managing Engineer:

- reviews the landfill Construction Drawings and Technical Specifications;
- reviews soils and geosynthetics-related documents (such reviews are for familiarization and for evaluation of constructibility only);
- attends project meetings related to construction quality activities;
- administers the CQA program (i.e., assigns and manages all on-site CQA personnel, reviews all field reports, and provides engineering review of all CQA-related activities);
- provides quality control of CQA documentation;

- reviews changes to the construction design, and assures any major changes are submitted to FDEP for approval prior to incorporation into the Construction Drawing and Technical Specifications; and

- with the CQA Site Manager, prepares the final certification report.

3.5.3.2 CQA Site Manager

The CQA Site Manager:

- acts as the on-site representative of the CQA Consultant;

- familiarizes all CQA Field Monitors with the site, project documents, and the CQA requirements;

- manages the daily activities of the CQA Field Monitors;

- attends regularly scheduled CQA-related meetings on-site;

- reviews the ongoing preparation of the construction record drawings;

- reviews test results provided by the Contractor;

- verifies the calibration and condition of on-site testing equipment;

- reviews the CQA Field Monitors' daily reports and logs;

- provides reports to the Construction Manager, and documents in a daily report any reported relevant observations by the CQA Field Monitors;

- prepares a daily report for the project;

- oversees the collection and shipping of all laboratory test samples;

- reviews results of laboratory testing and makes appropriate recommendations;

- reports any unresolved deviations from the CQA Plan and Construction Drawings and Technical Specifications to the Construction Manager;

- assists with the preparation of the final certification report;

- reviews appropriate certifications and documentation from the Contractor and the Geosynthetics Manufacturer and Installer, and makes appropriate recommendations;

- reviews the Geosynthetics Manufacturer's QC documentation;

- reviews the geosynthetics Installer's personnel qualifications for conformance with those required by the Technical Specifications; and

- performs duties of CQA Field Monitor as needed.

3.5.3.3 CQA Field Monitors

The duties of the CQA Field Monitors are monitoring and documenting construction of all soils and geosynthetics components of the landfill and other OHD facility activities, as assigned by the CQA Site Manager.

The duties of the CQA Field Monitors will include:

- monitoring material stockpiles for any deterioration of materials;

- monitoring surface-water drainage in the areas of soil and geosynthetic material stockpiles;

- preparing daily field reports;

- recording CQA and CQC activities on field logs;

- reporting problems to the CQA Site Manager;

- assisting with collection of samples from the constructed soil components in accordance with the CQA Plan;

- monitoring soil placement and compaction operations;

- monitoring the unloading and on-site handling and storage of the geosynthetics;

- monitoring geosynthetic repair operations;

- monitoring geosynthetic material deployment and installation operations; and

- collecting conformance samples for testing by CQA laboratories.

In addition to these specific duties, all CQA Field Monitors will document any on-site activities that could result in damage to the soils or geosynthetic components of the landfill. This is particularly true during the placement and compaction of the initial lift of soil on top of the underlying geosynthetic material. Any observations so noted by the CQA Field Monitors shall be reported immediately to the CQA Site Manager.

3.6 Soils CQA Laboratory

3.6.1 Definition

The Soils CQA Laboratory is the party, independent from Omni and Contractor, responsible for conducting geotechnical laboratory tests in accordance with standards referenced in the Construction Drawings and Technical Specifications and this CQA Plan. The testing results generated by the Soils CQA Laboratory shall be used by the CQA Consultant to verify compliance of the soils construction materials with the plans and specifications and submittals previously approved by the Construction Manager.

It is anticipated that the on-site Soils CQA Laboratory will be utilized to perform the conformance evaluation testing of the various soils components at the OHD facility. The off-site soils CQA Laboratory will be for more sensitive performance testing required during construction such as hydraulic conductivity testing which require tightly controlled laboratory conditions.

3.6.2 Qualifications

The Soils CQA Laboratory will be experienced in testing of soils similar to those proposed for use in the construction at the OHD facility in accordance with ASTM and other applicable soil test standards. The Soils CQA Laboratory will be capable of providing test results within a maximum of 7 working days of receipt of samples and will maintain that capability throughout the duration of the earthwork construction.

Prior to construction, the Soils CQA Laboratory, if different from the CQA Consultant, shall submit their qualifications and QA/QC procedures to the Construction Manager for review and approval. The qualifications presented by the Soils CQA Laboratory shall, as a minimum, include:

- corporate background and statement of qualifications;

- list of testing capabilities including reference to ASTM test methods;
- a laboratory QA/QC plan;
- information on staff size and experience; and
- information regarding test result turnaround time.

3.6.3 Responsibilities

The Soils CQA Laboratory will be responsible for testing various soils components at the OHD facility. These tests shall include, but not be limited to, material qualification (conformance) tests and material construction quality control (performance) tests as described in Construction Drawings and Technical Specifications. The CQA Consultant will be responsible for coordinating the Soils CQA Laboratory testing.

3.7 Geosynthetics CQA Laboratory

3.7.1 Definition

The Geosynthetics CQA Laboratory is the party, independent from Omni, Contractor, and geosynthetics Manufacturer and Installer, responsible for conducting tests on samples of geosynthetic materials used in construction of the landfill in accordance with standards referenced in the Construction Drawings and Technical Specifications and this CQA Plan. The testing results generated by the Geosynthetics CQA Laboratory shall be used by the CQA Consultant to verify compliance of the geosynthetic materials with plans and specifications and submittals previously approved by the Construction Manager.

3.7.2 Qualifications

The Geosynthetics CQA Laboratory shall hold current accreditation by Geosynthetic Research Institute (GRI) or be approved by the Design Engineer and have experience in testing geosynthetics similar to those proposed for use during construction at the OHD facility. The Geosynthetics CQA Laboratory shall be familiar with ASTM and other applicable geosynthetic test standards. The Geosynthetics CQA Laboratory will be capable of providing destructive test results for geomembrane field seams within

24 hours of receipt of samples and will maintain that capability throughout the duration of geosynthetic material installation.

Prior to construction, the Geosynthetics CQA Laboratory, if different from the CQA Consultant, shall submit their qualifications to the Construction Manager for review and approval. The qualifications presented by the Geosynthetics CQA Laboratory shall, as a minimum, include:

- corporate background and statement of qualifications;
- listing of testing capabilities including reference to ASTM or other applicable test methods;
- a laboratory QA/QC plan;
- information on staff size and experience; and
- information regarding test result turnaround time.

3.7.3 Responsibilities

The Geosynthetics CQA Laboratory will be responsible for testing various geosynthetic components of the landfill. These tests shall include, but not be limited to, geosynthetic conformance and performance tests and destructive testing of the geomembrane field seams as described in the Construction Drawings and Technical Specifications. The CQA Consultant will be responsible for coordinating the Geosynthetics CQA Laboratory testing.

3.8 Geosynthetics Manufacturers

The geosynthetics Manufacturers are the firms or corporations responsible for production of the geosynthetic materials to be used in construction at the OHD Facility. The geosynthetics Manufacturers shall be able to provide sufficient production capacity and qualified personnel to meet the demands of the project schedule. Prior to shipment of any material to the site, each geosynthetics Manufacturer shall be pre-qualified and approved by the Construction Manager. The geotextile, geomembrane, geocomposite and GCL Manufacturers shall meet the qualifications outlined in the Technical Specifications, respectively.

Each geosynthetics Manufacturer is responsible for the production and quality control of its respective geosynthetic product. In addition, each geosynthetics Manufacturer is responsible for the condition of the geosynthetic until the material is accepted by the Contractor. Each geosynthetics Manufacturer shall produce a consistent high quality product that shall meet all the requirements of the Technical Specifications. Each geosynthetics Manufacturer shall submit quality control documentation to the Construction Manager for its respective products as required by the Technical Specifications.

3.9 Geosynthetics Installers

The geosynthetics Installers will be experienced and qualified to install the geosynthetic materials of the type specified for this project. The geosynthetics Installers will be approved and/or licensed by the geosynthetics Manufacturers. A copy of the approval letter or license will be submitted by the Contractor to the Construction Manager as required by the Technical Specifications. The geosynthetics Installers shall meet the qualifications outlined in the Technical Specifications. The geosynthetics Installers will designate one representative as its supervisor, who will be responsible for acting as the geosynthetics Installer's spokesman on site. The geosynthetics Installers will provide the Construction Manager with a list of proposed seaming personnel and their qualifications. This document will be reviewed by the CQA Consultant. Final approval of the geosynthetic Installer's geomembrane seaming personnel will be the responsibility of the Construction Manager. Any proposed seaming personnel deemed insufficiently experienced will not be accepted. The most experienced seamer, the "master seamer", shall provide direct supervision, as required, over less experienced seamers. No field seaming shall take place without the master seamer being present.

The geosynthetics Installer's supervisor will be responsible for installation of the geosynthetics used in construction at the OHD facility and for providing supervision and guidance to the installation crew. The geosynthetics Installer's supervisor is also responsible for the following: (i) obtaining samples, as required by the CQA Plan and the specifications; (ii) field testing; (iii) documenting quality control testing activities; and (iv) coordinating the geosynthetics installation activities with the Construction Manager. The geosynthetics Installer's supervisor will be responsible for documenting the geosynthetics installation activities, including, but not limited to, on-site personnel, material inventories, production figures, test results, installation deficiencies, and resolution of construction problems.

3.10 Surveyor

The Surveyor is responsible for lines and grades required for control of the work on an ongoing basis during all phases of the OHD facility construction. Close interaction between the Surveyor, Contractor, and the CQA Consultant is essential to ensure that construction at the OHD facility is completed in accordance with the Construction Drawings and Technical Specifications. The project Surveyor shall be a state of Florida licensed Professional Land Surveyor or registered Professional Engineer who shall sign and seal all construction survey record drawings. All surveying personnel shall be experienced in the provision of surveying services, including detailed accurate documentation as required in the Technical Specifications. The Surveyor is responsible for all surveying activities and products in accordance with the Technical Specifications.

4. DOCUMENTATION

4.1 Overview

An effective CQA Plan depends largely on recognition of all construction activities that should be monitored and the assignment of responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of quality assurance and quality control activities. The CQA Consultant shall be responsible for assuring that the Contractor's quality control requirements have been addressed and satisfied.

The CQA Site Manager shall provide the Construction Manager descriptive daily field reports, data sheets, and logs, as requested, which document that monitoring activities have been accomplished. Examples of some of the forms that will be used to document CQA activities are included in Appendix A. The CQA Site Manager shall also maintain at the job site a complete file of Construction Drawings and Technical Specifications, this CQA Plan, the Contractor's Quality Control Plan(s), checklists, test procedures, daily logs, and other pertinent construction and CQA documents.

4.2 Daily Record Keeping

The CQA Consultant's daily reporting procedures shall include: (i) daily summary report; (ii) monitoring logs; (iii) testing data sheets; and (iv) when appropriate, problem identification and corrective measures reports.

4.2.1 Daily Summary Reports

The CQA Consultant's daily summary reports shall include the following information as applicable:

- an identifying sheet number for cross referencing and document control;
- date, project name, location, and other pertinent project identification;
- data on weather conditions;
- summary on meetings held and their results;

- process description(s) and location(s) of construction activities underway during the time frame of report;

- descriptions and specific locations of areas, or units, of work being tested and/or observed and documented;

- description of locations where tests and samples were taken;

- a narrative summary of field test results;

- off-site materials received, including quality control documentation;

- decisions made regarding acceptance of units of work, and/or corrective actions to be taken in instances of substandard testing results;

- identifying sheet numbers of data sheets and/or problem reporting and corrective measures reports used to substantiate the decisions described above; and

- signature of the respective CQA Site Manager and/or the CQA Field Monitor.

4.2.2 CQA Monitoring Logs and Test Data Sheets

Monitoring observations, sampling information, and test results shall be recorded on the appropriate monitoring logs and test data sheets. The CQA Consultant shall use the monitoring logs and test data sheets to ensure completeness of the required CQA activities. Any corrections to the monitoring logs and test data sheets shall be single line crossed out, initialed by the CQA personnel responsible for the correction and dated. Examples of relevant monitoring logs are presented in Appendix A.

The CQA Consultant's monitoring logs and test data sheets shall include the following information as applicable:

- project specific information such as project name, location;

- the date the CQA activity was performed;

- a unique identifying sheet number for cross-referencing and document control;

- description or title of the CQA activity or test procedure;

- location of the CQA activity or location from which the sample was obtained;
- type of CQA activity or procedure used (reference to standard method when appropriate);
- recorded observation or test data, with all necessary calculations;
- results of the CQA activity and comparison with specification requirements (pass/fail); and
- the initials or signature of personnel involved in CQA inspection activity.

4.2.3 Nonconformance Identification and Reporting

A nonconformance is defined herein as material or workmanship that does not meet the specified requirement(s). Nonconformance identification and corrective measures reports should be cross-referenced to specific summary reports, logs, or test data sheets where the nonconformance was identified. The reports should include the following information as applicable:

- a unique identifying sheet number for cross-referencing and document control;
- detailed description of the problem;
- location of the problem;
- probable cause;
- how and when the problem was located;
- estimation of how long problem has existed;
- suggested corrective measures;
- documentation of corrections (reference to inspection data sheets);
- suggested methods to prevent similar problems; and
- signature of the appropriate CQA Field Monitor and concurrence by the CQA Site Manager.

In some cases, not all of the above information will be available or obtainable. However, when available, such efforts to document nonconformances could help to avoid similar nonconformances in the future. The CQA Site Manager shall distribute copies of the report to the Construction Manager for further actions.

4.3 Photographic Documentation

The CQA Site Manager will be responsible for obtaining photographic documentation of the Contractor's activities, materials installation methods, and testing procedures. Photographs will serve as a pictorial record of work progress, problems, and corrective measures. Photographic reporting data sheets should be utilized to organize and document photographs taken during construction at the OHD facility. Such data sheets could be cross-referenced or appended to summary reports, CQA monitoring logs, or test data sheets and/or problem identification and corrective measures reports. At a minimum, photographic reporting data sheets should include the following information:

- a unique identifying number on data sheets and photographs for cross-referencing and document control;
- person responsible for photograph;
- the date and location where the photograph was taken; and
- location and description of the work;

These photographs will serve as a pictorial record of work progress, problems, and corrective measures. Color prints shall be organized chronologically and kept in a permanent protective file. Negatives and/or digital files shall be stored in a separate protective file.

4.4 Design and/or Specifications Changes

Design and/or specifications changes may be required during construction. In cases of Contractor initiated changes, the Contractor must submit written requests for such changes to the Construction Manager. The Design Engineer shall review and respond to these requests in a timely manner. All design and/or specifications changes will be made only with the approval of the Engineer of Record and Design Engineer and approval by FDEP if required. Such changes will take the form of a change order to the contract if required.

4.5 Nonconformances

The Construction Manager will be informed in writing of any significant recurring nonconformance with the Construction Drawings, Technical Specifications, or CQA Plan by the CQA Consultant. The cause of the nonconformance will be determined by the CQA Consultant. The Contractor will be directed by the Construction Manager to make appropriate changes in materials or procedures in order to correct the nonconformance. When this type of evaluation is made, the results will be documented, and any revision to procedures or specifications must be approved by the Design Engineer.

4.6 CQA Certification Report

At the completion of construction phases, the CQA Consultant will provide Omni with a construction phase final certification report for submittal to FDEP. This report will acknowledge: (i) that the work has been performed in compliance with the approved Construction Drawings, Technical Specifications, and approved modifications; (ii) physical sampling and testing has been conducted at the appropriate frequencies; and (iii) that the summary documentation provides the necessary supporting information.

At a minimum, this report will include:

- summary of CQA activities;
- CQA monitoring logs and testing data sheets including sample location plans;
- laboratory test results;
- problem identification and reports of corrective measures reports;
- a descriptive summary of any changes to the Construction Drawings or Technical Specifications; and
- a summary statement indicating compliance with the Construction Drawings or Technical Specifications and any approved changes that are signed and sealed by the CQA Managing Engineer.

The record drawings, which include scale drawings depicting the location of the construction and details pertaining to the extent of construction (e.g., depths, plan dimensions, elevations, soil component thicknesses, etc.), and a geomembrane panel drawing prepared by the CQA Consultant will also be included as part of the final certification report.

4.7 Storage of Records

The CQA Site Manager will be responsible for all CQA document storage during the construction at the OHD facility. This includes the CQA Consultant's copy of the Construction Drawings and Technical Specifications, the CQA Plan, and the originals of all the data sheets and reports. When the OHD facility construction is complete and upon issuance of the final certification report, the CQA document originals will be organized and retained by the CQA Consultant until requested by Omni. Required records shall include, but not be limited to, field logbooks, other data collections forms, equipment calibration records, costs data, drawings, maintenance records, and all associated reports.

5. SOILS CONSTRUCTION

5.1 Introduction

CQA monitoring and testing shall be performed during installation of the liner system, the final cover system, and other earthwork components. Criteria to be used for determination of acceptability of the various soil components are identified in the Construction Drawings and Technical Specifications and this CQA Plan.

5.2 Soil Components

There are several principal soil components included in the OHD facility construction. The soil components or layers of the liner system include the following, from top to bottom:

- a 2-ft thick liner protective layer above the geomembrane;
- a gravel drainage layer in the leachate collection swales and sumps; and
- a varying thickness of compacted general fill layers below the liner system.

The soil components or layers of the OHD facility final cover system above the waste include the following, from top to bottom:

- a 0.5-ft thick vegetative layer;
- a 1.5-ft thick cover protective soil layer above the geomembrane; and
- a 1.0-ft thick intermediate cover layer below the geomembrane.

General fill material is used in other areas of earthwork outside the liner or final cover systems. All general fill placement, grading, and compaction will be monitored and tested in accordance with the Construction Drawings, Technical Specifications, and this CQA Plan.

5.3 Record Drawings and As-Built Surveys

During construction of the soil components at the OHD facility, the CQA Consultant shall routinely review record drawings submitted by the Contractor. The drawings are used to verify location of work, percent of work completed, layer thickness, or final grades. Prior to the placement of successive soil or geosynthetic layers the CQA Consultant shall review as-built surveys that indicate compliance of the preceding layer thickness, lines, and grades.

Once an as-built survey has been received, it will be the responsibility of the CQA Consultant to review the information in a timely manner and notify the Contractor of any noncompliance.

5.4 Related Construction Drawings and Technical Specifications

Several sections of the Technical Specifications should be referenced by the CQA Consultant for pertinent soil materials physical properties and construction requirements. Related specifications include the following:

- Section 02100 - Surveying;
- Section 02110 - Clearing, Grubbing & Stripping;
- Section 02200 - Earthwork;
- Section 02215 - Trenching and Backfilling;
- Section 02225 – Low-Permeability Soil Layer;
- Section 02230 - Road Construction;
- Section 02235 - Drainage Gravel;
- Section 02240 - Protective Soil Layers;
- Section 02245 - Riprap;
- Section 02290 - Erosion & Sediment Control; and
- Section 02920 - Vegetative Layer.

Prior to the start of soils construction, the CQA Consultant shall review the information required by the Technical Specifications listed above. Compliance of the submittals with the Technical Specifications shall be determined by the Construction Manager.

5.5 Subgrades

During construction, monitoring of the subgrade preparation shall be performed by the CQA Consultant. The CQA Consultant shall monitor to assure a firm and smooth surface that is free of vegetation and other deleterious materials is achieved. Material placed to achieve grades indicated on the Construction Drawings shall be monitored by the CQA Consultant to verify that the subgrade material and fill placement, grading, and compaction complies with the Technical Specifications. Areas that do not meet the Technical Specifications will be delineated, and nonconforming areas will be reworked by the Contractor. This process will be repeated until acceptable results are achieved.

The CQA Consultant shall monitor the repair and rework of fill material that is damaged by excess moisture (causing softening). If such conditions are found to exist, the CQA Consultant shall evaluate the suitability of the subgrade by the following methods as applicable:

- moisture/density testing; and/or
- continuous visual inspection during proof-rolling.

5.6 Conformance Testing

It will be necessary for the CQA Consultant to observe and test the soil components to ensure they are uniform and conform to the requirements of the Technical Specifications. For soil materials obtained from on-site sources, visual inspections and conformance tests shall be performed by the CQA Consultant prior to the materials being used. If soil materials are obtained from off site borrow sources, visual inspection and conformance tests shall be performed at the source location or as the materials arrive at the OHD site. Borrow area inspections may also be utilized by the CQA Consultant to ensure that only suitable soil materials are transported to the OHD site. For off-site borrow areas containing non-uniform materials, it shall be necessary for the Contractor and the CQA personnel to coordinate excavation and monitoring of the segregation of substandard materials. All materials failing to comply with conformance standards shall be rejected for use at the OHD facility.

Initial evaluation of various soil types by CQA personnel during construction shall be largely visual; therefore, the CQA personnel must be experienced with visual-manual soil classification procedures. CQA personnel shall be aware that changes in color or texture can be indicative of a change in soil type. CQA personnel shall observe soils for deleterious materials (e.g., roots, stumps, and large objects). When necessary, the visual-manual procedure for the description and identification of soils shall be conducted by the CQA Consultant in accordance with test method ASTM D 2488.

5.6.1 Test Methods

Conformance tests used to evaluate the suitability of soil materials during construction shall be performed in accordance with the current ASTM or other applicable test procedures indicated in Table 5-1. Documentation and reporting of the test results shall be the responsibility of the CQA Consultant.

The standard Proctor test (ASTM D 698) shall be used for the evaluation of moisture/density relationships unless otherwise indicated. Any conflict regarding acceptance of test results shall be resolved by the Design Engineer.

5.6.2 Test Frequency

The frequency of conformance tests shall conform to the minimum frequencies presented in Table 5-1. The frequency of testing may be increased at the discretion of the CQA Consultant or if variability of the materials is observed. The testing frequencies described herein for general fill shall also apply to materials used by the Contractor in areas outside the limits of the liner and final cover systems at the OHD facility.

5.7 Construction Monitoring

During installation of the various soil components, the CQA Consultant shall visually observe and document the Contractor's earthwork activities for the following:

- changes in the soil consistency;
- the thickness of lifts as loosely placed and as compacted;
- soil conditioning prior to placement including general observations regarding moisture distribution, clod size, etc.;
- placement method which may damage or cause displacement or wrinkling of geosynthetics;
- the action of the compaction and heavy hauling equipment on the construction surface (sheepsfoot penetration, pumping, cracking, etc.);
- the number of passes used to compact each lift;
- desiccation cracks or the presence of ponded water; and
- final lift or layer thickness.

5.8 Hydraulic Conductivity Testing Evaluations

As shown in Table 5-1, hydraulic conductivity (permeability) tests shall be conducted on soil materials proposed in the liner and final cover systems including the low permeability layer at the sump areas, protective soil layers and drainage materials (i.e., gravel, processed tire chips). Permeability testing of these materials shall be performed in accordance with ASTM D 5084 or ASTM D 2434, as applicable. The CQA Consultant shall be responsible for documenting pertinent sampling information including the date the sample was obtained, sample identification number, and location.

5.9 Performance Testing

During construction, the CQA Consultant shall observe and test all soil components to ensure they are installed in accordance with the requirements of the Construction Drawings and Technical Specifications. The CQA Consultant shall also evaluate the procedures, methods, and equipment used by the Contractor to install the various soil components.

5.9.1 Test Methods

All performance testing shall be conducted in accordance with the Technical Specifications or as directed by the Design Engineer. The field testing methods, used to evaluate the suitability of soils during their installation, shall be performed by the CQA Consultant in accordance with current ASTM test procedures indicated in Table 5-2. Documentation and reporting of the test results shall be the responsibility of the CQA Consultant.

The standard Proctor test (ASTM D 698) shall be used for the evaluation of moisture/density relationships unless otherwise indicated. In-place surface moisture/density by nuclear test methods (ASTM D 3017 and D 2922) shall be used for in-situ field testing. The sand cone test method (ASTM D 1556) or drive cylinder test method (ASTM D 2937) shall be used to establish correlations of moisture and density in cases of uncertainty, and as a check of the nuclear surface moisture/density gauge calibration. Any conflict regarding acceptance of test results shall be resolved by the Design Engineer.

5.9.2 Test Frequency

Performance testing shall be conducted during the course of the work. The minimum construction performance testing frequencies are presented in Table 5-2. The frequency may be increased at the discretion of the CQA Consultant or if variability of the materials is observed by the CQA Consultant. Sampling locations shall be selected by the CQA Consultant. If necessary, the location of routine in-place density tests shall be selected using a non-biased sampling approach.

A special testing frequency shall be used at the discretion of the CQA Consultant when visual observations of construction performance indicate a potential problem. Additional testing for suspected areas shall be considered when:

- rollers slip during rolling operations;
- lift thickness is greater than specified;
- material is at improper and/or variable moisture content;
- it is suspected that less than the specified number of roller passes are made;
- dirt-clogged rollers are used to compact the material;
- rollers may not have used optimum ballast;
- there is change to subgrade condition since subgrade approval;
- fill materials differ substantially from those specified;
- the degree of compaction is doubtful; and
- as directed by the Design Engineer or the Construction Manager.

During construction, the frequency of testing may also be increased in the following situations:

- adverse weather conditions;
- breakdown of equipment;
- at the start and finish of grading;
- material fails to meet specifications; and
- the work area is reduced.

5.10 Deficiencies

If a defect is discovered in the soils construction, the CQA Consultant shall immediately determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the CQA Consultant shall determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the CQA Consultant deems appropriate. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, the CQA Consultant shall define the limits and nature of the defect and the appropriate remedy.

As soon as possible, after determining the extent and nature of substandard materials, noncompliant construction practice, or other such deficiency in materials or workmanship which cannot be immediately resolved on-the-spot, the CQA Consultant shall notify the Construction Manager and Contractor and schedule appropriate retests when the work deficiency is to be corrected.

The CQA Consultant shall verify that the Contractor has corrected all noted deficiencies. If a specified criterion cannot be met, or unusual weather conditions hinder work, the Contractor shall submit suggested solutions or alternatives to the Construction Manager for review.

At locations where the field testing indicates in-situ conditions which do not comply with the requirements of the Technical Specifications, the failing area shall be reworked to the satisfaction of the CQA Consultant. Alternatively, at the CQA Consultant's option, undisturbed samples of in-place material shall be obtained for appropriate testing. All retests performed by the CQA Consultant must verify that the deficiency has been corrected before any additional work is performed by the Contractor in the area of the deficiency.

5.11 Documentation

The documentation of soils CQA testing activities is an important factor in assuring the successful construction, performance, and approval of the soil components of the OHD facility landfill. The CQA monitoring observations, sample location descriptions, field test results, and on-site laboratory test results shall be documented by the CQA Consultant on forms specifically designed for their purpose. Reports and forms shall be submitted to the Construction Manager as requested.

TABLE 5-1

MINIMUM CONFORMANCE TESTING FREQUENCIES FOR OHD SOIL COMPONENTS

TEST NAME/ TEST METHOD	GENERAL FILL	LINER PROTECTIVE SOIL	GRANULAR DRAINAGE MATERIAL	LOW-PERMEABILITY SOIL	CAP PROTECTIVE SOIL	VEGETATIVE LAYER
SPECIFICATION SECTION	02200	02240/02250	02235	02225	02240	02920
Particle Size Analysis/ASTM D 422	1 test per 10,000 yd^3	N/A	N/A	1 test per Cell	1 test per 5,000 yd^3	1 test per 5,000 yd^3
Particle Size Analysis/ASTM C 136	N/A	1 test per 2,000 yd^3	1 test per 2,000 yd^3	N/A	N/A	N/A
Atterberg Limits/ASTM D 4318 (for plastic soils only)	N/A	N/A	N/A	N/A	1 test per 5,000 yd^3	N/A
Soil Classification/ASTM D 2487	1 test per 10,000 yd^3	1 test per 2,000 yd^3	1 test per 2,000 yd^3	1 test per Cell	1 test per 5,000 yd^3	1 test per 5,000 yd^3
Standard Proctor/ASTM D 698	1 test per 25,000 yd^3	N/A	N/A	1 test per Cell	1 test per 5,000 yd^3	N/A
Hydraulic Conductivity	N/A	1 test per 3,000 yd^3 (ASTM D 2434)	1 test per 3,000 yd^3 (ASTM D 2434)	1 test per Cell (ASTM D 5084)	N/A	N/A
Organic Content/ASTM D2974	N/A	N/A	N/A	1 test per 500 yd^3 minimum of 1 test per cell	N/A	1 test per 5,000 yd^3

N/A = Not Applicable

TABLE 5-2

MINIMUM PERFORMANCE TESTING FREQUENCIES FOR OHD SOIL COMPONENTS

TEST NAME/ TEST METHOD	SOIL TYPE		
	GENERAL FILL/ MISC. SOILS	LOW-PERMEABILITY SOIL	CAP PROTECTIVE SOIL
SPECIFICATION SECTION	02200	02225	02240
In-Situ Moisture/ASTM D 3017	5 tests per acre per lift(1)	1 test per lift per cell(1)	5 tests per acre per lift(1)
In-situ Density/ASTM D 2922	5 tests per acre per lift(1) or 1 test per 250 lf per lift	1 test per lift per cell (1)	5 tests per acre per lift(1)
Sand Cone/ASTM D 1556 or Drive Cylinder/ASTM D 2937	1 test per 25 nuclear tests or 1 test per 250 lf per lift	1 test per cell	1 test per 25 nuclear test
Hydraulic Conductivity/ASTM D5084	N/A	1 test per cell	N/A

N/A = Not Applicable

NOTE: 1. A minimum of two nuclear moisture and density tests each day of active soils construction

6. GEOMEMBRANE

6.1 Introduction

The CQA Consultant shall perform conformance and destructive seam testing and shall monitor the installation of geomembranes as required by Section 02770 of the Technical Specifications and this CQA Plan. The testing used to evaluate the conformance of the geomembrane sheet and seams with the requirements of the Technical Specifications shall be carried out by the CQA Consultant in accordance with the current versions of the ASTM or other applicable test procedure indicated in Tables 6-1 and 6-2.

6.2 Manufacturing Plant Visit

At the request of Omni, the CQA Consultant, or authorized representative, shall visit the plant of the geomembrane Manufacturer for the purpose of collecting conformance samples and verifying that manufacturing quality control procedures are in conformance with Section 02770 of the Technical Specifications. If possible, such a visit shall be performed prior to or during the manufacturing of the geomembrane rolls for the OHD facility project. The CQA Consultant shall review the manufacturing process, quality control procedures, laboratory facilities, and testing procedures.

During the project specific plant visit, the CQA Consultant shall:

- verify that properties guaranteed by the geomembrane Manufacturer meet all specifications;
- verify that the measurements of properties by the geomembrane Manufacturer are properly documented and test methods used are acceptable;
- spot inspect the rolls and verify that they are free of holes, blisters, or any sign of contamination by foreign matter;
- review packaging and transportation procedures to verify that these procedures are not damaging the geomembrane;
- verify that all rolls are properly labeled; and
- verify that extrusion rods and/or beads manufactured for the field seaming of

the geomembrane are derived from the same base resin type as the geomembrane.

Upon completion of the manufacturing plant visit, a report describing the findings and observations shall be completed by the CQA Consultant and shall be included as an attachment to the final certification report.

6.3 Transportation, Handling and Storage

The CQA Consultant shall monitor the transportation, handling, and storage of the geomembrane on-site. The Construction Manager shall designate a geomembrane storage location. It will be the responsibility of the Contractor to protect the geomembrane stored on site from theft, vandalism, and damage.

Upon delivery at the site, the Contractor, Installer, and CQA Consultant shall conduct an inspection of the rolls for defects and damage. This inspection shall be conducted without unrolling the materials unless defects or damages are found or suspected. The CQA Consultant shall indicate to the Construction Manager:

- rolls, or portions thereof, which should be rejected and removed from the site because they have severe or nonrepairable flaws which may compromise geomembrane quality; and

- rolls that include minor and repairable flaws that do not compromise geomembrane quality.

The CQA Consultant shall also monitor that equipment used to handle the geomembrane on-site is adequate and does not pose any risk of damage to the geomembrane when used properly.

6.4 Conformance Testing

6.4.1 Sampling Procedures

Upon delivery of the geomembrane rolls to the OHD facility, the CQA Consultant shall ensure that representative geomembrane conformance samples are obtained at the specified frequency and forwarded to the Geosynthetics CQA Laboratory for testing. Geomembrane conformance samples shall be taken across the entire width of the roll and shall not include the first 3 ft of material. Unless otherwise directed by the Design

Engineer, samples shall be 3 ft long by the roll width. The required minimum geomembrane conformance sampling frequencies are provided in Table 6-1. The CQA Consultant shall mark the machine direction on the samples with an arrow and affix a label, tag, or otherwise mark each sample with the following information:

- date sampled;
- project number;
- lot/batch number and roll number;
- conformance sample number; and
- CQA personnel identification.

6.4.2 Testing Procedures

Conformance testing of the geomembrane materials delivered to the site will be conducted to ensure compliance with both the Technical Specifications and the Manufacturer's list of minimum average roll values. As a minimum, the geomembrane conformance test procedures listed in Table 6-1 shall be performed by the Geosynthetics CQA Laboratory.

6.4.3 Test Results

All conformance test results shall be reviewed, accepted, and reported by the CQA Consultant before deployment of the geomembrane. Any non-conformance of the material's properties with the requirements of the Technical Specifications shall be reported to the Construction Manager. In all cases, the test results shall meet, or exceed, the property values listed in Appendix B.

6.4.4 Conformance Test Failure

In the case of failing test results, the Contractor may request that another sample from the failing roll be retested by the Geosynthetics CQA Laboratory with the Manufacturer's technical representative present during the test procedure. If the retest fails or if the option to retest is not exercised, then two isolation conformance samples shall be obtained by the CQA Consultant. These isolation samples shall be taken from rolls, which have been determined by correlation with the manufacturer's roll number, to have been manufactured prior to and after the failing roll. This method for choosing isolation rolls for testing should continue until passing tests are achieved. All rolls that fall numerically between the passing roll numbers shall be rejected. The CQA Consultant will verify that the Contractor has replaced all rejected rolls. The CQA Consultant shall document all actions taken in conjunction with geomembrane conformance failures.

6.5 Anchor Trench

The CQA Consultant shall verify and document that the anchor trench has been constructed as indicated in the Construction Drawings. The amount of anchor trench open at any time shall be limited to one day of geomembrane installation capacity. The anchor trench shall be constructed with proper drainage to prevent ponding.

Geosynthetic materials in the anchor trench shall be temporarily anchored with sand bags or other suitable methods approved by the CQA Consultant. The anchor trench shall be backfilled with suitable material as indicated in the Construction Drawings and Technical Specifications as soon as possible after all geosynthetics are installed. In-place moisture/density by nuclear methods testing of the compacted anchor trench backfill shall be performed at a frequency of one per 100 lineal feet of anchor trench.

The anchor trench shall be constructed with a slightly rounded corner where the geosynthetics enter the trench. No loose soil shall be allowed to underlie the geosynthetics in the anchor trench. The CQA Consultant shall verify that all temporary ballast (i.e., sandbags) and deleterious materials are removed from the anchor trench prior to backfilling. Backfilling of the anchor trench shall be performed when the geomembrane is in its most contracted state to prevent stress inducement and using extreme care to prevent any damage to the geosynthetic materials.

6.6 Geomembrane Placement

6.6.1 Field Panel Identification

A field panel is a piece of geomembrane larger than approximately 10 ft^2, which is to be seamed in the field, i.e., a field panel is a roll or a portion of roll cut in the field. The CQA Consultant shall assure that each field panel is given an "identification code" (number or letter-number) consistent with the as-built layout plan. This identification code shall be agreed upon by the Installer and CQA Consultant. This field panel identification code shall be as simple and logical as possible. The geosynthetic Manufacturer's roll numbers shall be traceable to the field panel identification code.

The CQA Consultant shall document the correspondence between roll numbers, factory panels, and field panel identification codes. The field panel identification code shall be used for all quality assurance/quality control records.

6.6.2 Field Panel Placement

The CQA Consultant shall monitor that field panels are installed substantially at the location indicated in the Installer's layout plan, as approved or modified. The CQA Consultant shall record the field panel identification code, Manufacturer's roll number, location, date of installation, time of installation, and dimensions of each field panel.

Geomembrane placement shall not proceed at an ambient temperature below 40°F or above 104°F unless authorized by the Design Engineer. Geomembrane placement shall not proceed during any precipitation, in the presence of excessive moisture (e.g., fog, dew), in an area of ponded water, or in the presence of excessive winds. The CQA Consultant shall monitor that the above conditions are fulfilled and that the supporting soil has not been damaged by adverse weather conditions.

The CQA Consultant shall monitor geomembrane deployment for the following:

- any equipment used does not damage the geomembrane by handling, trafficking, excessive heat, leakage of hydrocarbons or other means;
- the prepared surface underlying the geomembrane has not deteriorated since previous acceptance, and is still acceptable immediately prior to geomembrane placement;
- any geosynthetic elements immediately underlying the geomembrane are clean and free of foreign objects or debris;
- all personnel working on the geomembrane do not smoke, wear damaging shoes, or engage in other activities which could damage the geomembrane;
- the method used to unroll the panels does not cause scratches or crimps in the geomembrane and does not damage the supporting soil;

- the method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels);

- adequate temporary loading and/or anchoring (e.g., sand bags, tires), not likely to damage the geomembrane, has been placed to prevent uplift by wind (in case of high winds, continuous loading, e.g., by adjacent sand bags, is recommended along edges of panels to minimize risk of wind flow under the panels); and

- direct contact with the geomembrane is minimized; i.e., the geomembrane is protected by geotextiles, extra geomembrane, or other suitable materials, in areas where excessive traffic may be expected.

The CQA Consultant shall observe the geomembrane panels, after placement and prior to seaming, for damage. The CQA Site Manager shall advise the Construction Manager which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected shall be marked and their removal from the work area recorded by the CQA Consultant. Repairs shall be made according to procedures described in this Section.

6.7 <u>Field Panel Seaming</u>

6.7.1 Panel Layout

The CQA Consultant shall review the panel layout drawing previously submitted to the Construction Manager by the Installer and verify that it is consistent with accepted state of practice. In general, seams should be oriented parallel to the line of maximum slope, i.e., oriented along, not across, the slope. In corners and odd-shaped geometric locations, the number of seams should be minimized. No horizontal seam should be less than 5 ft beyond the toe or shoulder of the slope, or areas of potential stress concentrations, unless otherwise authorized by the Design Engineer. A seam numbering system compatible with the field panel identification numbering system shall be agreed upon prior to any seaming.

6.7.2 Seaming Equipment and Products

Approved processes for field seaming are extrusion welding and fusion welding. Proposed alternate processes shall be documented and submitted to the Construction

Manager for approval. Only equipment which have been specifically recommended by the geosynthetics Manufacturer by make and model shall be used. All seaming equipment shall be permanently marked with an identification number.

6.7.2.1 Fusion Process

The fusion-welding apparatus must be automated, self-propelled devices. The fusion-welding apparatus shall be equipped with gauges giving the applicable temperatures and welding speed. The CQA Consultant shall monitor ambient temperatures, geomembrane surface temperatures, apparatus speed, and apparatus temperatures at appropriate intervals.

The CQA Consultant shall also monitor that:

- the number of spare operable seaming apparatus agreed by the Construction Manager are maintained on site;
- equipment used for seaming will not damage the geomembrane;
- the seaming zone is dry and clean;
- there is sufficient overlap between panels;
- the electric generator is placed on a smooth base such that no damage occurs to the geomembrane;
- for cross seams, the edge of the cross seam is ground to a smooth incline (top and bottom) prior to welding;
- an insulating material is placed beneath the hot welding apparatus after usage; and
- a movable protective layer is used, as necessary, directly below each overlap of geomembrane that is to be seamed to prevent build-up of moisture between the sheets.

6.7.2.2 Extrusion Process

The extrusion-welding apparatus shall be equipped with gauges giving the temperature in the apparatus and at the nozzle. The CQA Consultant shall verify that the extrudate is comprised of the same resin as the geomembrane sheeting. The CQA Consultant shall monitor extrudate temperatures, ambient temperatures, and geomembrane surface temperatures at appropriate intervals.

The CQA Consultant shall also monitor that:

- the number of spare operable seaming apparatus agreed by the Construction Manager are maintained on site;
- equipment used for seaming is not likely to damage the geomembrane;
- the seaming zone is dry and clean;
- the extruder is purged prior to beginning a seam until all heat-degraded extrudate has been removed from the barrel;
- the electric generator is placed on a smooth base such that no damage occurs to the geomembrane; and
- an insulating material is placed beneath the hot welding apparatus after usage.

6.7.3 Seam Preparation

The CQA Consultant shall monitor that:

- prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris of any kind, and foreign material;
- seams are overlapped a minimum of 4 inches;
- if seam overlap grinding is required, the process is completed according to the geosynthetics Manufacturer's instructions or Section 02770 of the Technical Specifications, whichever is the more stringent, prior to the seaming operation, and in a way that does not damage the geomembrane;

- the grind depth shall not exceed 10 percent of the geomembrane thickness;
- grinding marks shall not appear beyond the extrudate after it is placed; and
- seams are aligned with the fewest possible number of wrinkles and "fishmouths".

6.7.4 Weather Conditions for Seaming

The normally required weather conditions for seaming are as follows:

- Unless authorized by the Design Engineer, no seaming shall be attempted at an ambient temperature below 40°F or above 104°F.
- Between ambient temperatures of 40°F and 50°F, seaming is possible if the geomembrane is preheated by either sun or hot air device, and if there is no cooling of the geomembrane to below 50°F resulting from wind.
- In all cases, the geomembrane seam areas shall be dry and protected from rain and wind.

The CQA Consultant shall verify that methods used by the Installer for seaming at ambient temperatures below 40°F or above 104°F will produce seams that are entirely equivalent to seams produced at ambient temperatures between 40°F and 104°F and protect the overall quality of the geomembrane. The CQA Consultant shall monitor that seaming conducted during abnormal weather conditions is performed in accordance with the methods approved by the Design Engineer.

6.7.5 Overlapping and Temporary Bonding

The CQA Consultant shall monitor that:

- the panels of geomembrane have a finished overlap of a minimum of 4 in. for both extrusion and fusion welding, but in any event sufficient overlap shall be provided to allow peel tests to be performed on the seam;
- no solvent or adhesive is used; and
- the procedure used to temporarily bond adjacent panels together does not damage the geomembrane; in particular, the temperature of hot air at the nozzle

of any spot welding apparatus is controlled such that the geomembrane is not damaged.

6.7.6 Trial Seams

The CQA Consultant shall verify that the Installer performs trial seam tests in accordance with Section 02770 of the Technical Specifications. The CQA Consultant shall observe and document the Installer's trial seam testing procedures. The trial seam samples shall be assigned an identification number and marked accordingly by the CQA Consultant. Each sample shall be marked with the date, time, machine temperature(s) and setting(s), number of seaming unit, and name of seaming technician. Trial seam samples shall be maintained until destructive seam testing of the applicable seams are tested and pass.

6.7.7 General Seaming Procedures

No geomembrane seaming shall be performed unless the CQA Consultant is on-site. The CQA Consultant shall monitor the general seaming procedure used by the installer as follows:

- If required for fusion welding, a movable protective layer of plastic will be placed directly below each overlap of geomembrane that is to be seamed. This is to prevent any moisture build-up between the sheets to be welded.

- If required, a firm substrate shall be provided by using a flat board, a conveyor belt, or similar hard surface directly under the seam overlap to achieve proper support.

- Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles shall be seamed and any portion where the overlap is inadequate shall then be patched with an oval or round patch of the same geomembrane extending a minimum of 6 in. beyond the cut in all directions.

- If seaming operations are carried out at night, adequate illumination shall be provided by the Contractor/Installer to the satisfaction of the CQA Consultant.

- Seaming shall extend to the outside edge of panels to be placed in the anchor trench.

6.7.8 Nondestructive Seam Continuity Testing

The CQA Consultant shall monitor that the Installer shall nondestructively test all field seams over their full length using a vacuum test unit or air pressure test (for double fusion seams only). Spark testing will be performed if the seam cannot be tested using the vacuum or air pressure test methods. The purpose of nondestructive tests is to check the continuity of seams. Continuity testing shall be carried out as the seaming work progresses, not at the completion of all field seaming. The CQA Consultant shall:

- monitor nondestructive testing;
- document the results of the nondestructive testing; and
- inform the Contractor and Construction Manager of any noncompliance.

Any required seam repairs shall be made in accordance with the Technical Specifications. The CQA Consultant shall:

- observe the repair procedures;
- observe the retesting procedures; and
- document the results.

The seam number, date of observation, dimensions and/or descriptive location of the seam length tested, name of person performing the test, and outcome of the test shall be recorded by the CQA Consultant.

6.7.9 Destructive Testing

Destructive seam testing shall be performed during the geomembrane installation. The purpose of this testing is to evaluate seam strength. Destructive seam testing shall be done as the seaming work progresses, not at the completion of all field seaming.

6.7.9.1 Location and Frequency

The CQA Consultant shall select all destructive seam test sample locations. Sample locations shall be established as follows.

- A minimum frequency of one test location per 500 ft of seam length. This minimum frequency is to be determined as an average taken throughout the entire facility. This minimum frequency will be decreased for seams made outside the normal ambient temperature range of 40°F to 104°F.

- Test locations shall be determined during seaming at the CQA Consultant's discretion. Selection of such locations may be prompted by suspicion of excess crystallinity, contamination, offset welds, or any other potential cause of imperfect welding.

The Installer shall not be informed in advance of the locations where the seam samples will be taken.

6.7.9.2 Sampling Procedures

Destructive seam testing shall be performed as the seaming progresses in order to obtain the Geosynthetic CQA Laboratory test results before the geomembrane is covered by overlying materials. The CQA Consultant shall:

- observe sample cutting;

- assign a number to each sample, and mark it accordingly; and

- record sample location on geomembrane panel layout drawing.

All holes in the geomembrane resulting from destructive seam test sampling shall be immediately repaired in accordance with repair procedures described in Section 02770 of the Technical Specifications. The continuity of the new seams in the repaired area shall be nondestructively tested as described in this Section.

6.7.9.3 Size of Samples

At a given sampling location, two types of samples (field test samples and laboratory test samples) shall be taken. First, a minimum of two field samples or test strips should be taken for field testing. Each of these test strips shall be 1 in. wide by 12 in. long, with the seam centered parallel to the width. The distance between these two specimens shall be 42 in. If both specimens pass the field test described in this Section, a second full laboratory destructive sample shall be taken for testing by the Geosynthetics CQA Laboratory.

The full destructive sample shall be located between the two field test strips. The sample shall be 12 in. wide by 42 in. long with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:

- one 12 in. by 12 in. portion to the Installer;
- one 12 in. by 12 in. portion to the Construction Manager for archive storage; and
- one 12 in. by 18 in. portion for Geosynthetics CQA Laboratory testing.

6.7.9.4 Field Testing

The test strips shall be tested in the field, for peel adhesion, using a gauged tensiometer. In addition to meeting the strength requirements outlined in Appendix B, all specimens shall exhibit a Film Tear Bond and shall not fail in the weld. If any field test sample fails to meet these requirements, the destructive sample has failed.

The CQA Consultant shall witness all field tests and mark all samples and portions with their number. The CQA Consultant shall also log the date, number of seaming unit, seaming technician identification, destructive sampling, and pass or fail description.

6.7.9.5 Geosynthetics CQA Laboratory Testing

Destructive test samples shall be tested by the Geosynthetics CQA Laboratory. Testing shall include "Bonded Seam Strength" and "Peel Adhesion" (ASTM D 6932). The minimum acceptable values to be obtained in these tests are presented in Appendix B. At least five specimens shall be tested for each test method. Specimens shall be selected alternately by test from the samples (i.e., peel, shear, peel, shear...). Both the inside and outside tracks of the double track fusion seams shall be tested for peel adhesion. A passing test shall meet the minimum required values in at least four out of five specimens.

The Geosynthetics CQA Laboratory shall provide test results no more than 24 hours after they receive the samples. The CQA Site Manager shall review laboratory test results as soon as they become available, and make appropriate recommendations to the Construction Manager.

6.7.9.6 Procedures for Destructive Test Failure

The following procedures shall apply whenever a sample fails a destructive test, whether that test was conducted in the field or by the Geosynthetics CQA Laboratory. The CQA Consultant will monitor that the Installer follows one of the two options below:

- The Installer can reconstruct the seam (e.g., remove the old seam and reseam) between any two passed destructive test locations or between points judged by the CQA Consultant to represent conditions of the failed seam (e.g., a tie-in seam or a seam made by the apparatus and/or operator used in the failing seam);or

- The Installer can trace the welding path to an intermediate location a minimum of 10 ft from the point of the failed test in each direction and take a small sample for additional field testing in accordance with the destructive test procedure at each location. If these additional isolation samples pass the field test, then full laboratory samples are taken at both locations. If these laboratory samples meet the specified strength criteria, then the seam is reconstructed between these locations. If either sample fails, then the process is repeated to establish the zone in which the seam should be reconstructed or repaired.

All failed seams must be bounded by two locations from which samples passing laboratory destructive tests have been taken or the entire seam is reconstructed and retested. In cases exceeding 150 ft of reconstructed seam, a sample taken from the zone in which the seam has been reconstructed must pass destructive testing. Repairs shall be made in accordance with this section. The CQA Consultant shall document all actions taken in conjunction with destructive test failures.

6.8 Defects and Repairs

6.8.1 Identification

All seams and non-seam areas of the geomembrane shall be examined by the CQA Consultant for identification of defects, holes, blisters, undispersed raw materials and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane shall be clean at the time of examination. The Construction Manager shall require the geomembrane surface to be broomed or washed by the Contractor if the amount of dust or mud inhibits examination.

6.9 Repair Procedures

Any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test, shall be repaired by the geosynthetics Installer in accordance with Section 02770 of the Technical Specifications. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be agreed upon between the Installer and CQA Consultant.

In addition, the following conditions shall be monitored by the CQA Consultant:

- surfaces of the geomembrane which are to be repaired shall be abraded no more than one hour prior to the repair;
- all surfaces must be clean and dry at the time of the repair;
- all seaming equipment used in repairing procedures must be approved;
- the repair procedures, materials, and techniques shall be approved by the CQA Consultant in advance of the specific repair;
- patches or caps shall extend at least 6 in. beyond the edge of the defect, and all corners of patches shall be rounded with a radius of at least 3 in.; and
- the geomembrane below large caps should be appropriately cut to avoid water or gas collection between the two sheets.

6.9.1 Verification of Repairs

Each repair shall be numbered and logged. Each repair shall be non-destructively tested using approved methods. Repairs which pass the non-destructive test shall be taken as an indication of an adequate repair. Large caps may be of sufficient extent to require destructive test sampling, at the discretion of the CQA Consultant or as specified in Table 6-2. The CQA Consultant shall observe all non-destructive testing of repairs and shall record the number of each repair, date, and test outcome.

6.10 Liner and Cap System Acceptance

The Contractor shall retain all responsibility for the geosynthetics until acceptance by the Construction Manager. The terms for the liner and cover system acceptance are described in Section 02770 of the Technical Specifications.

6.11 Materials in Contact with the Geomembrane

The procedures outlined in this section are intended to assure that the installation of materials in contact with the geomembrane do not cause damage. Additional quality assurance and quality control procedures are necessary to assure that systems built with these materials will be constructed in such a way to ensure proper performance.

6.11.1 Soils

The CQA Consultant shall monitor that the Contractor takes all necessary precautions to ensure that the geomembrane is not damaged during its installation, during the installation of other components of the liner and the final cover systems, or by other construction activities. The CQA Consultant shall monitor the following:

- placement of protective soil materials above the geomembrane which shall not proceed at an ambient temperature below 40°F or above 104°F unless otherwise approved by the Construction Manager;
- soil placement operations above the geomembrane shall be performed by the Contractor to minimize wrinkles in the geomembrane;
- equipment used for placing soil shall not be driven directly on the geomembrane;
- a minimum soil thickness of 1 ft is maintained between a light, track-mounted dozer (e.g., having a maximum ground pressure of 5 psi) and the geomembrane;
- a minimum soil thickness of 3 ft is maintained between rubber-tired vehicles and the geomembrane; and
- soil thickness shall be greater than 3 ft in heavily trafficked areas such as access ramps.

6.11.2 Appurtenances

The CQA Consultant shall monitor that:

- installation of the geomembrane in appurtenant areas, and connection of geomembrane to appurtenances have been made in accordance with the Construction Drawings and Technical Specifications;
- extreme care is taken by the Installer when seaming around appurtenances since neither non-destructive nor destructive testing may be feasible in these areas; and
- the geomembrane has not been visibly damaged when making connections to appurtenances.

TABLE 6-1

GEOMEMBRANE CONFORMANCE TESTING REQUIREMENTS

TEST NAME	TEST METHOD	MINIMUM TESTING FREQUENCY[1]
Specific Gravity	ASTM D 792 Method A or ASTM D 1505	1 test per 100,000 ft^2
Thickness	ASTM D 5199 or ASTM D 5994 GRI GM13	1 test per 100,000 ft^2
Tensile Strength at Yield	ASTM D 638	1 test per 100,000 ft^2
Tensile Strength at Break	ASTM D 638	1 test per 100,000 ft^2
Elongation at Yield	ASTM D 638	1 test per 100,000 ft^2
Elongation at Break	ASTM D 638	1 test per 100,000 ft^2
Carbon Black Content	ASTM D 1603	1 test per 100,000 ft^2
Carbon Dispersion	ASTM D 5596	1 test per 100,000 ft^2
Interface Shear Strength	ASTM D 5321	1 test per interface per 10 acres

Notes:

1. Test shall be performed at a frequency of one per lot or at listed frequency, whichever is greater. A lot shall be as defined by ASTM D 4354.

TABLE 6-2

GEOMEMBRANE SEAM TESTING REQUIREMENTS

TEST NAME	TEST METHOD	MINIMUM TESTING FREQUENCY
Peel Adhesion of Seam	ASTM D 6392[(1,3)]	1 test every 500 ft
Bonded Seam Strength	ASTM D 6392[(2,3)]	1 test every 500 ft
Vacuum Testing Welded Seams	—	100 percent of extrusion welds
Air Pressure Testing Welded Seams	—	100 percent of fusion welds

Notes:

1. For peel adhesion, seam separation shall not extend more than 10 percent into the seam interface. Testing shall be discontinued when the sample has visually yielded.
2. For shear tests, the sheet shall yield before failure of the seam.
3. For either test, sample failure shall be a Film Tear Bond (FTB) as outlined in NSF 54, Appendix A.

7. GEOSYNTHETIC CLAY LINER

7.1 Introduction

The CQA Consultant shall perform conformance testing and shall monitor the installation of the geosynthetic clay liner (GCL) as required by Section 02780 of the Technical Specifications and this CQA Plan. The testing used to evaluate the conformance of the GCL with the requirements of the Technical Specifications shall be performed by the CQA Consultant in accordance with the current versions of the ASTM or other applicable test procedure indicated in Table 7-1.

7.2 Transportation, Handling, and Storage

The CQA Consultant shall monitor the transportation, handling, and storage of the GCL on-site. The Construction Manager shall designate a GCL storage location. Handling of the rolls shall be performed in a competent manner such that damage does not occur to the GCL or its protective wrapping. Any protective wrapping that is damaged or stripped off the rolls shall be repaired immediately to the satisfaction of the CQA Consultant. During transportation, handling, and storage the GCL rolls will be protected from ultraviolet light exposure, precipitation or other inundation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.

Upon delivery of the GCL at the site, the Contractor, Installer, and CQA Consultant shall conduct an inspection of the rolls for defects and damage. This inspection shall be conducted without unrolling the materials unless defects or damages are found or suspected. The CQA Consultant shall indicate to the Construction Manager:

- rolls, or portions thereof, which should be rejected and removed from the site because they have severe flaws; and
- rolls which include minor repairable flaws.

The CQA Consultant shall also monitor that equipment used to handle the GCL on-site is adequate and does not pose any risk of damage to the GCL when used properly.

7.3 Conformance Testing

7.3.1 Sampling Procedures

Upon delivery of the rolls of GCL, the CQA Consultant will assure that samples are removed and forwarded to the Geosynthetic CQA Laboratory for testing of conformance to both the Technical Specifications and the list of guaranteed properties provided by the Manufacturer. Conformance samples will be 3 ft long by the roll width. The CQA Consultant will mark the machine direction on the samples with a waterproof marker, and tape or otherwise secure the cut edges of the sample to eliminate the loss of the granular bentonite. The required minimum sampling frequencies are provided in Table 7-1. The rolls shall be immediately re-wrapped and replaced in their shipping trailers or in the temporary field storage area. The CQA Consultant shall mark the machine direction on the samples with an arrow and affix a label, tag, or otherwise mark each sample with the following information:

- date sampled;
- project number;
- lot/batch number and roll number;
- conformance sample number; and
- CQA personnel identification.

7.3.2 Testing Procedure

Conformance testing of the GCL materials delivered to the site will be conducted to ensure compliance with both the Technical Specifications and the Manufacturer's list of minimum average roll values. As a minimum, the GCL conformance test procedures listed in Table 7-1 shall be performed by the Geosynthetics CQA Laboratory.

7.3.3 Test Results

The CQA Consultant will examine all results from laboratory conformance testing and will report any non-conformance to the Construction Manager. The GCL conformance test results shall meet or exceed the minimum property values presented in Appendix C.

7.3.4 Conformance Test Failure

In the case of failing test results, the Contractor may request that another sample from the failing roll be retested by the Geosynthetics CQA laboratory with the Manufacturer's technical representative present during the test procedure. If the retest fails or if the option to retest is not exercised, then two isolation conformance samples shall be obtained by the CQA Consultant. These isolation samples shall be taken from rolls, which have been determined by correlation with the manufacturer's roll number, to have been manufactured prior to and after the failing roll. This method for choosing isolation rolls for testing should continue until passing tests are achieved. All rolls that fall numerically between the passing roll numbers shall be rejected. The CQA Consultant will verify that the Contractor has replaced all rejected rolls. The CQA Consultant shall document all actions taken in conjunction with GCL conformance failures.

7.4 Surface Preparation

The GCL shall not be placed on surfaces which are softened due to high water content or cracked due to desiccation. The CQA Consultant and the Installer will jointly verify that the surface on which the GCL will be installed is acceptable. The Contractor shall comply with the surface preparation and acceptance requirements identified in Section 02200 of the Technical Specifications. Additionally, the surface shall contain no loose stones and no ruts greater than 1-in. depth. The CQA Consultant shall notify the Contractor of any observed change in the supporting soil condition that may require repair work and verify that compacted soil repair work is completed in accordance with the requirements of the Technical Specifications of this CQA Plan.

7.5 Placement

The CQA Consultant shall verify that the Installer has taken all necessary precautions to protect the underlying subgrade during GCL deployment operations. The CQA Consultant shall verify that all GCL is handled in such a manner as to ensure they are not damaged in any way, and the following conditions are met:

- in the present of wind, all GCL are weighted with sandbags or the equivalent;

- GCL is kept continually under tension to minimize the presence of wrinkles;
- GCL is cut using a utility blade in a manner recommended by the Manufacturer;
- during placement, care is taken not to entrap fugitive stones or other debris under the GCL;
- the exposed GCL is protected from damage in heavily trafficked areas;
- a visual examination of the GCL is carried out over the entire surface, after installation, to assure that damaged areas, if any, are identified and repaired; and
- if a white colored GCL is used, precautions are taken against "snowblindness" of personnel.

7.6 Overlaps

The CQA Consultant shall monitor and verify the GCL overlapping procedures conform to the requirements of Section 02780 of the Technical Specifications. GCL panels shall be overlapped at a minimum of 6 inches along panel sides and a minimum of 12 inches along panel ends. Dry bentonite powder shall be applied, at a minimum rate of one pound per lineal foot, around pipe penetrations or other perforations of GCL which may be required.

7.7 Repair

The CQA Consultant shall monitor the repair of any holes or tears in the GCL or the geotextile backing. Repairs shall be made by placing a patch made from the same type GCL over the damaged area. On slopes greater than 5 percent, the patch shall overlap the edges of the hole or tear by a minimum of 2 ft in all directions. On slopes, 5 percent or flatter, the patch shall overlap the edges of the hole or tear by a minimum of 1 ft in all directions. The patch shall be secured to the satisfaction of the CQA Consultant to avoid shifting during soil placement or covering with another geosynthetic.

TABLE 7-1

GCL CONFORMANCE TESTING REQUIREMENTS

TEST NAME	TEST METHOD	MINIMUM TESTING FREQUENCY
Hydraulic Conductivity	ASTM D 5887	1 test per 100,000 ft^2
Interface Shear Strength	ASTM D 6243	1 test per interface per 10 acres

Notes:

1. Testing shall be performed at a frequency of one per lot or at listed frequency, whichever is greater. A lot is defined by ASTM D 4354.

8. GEOTEXTILES

8.1 Introduction

The CQA Consultant shall perform conformance testing and shall monitor the installation of geotextile filters, and separators as required by Section 02720 of the Technical Specifications and this CQA Plan. The testing used to evaluate the conformance of the geotextiles with the requirements of the Technical Specifications shall be performed by the CQA Consultant in accordance with the current versions of the ASTM or other applicable test procedure indicated in Table 8-1.

8.2 Transportation, Handling, and Storage

The CQA Consultant shall monitor the transportation, handling, and storage of the geotextile on-site. The Construction Manager shall designate a geotextile storage location. During transportation, handling, and storage, the geotextile shall be protected from ultraviolet light exposure, precipitation or other inundation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.

Handling of the geotextile rolls shall be performed in a competent manner such that damage does not occur to the geotextile or to its protective wrapping. Rolls of geotextiles shall not be stacked upon one another to the extent that deformation of the core occurs or to the point where accessibility can cause damage in handling. Furthermore, geotextile rolls shall be stacked in such a way that access for conformance sampling is possible. Protective wrappings shall be removed less than one hour prior to unrolling the geotextile. After unrolling, a geotextile shall not be exposed to ultraviolet light for more than 30 calendar days.

Outdoor storage of geotextile rolls shall not exceed the Manufacturers recommendations or longer than 6 months whichever is less. For storage periods longer than 6 months a temporary enclosure shall be placed over the rolls, or they shall be moved to an enclosed facility. The location of temporary field storage shall not be in areas where water can accumulate. The rolls shall be elevated off the ground to prevent contact with ponded water.

Upon delivery at the site, the Contractor, Installer, and CQA Consultant shall conduct an inspection of the rolls for defects and damage. This inspection shall be conducted without unrolling the materials unless defects or damages are found or suspected. The CQA Consultant shall indicate to the Construction Manager:

- rolls, or portions thereof, which should be rejected and removed from the site because they have severe flaws; and

- rolls which include minor repairable flaws.

The CQA Consultant shall also monitor that equipment used to handle the geotextiles on-site is adequate and does not pose any risk of damage to the geotextiles when used properly.

8.3 Conformance Testing

8.3.1 Sampling Procedures

Samples shall be taken across the entire width of the roll and shall not include the first 3 feet. Unless otherwise specified, samples shall be 3 feet long by the roll width. The required minimum geotextile conformance sampling frequencies are provided in Table 8-1. The CQA Consultant shall mark the machine direction on the samples with an arrow and affix a label, tag, or otherwise mark each sample with the following information:

- date sampled;

- project number;

- lot/batch number and roll number;

- conformance sample number; and

- CQA personnel identification.

The geotextile rolls which are sampled shall be immediately rewrapped in their protective coverings to the satisfaction of the CQA Consultant.

8.3.2 Testing Procedure

Conformance testing of the geotextile materials delivered to the site will be conducted to ensure compliance with both the Technical Specifications and the Manufacturer's list of minimum average roll values. As a minimum, the geotextile conformance test procedures listed in Table 8-1 shall be performed by the Geosynthetics CQA Laboratory.

8.3.3 Test Results

The CQA Consultant shall review all laboratory conformance test results and verify compliance of the test results with the specification shown in Appendix D prior to deployment of the geotextiles. Any non-conformance shall be reported to the Construction Manager.

8.3.4 Conformance Test Failure

In the case of failing test results, the Contractor may request that another sample from the failing roll be retested by the Geosynthetics CQA Laboratory with the Manufacturer's technical representative present during the test procedure. If the retest fails or if the option to retest is not exercised, then two isolation conformance samples shall be obtained by the CQA Consultant. These isolation samples shall be taken from rolls, which have been determined by correlation with the Manufacturer's roll number, to have been manufactured prior to and after the failing roll. This method for choosing isolation rolls for testing should continue until passing tests are achieved. All rolls that fall numerically between the passing roll numbers shall be rejected. The CQA Consultant will verify that the Contractor has replaced all rejected rolls. The CQA Consultant shall document all actions taken in conjunction with geotextile conformance failures.

8.3.5 Placement

The CQA Consultant shall monitor the placement of all geotextiles to assure they are not damaged in any way, and the following conditions are met.

- On slopes, the geotextiles shall be securely anchored in the anchor trench and then deployed down the slope in such a manner as to continually keep the geotextile in tension.

- In the presence of wind, all geotextiles shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with earth cover material.

- Trimming of the geotextiles shall be performed using only a upward cutting hook blade. Special care must be taken to protect other materials from damage which could be caused by the cutting of the geotextiles.

- The CQA Consultant shall monitor that the Installer is taking necessary precautions to prevent damage to underlying layers during placement of the geotextile.

- During placement of geotextiles, care shall be taken not to entrap stones, excessive dust, or moisture that could generate clogging of drains or filters.

- A visual examination of the geotextile shall be carried out over the entire surface, after installation, to ensure that no potentially harmful foreign objects, (e.g., stones, sharp objects, small tools, sandbags, etc.) are present.

8.4 Seams and Overlaps

All geotextile filters shall be continuously sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped 6 in. prior to seaming. No horizontal seams shall be allowed on side slopes that are steeper than 10 horizontal to 1 vertical (i.e. seams shall be along, not across, the slope), except as part of a patch.

Sewing shall be done using polymeric thread with chemical and ultraviolet resistance properties equal to or exceeding those of the geotextile. The seams shall be sewn using a single row type "401" two-thread chainstitch. The CQA Consultant shall monitor the geotextile seaming procedures to verify that seams and overlaps are in accordance with Section 02720 of the Technical Specifications.

Geotextile separators may be overlapped a minimum of 2 feet in lieu of sewing.

8.5 Repair

The CQA Consultant shall monitor that any holes or tears in the geotextile are repaired as follows:

- On-slopes: A patch made from the same geotextile is double seamed into place (with each seam 1/4 in. to 3/4 in. apart and no closer than 1 in. from any edge) with a minimum 12-in. overlap. Should any tear exceed 50 percent of the width of the roll, that roll shall be removed from the slope and replaced.

- Non-slopes: A patch made from the same geotextile is sewn in place with a minimum of 12 in. overlap in all directions away from the repair area.

Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile. The CQA Consultant shall observe all repairs and assure that any non-compliance with the above requirements is corrected.

8.6 Placement of Soil Materials

The CQA Consultant shall monitor the Contractor's placement of all materials located on top of a geotextile, to verify:

- that no damage occurs to the geotextile;

- that no shifting of the geotextile from its intended position occurs and underlying materials are not exposed or damaged;

- that excess tensile stress does not occur in the geotextile; and

- that equipment ground pressure on geotextiles overlying geomembranes does not exceed those specified in Section 02720 of the Technical Specifications.

Soil backfilling or covering of the geotextile with another geosynthetic shall be completed within 30 days. On side slopes, soil layers shall be placed over the geotextile from the bottom of the slope upward.

TABLE 8-1

GEOTEXTILE CONFORMANCE TESTING REQUIREMENTS

TEST NAME	TEST METHOD	MINIMUM TESTING FREQUENCY
Mass per Unit Area	ASTM D 5261	1 test per 100,000 ft^2
Grab Strength	ASTM D 4632[(1)]	1 test per 100,000 ft^2
Trapezoidal Tear Strength	ASTM D 4533[(2)]	1 test per 100,000 ft^2
Puncture Resistance	ASTM D 4833[(3)]	1 test per 100,000 ft^2
Burst Strength	ASTM D 3786	1 test per 100,000 ft^2
Apparent Opening Size[(5)]	ASTM D 4751	1 test per 100,000 ft^2
Permittivity[(5)]	ASTM D 4491	1 test per 100,000 ft^2

Notes:

1. Minimum of values measured in machine and cross machine directions with 1 inch clamp on Constant Rate of Extension (CRE) machine.
2. Minimum value measured in machine and cross machine direction.
3. Tension testing machine with a 1.75-inch diameter ring clamp, the steel ball being replaced with 0.31-inch diameter solid steel cylinder with a flat tip centered within the ring clamp.
4. Testing shall be performed at a frequency of one per lot or at listed frequency, whichever is greater. A lot is defined by ASTM 4354.
5. Apparent opening size and permittivity testing to be performed on filter geotextiles only.

9. GEOCOMPOSITES

9.1 Introduction

The CQA Consultant shall perform conformance testing and shall monitor the installation of the geocomposite drainage layers as required by Section 02740 of the Technical Specifications and this CQA Plan. The testing used to evaluate the conformance of the geocomposite drainage layers with the requirements of the Technical Specifications shall be performed by the CQA Consultant in accordance with the current versions of the ASTM or other applicable test procedure indicated in Table 9-1.

9.2 Transportation, Handling and Storage

The CQA Consultant shall monitor the transportation, handling, and storage of the geocomposite on-site. The Construction Manager shall designate a geocomposite storage location. During transportation, handling, and storage, the geocomposite shall be protected from ultraviolet light exposure, precipitation or other inundation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.

Handling of the geocomposite rolls shall be performed in a competent manner such that damage does not occur to the geocomposite or to its protective wrapping. Rolls of geocomposite shall not be stacked upon one another to the extent that deformation of the roll occurs or to the point where accessibility can cause damage in handling. Furthermore, geocomposite rolls shall be stacked in such a way that access for conformance sampling is possible. Protective wrappings shall be removed less than one hour prior to unrolling the geocomposite. After unrolling, a geocomposite shall not be exposed to ultraviolet light for more than 30 calendar days.

Outdoor storage of geocomposite rolls shall not exceed the Manufacturer's recommendations or longer than 6 months whichever is less. For storage periods longer than 6 months a temporary enclosure shall be placed over the rolls, or they shall be moved to an enclosed facility. The location of temporary field storage shall not be in areas where water can accumulate. The rolls shall be elevated off the ground to prevent contact with ponded water.

Upon delivery at the site, the Contractor, Installer, and CQA Consultant shall conduct an inspection of the rolls for defects and damage. This inspection shall be conducted without unrolling the materials unless defects or damages are found or suspected. The CQA Consultant shall indicate to the Construction Manager:

- rolls, or portions thereof, which should be rejected and removed from the site because they have severe flaws; and

- rolls which include minor repairable flaws.

The CQA Consultant shall also monitor that equipment used to handle the geocomposites on-site is adequate and does not pose any risk of damage to the geocomposites when used properly.

9.3 Conformance Testing

9.3.1 Sampling Procedures

Samples shall be taken across the entire width of the roll and shall not include the first 3 feet. Unless otherwise specified, samples shall consist of one section 3 feet long by the roll width for geonet and geocomposite testing and one section 10 feet long cut 1 foot from the edge of the geonet for testing of the unbonded geotextiles. The required minimum geocomposite conformance sampling frequencies are provided in Table 9-1. The CQA Consultant shall mark the machine direction on the samples with an arrow and affix a label, tag, or otherwise mark each sample with the following information:

- date sampled;

- project number;

- lot/batch number and roll number;

- conformance sample number; and

- CQA personnel identification.

The geocomposite rolls which are sampled shall be immediately rewrapped in their protective coverings to the satisfaction of the CQA Consultant.

9.3.2 Testing Procedure

Conformance testing of the geocomposite materials delivered to the site will be conducted to ensure compliance with both the Technical Specifications and the manufacturer's list of minimum average roll values. As a minimum, the geotextile, geonet, and geocomposite conformance test procedures listed in Table 9-1 shall be performed by the Geosynthetics CQA Laboratory.

9.3.3 Test Results

The CQA Consultant shall review all laboratory conformance test results and verify compliance of the test results with the specification shown in Appendix E prior to deployment of the geocomposites. Any non-conformance shall be reported to the Construction Manager.

9.3.4 Conformance Test Failure

In the case of failing test results, the Contractor may request that another sample from the failing roll be retested by the Geosynthetics CQA laboratory with the manufacturer's technical representative present during the test procedure. If the retest fails or if the option to retest is not exercised, then two isolation conformance samples shall be obtained by the CQA Consultant. These isolation samples shall be taken from rolls, which have been determined by correlation with the manufacturer's roll number, to have been manufactured prior to and after the failing roll. This method for choosing isolation rolls for testing should continue until passing tests are achieved. All rolls which fail numerically between the passing roll numbers shall be rejected. The CQA Consultant will verify that the Contractor has replaced all rejected rolls. The CQA Consultant shall document all actions taken in conjunction with geocomposite conformance failures.

9.4 Placement

The CQA Consultant shall monitor the placement of all geocomposites to assure they are not damaged in any way, and the following conditions are met.

- On slopes, the geocomposites shall be securely anchored in the anchor trench and then deployed down the slope in such a manner as to continually keep the geocomposites in tension.

- In the presence of wind, all geocomposites shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with earth cover material.

- Trimming of the geocomposites shall be performed using only a upward cutting hook blade. Special care must be taken to protect other materials from damage which could be caused by the cutting of the geocomposites.

- The CQA Consultant shall monitor that the Installer is taking necessary precautions to prevent damage to underlying layers during placement of the geocomposite.

- During placement of geocomposites, care shall be taken not to entrap stones, soil, excessive dust, or moisture that could damage the geomembrane, generate clogging of drains or filters, or hamper subsequent drainage operations.

- A visual examination of the geocomposite shall be carried out over the entire surface, after installation, to ensure that no potentially harmful foreign objects, (e.g., stones, sharp objects, small tools, sandbags, etc.) are present.

9.5 Joining, Seams, and Overlaps

The components of the geocomposite (e.g., geotextile, geotextile) shall be seamed, joined, and overlapped to like components in adjacent geocomposites. Lower geotextile components of the geocomposites shall be overlapped such that the component has a minimum overlap of four inches. Adjacent edges of geonet component along the length of the geocomposite should be overlapped a minimum 2-3 inches and joined by tying the geonet together with white or yellow plastic fasteners or polymeric thread. Geonet for adjoining geocomposite panels (end to end) along the roll width should be shingled down in direction of slope and overlapped a minimum of 12 inches. Upper geotextile components of the geocomposites shall be continuously sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped 6 in. prior to sewing. No horizontal seams shall be allowed on side slopes that are steeper than 10 horizontal to 1 vertical (i.e. seams shall be along, not across, the slope), except as part of a patch.

Sewing of geotextiles shall be done using polymeric thread with chemical and ultraviolet resistance properties equal to or exceeding those of the geotextile. The seams shall be sewn using a single row type "401" two-thread chainstitch. The CQA Consultant shall monitor the geotextile seaming and geonet tying procedures to verify that joining, seams, and overlaps are in accordance with Section 02740 of the Technical Specifications.

9.6 Repair

The CQA Consultant shall monitor that any holes or tears in the geocomposite are repaired as follows:

- A patch made from the same geocomposite will be secured into place by tying fasteners through the bottom geotextile and the geonet of the patch, and through the top geotextile and geonet.
- The patch will extend 2 feet beyond the edges of the hole or tear.
- The patch will be secured every 6 inches and heat sealed to the top geotextile of the geocomposite needing repair.
- If the hole or tear is more than 50 percent of the width of the roll, the damaged area should be cut out and the two portions of the geocomposite will be joined.

Care will be taken to remove any soil or other material which may have penetrated the torn geocomposite component. The CQA Consultant shall observe any repair and assure that any non-compliance with the above requirements is corrected.

9.7 Placement of Soil Materials

The CQA Consultant shall monitor the Contractor's placement of all soil materials located on top of a geocomposite, to verify:

- that no damage occurs to the geocomposite;
- that no shifting of the geocomposite from its intended position occurs and underlying materials are not exposed or damaged;
- that excess tensile stress does not occur in the geocomposite; and

- that equipment ground pressure on geocomposites overlying geomembranes does not exceed those specified in Section 02740 of the Technical Specifications.

Soil backfilling or covering of the geocomposite shall be completed within 30 days. On side slopes soil layers shall be placed over the geocomposite from the bottom of the slope upward.

TABLE 9-1

GEOCOMPOSITE CONFORMANCE TESTING REQUIREMENTS

TEST NAME	TEST METHOD	MINIMUM TESTING FREQUENCY[3]
Geotextile Components		
Mass per Unit Area	ASTM D 5261	1 test per 100,000 ft^2
Grab Strength	ASTM D 4632[1]	1 test per 100,000 ft^2
Trapezoidal Tear Strength	ASTM D 4533[2]	1 test per 100,000 ft^2
Apparent Opening Size	ASTM D 4751	1 test per 100,000 ft^2
Permittivity	ASTM D 4491	1 test per 100,000 ft^2
Geocomposite		
Transmissivity[4]	ASTM D 4716	1 test per 100,000 ft^2
Peel Strength	ASTM F 904	1 test per 100,000 ft^2
Interface Shear Strength	ASTM D 5321	1 test per interface per 10 acres

Notes:

1. Minimum of values measured in machine and cross machine directions with 1 inch clamp on Constant Rate of Extension (CRE) machine.
2. Minimum value measured in machine and cross machine direction.
3. Testing shall be performed at a frequency of one per lot or at listed frequency, whichever is greater. A lot is defined by ASTM 4354.
4. The design transmissivity is the hydraulic transmissivity of the geocomposite measured using water at 68°F ± 3°F with a hydraulic gradient and compressive stress for geocomposites used in the liner system and less than the final cover system as described in the Technical Specifications. For the tests, the geocomposites shall be overlain by soil representative of the material that will be used on the project. The geocomposite shall be underlain by a textured geomembrane. The minimum test duration shall be 24 hours and the report for the test results shall include measurements at intervals over the entire test duration.

10. PIPES AND FITTINGS

10.1 Introduction

The CQA Consultant shall monitor the installation of ancillary materials such as pipes and fittings for the leachate collection and conveyance system and landfill gas management system as required by Sections 02715 of the Technical Specifications, the Construction Drawings and this CQA Plan.

10.2 Butt-Fusion Welding Process

The CQA Consultant shall monitor the assembling of lengths of HDPE pipe into suitable installation lengths by the butt-fusion process. Butt-fusion means the butt-joining of the pipe by softening the aligned faces of the pipe ends in a suitable apparatus and pressing them together under controlled pressure. Butt-fusion welding of the HDPE pipes and fittings shall be performed by the Contractor in accordance with the pipe manufacturer's recommendations as to equipment and technique.

10.3 Transportation, Handling and Storage

The pipe is to be bundled together with plastic straps for bulk handling and shipment. The packing shall be such that either fork lifts or cranes equipped with slings can be used for safe handling. The pipe shall be segregated by wall thickness and diameter.

The CQA Consultant shall monitor the offloading of the pipe to assure that handling is done in a competent manner and that the pipes are not placed in areas where water can accumulate. The pipe shall not be stacked more then three high or in such a manner that could cause damage to the pipe. Furthermore, the pipe shall be stacked in such a manner that access for any conformance sampling is possible. Outdoor storage should be no longer than 12 months. For outdoor storage periods longer than 12 months a temporary covering shall be placed over the pipes, or they shall be moved to within an enclosed facility.

10.4 Installation

The CQA Consultant shall monitor that care is taken during installation of the pipes such that they will not be cut, kinked, or otherwise damaged. Ropes, fabric, or rubber-protected slings and straps shall be used by the Contractor when installing pipes. The use of chains, cables, or hooks inserted into the pipe ends shall not be allowed.

The Contractor shall install the pipe and fittings in such a manner that the materials are not damaged. Slings for handling the pipe shall not be positioned at butt-fused joints of HDPE pipes. Sections of the pipes with deep cuts and/or gouges shall be removed and the ends of the pipeline rejoined. Care shall be exercised when lowering pipe into the trench to prevent damage or twisting of the pipe.

10.5 Testing

The CQA Consultant shall monitor the testing of all pipes as required by the Technical Specifications and as necessary to assure workmanship conforming the state-of-practice.

11. MECHANICAL AND ELECTRICAL

11.1 Introduction

The CQA Consultant shall monitor the materials used in and installation of all mechanical and electrical systems to assure compliance with the Technical Specifications and approved submittals. The mechanical and electrical systems include, but are not limited to, the following:

- leachate sump pumps and associated connections and wiring;
- overhead/buried power distribution system, power wiring, including power circuit connections for pump motors, and equipment mounting boards; and
- temporary support facilities for electric, water, and sanitary sewer services.

11.2 Related Construction Drawings and Technical Specifications

The mechanical work performed by the Contractor shall comply with the Construction Drawings, Technical Specifications, and approved submittals. These specifications shall be referenced for specific details of the mechanical equipment requirements and installation. The electrical work performed by the Contractor shall comply with Construction Drawings, Technical Specifications, and approved submittals. These specifications shall be referenced for specific details of the electrical requirements and installation.

11.3 Codes, Rules, Inspections, and Workmanship

The CQA Consultant shall monitor the work of the Contractor in the installation of all mechanical and electrical appurtenances in accordance with national codes and other regulations or authorities having jurisdiction over the work. The CQA Consultant shall observe and document construction acceptance testing procedures performed by the Contractor.

11.4 Record Drawings

The CQA Consultant shall monitor the maintenance by the Contractor of a set of prints on which the actual installation of all mechanical and electrical work shall be accurately shown, indicating any variation from Construction Drawings or approved submittals. Changes in layout or circuitry shall be clearly and completely indicated as the work progresses. These progress prints shall be inspected by the Design Engineer and Construction Manager and used to determine the progress of mechanical and electrical work.

At the completion each phase of the work, the CQA consultant shall obtain from the Contractor a set of record drawings of the work to include marked-up prints showing the dimensioned location of all underground systems.

12. CONCRETE

12.1 Introduction

This CQA Consultant shall monitor the construction and perform conformance testing of all concrete materials and finished products to assure compliance with Construction Drawings and Technical Specifications.

12.2 Inspections

The CQA Consultant shall monitor concrete workmanship to assure that the Contractor does not place concrete until foundations, forms, reinforcing steel, pipes, conduits, sleeves, anchors, hangers, inserts, and other work required to be built into concrete has been inspected and approved by the Construction Manager. The Contractor is required to notify the Construction Manager and CQA Consultant at least 24 hours in advance of concrete placement activities for scheduling of the inspection activities described above.

12.3 Field Quality Control Testing

Conformance testing of placed concrete shall be the responsibility of the CQA Consultant. The concrete test program shall meet the following requirements:

- Concrete samples will be obtained by the CQA Consultant at a frequency of one set of standard cylindrical test specimens for the first 5 cubic yards and every 25 cubic yards of concrete or any portion of thereafter for each structure. For each work shift, when concrete is delivered, at least one set of specimens will be made. A set of test specimens will consist of at least three standard cylinders. Each set of test specimens will be tested for 2-day, 7-day, and 28-day compressive strength, and a fourth cylinder will be held in reserve.

- Compressive strengths shall be determined from the standard test specimens taken according to ASTM C 31 and ASTM C 172, and cured and tested in accordance with ASTM C 39. Core drilling, if required, and testing will be in accordance with ASTM C 94.

- If required by the Engineer, slump and air content shall be determined with no less frequency than that of casting strength specimen sets. Air content and slump shall be determined in accordance with ASTM C 231 and ASTM C 143, respectively.

The CQA Consultant shall be responsible for reporting all test results to the Contractor and the Construction Manager. Materials determined by the Construction Manager to fail the requirements of the Construction Drawings and Technical Specifications shall be rejected.

13. ROAD CONSTRUCTION

13.1 Introduction

The CQA Consultant shall monitor and test materials used in the construction of the various roads to assure compliance with Construction Drawings and Technical Specifications.

13.2 Subgrade Preparation

In-place moisture/density testing by nuclear methods (ASTM D3017 and D2922) shall be performed by the CQA Consultant for all compacted fill materials. Fill placement and compaction shall be conducted in accordance with Section 02200 of the Technical Specifications. For road subgrades, nuclear moisture/density tests shall be performed at a minimum frequency of 1 test per 200 lineal ft per lift. The CQA Consultant shall monitor the Contractor's proofrolling of cut sections.

13.3 Subbase Layer

The CQA Consultant shall monitor and test the subbase layer to ensure it is constructed to the thickness grades and density as required by the Construction Drawings and the Technical Specifications. Moisture/density tests shall be performed at a minimum frequency of 1 test per 200 lineal feet per lift.

13.4 Base Layer

The CQA Consultant shall monitor the base aggregate to ensure it is constructed to the thickness, grades, and limits shown on the Construction Drawings. The CQA Consultant shall monitor the test section required in Section 02230 of the Technical Specifications.

13.5 Quality Control Testing

Quality control testing of the materials used in construction of the roads shall be the responsibility of the CQA Consultant. The frequency of CQA testing for the subbase aggregate and base aggregate materials is as follows:

- particle size analysis (ASTM C136) at a frequency of one test per 5,000 yd^3;

and

- density and moisture (ASTM D 2922 and ASTM D 3017) at a frequency of one test per 300 lineal feet per lift.

Requirements for in-situ density of base aggregates shall be defined during the compaction of a test strip. The base aggregate shall be compacted in accordance with the requirements of Section 02230 of the Technical Specifications.

13.6 Repairs

If a defective area is discovered, the CQA Consultant will evaluate the extent and nature of the defect. After this determination the Contractor shall correct the deficiency to the satisfaction of the Construction Manager. The Contractor shall not perform additional work in the area until the Construction Manager approves the correction of the defect. In the event of damage, the Contractor shall immediately make repairs and replacements as necessary to the satisfaction of the Construction Manager.

14. GENERAL SITE WORK

14.1 Introduction

The CQA Consultant shall monitor the activities that are to be performed for various general site work items including, but not limited to riprap, erosion and sediment control, culverts, fences and gates, and vegetation for compliance with Construction Drawings and Technical Specifications.

14.2 Conformance Testing

Conformance testing of materials to ensure compliance with the Construction Drawings and Technical Specifications shall be performed by the CQA Consultant at the discretion of the Construction Manager. If nonconformances or other deficiencies are found by the CQA Consultant in the Contractors materials or completed work, the Contractor will be required to repair or replace the deficiency at no cost. Any noncompliant items shall be reported to the Construction Manager.

APPENDIX A

CQA FORMS AND LOG

GeoSyntec Consultants

Omni Waste
of Osceola County LLC

DAILY FIELD REPORT

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: __________ TASK NO.: __________

DESCRIPTION: ____________________ DATE: ______ day ______ month ______ year

CONTRACTOR: ____________________

WEATHER: ____________________

COPY TO: ____________________ PER: ____________________ HRS: __________

 FILE NO. 1-04-DFR

SHEET NO. ______ OF ______

GeoSyntec Consultants

Omni Waste of Osceola County LLC

FIELD OBSERVATION REPORT

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ DATE: ______ day ______ month ______ year

WEATHER: ____________________

AREA: ....

CONTRACTOR: ....

EQUIPMENT USED: ....

WORK PERFORMED: ....

COPY TO: ____________________ PER: ____________________

GeoSyntec Consultants

Omni Waste of Osceola County LLC

WEEKLY FIELD REPORT

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: __________ TASK NO.: __________

DESCRIPTION: ____________________ WEEK ENDING: ____________________

COPY TO: ____________________ PER: ____________________

 FILE NO. 1-05-WFR

GeoSyntec Consultants

Omni Waste of Osceola County LLC

TRANSMITTAL LETTER

PROJECT: ______________________

LOCATION: ______________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ______________ DATE: ______ day ______ month ______ year

ATTENTION: ______________________

ADDRESS: ______________________

____

☐ FOR APPROVAL	☐ PRINTS	☐ TEST RESULTS	☐ ________
☐ FOR COMMENTS	☐ PHOTOS	☐ DOCUMENTS	☐ ________
☐ AS REQUESTED	☐ LOGS	☐ CONTRACTS	☐ ________

NO. OF COPIES	DRAWING NUMBER	DESCRIPTION	DATE

REMARKS

COPY TO: ______________ FROM: ______________

GeoSyntec Consultants

Omni Waste of Osceola County LLC

CHANGE ORDER (CO) REFERENCE NO.: ____________

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ DATE: ______ day ______ month ______ year

FINANCIAL IMPACT: . . YES . . . . . . NO . . . . NA . . .	SCHEDULE IMPACT: . . YES . . . NO . . . . NA . . . . .
SAVINGS: . . . . YES . . . . . . EST. $ . . . . NO. .	SAVINGS: . . . . . YES . . . . EST. DAYS . . . . NO. . . . .
COST: . . . . YES . . . . . . EST. $ . . . . NO. .	DELAY: . . . . YES . . . . EST. DAYS . . . . NO. . . . .

REFERENCES: . . . .

SPECIFICATION SECTION: . . . . CQA PLAN SECTION: . . . .

MATERIAL TYPE: . . . .

ITEM BEING CHANGE OR ADDED: . . . .

REASON FOR CHANGE: . . . .

EFFECTIVE DATE OF THE CHANGE . . . . (day) . . . . (mo) . . . . (year)

FINANCIAL AND SCHEDULE CONSIDERATIONS . . . .

OWNER'S REPRESENTATIVE day/mo/yr

CQA REPRESENTATIVE day/mo/yr

PROJECT MANAGER day/mo/yr

COPY TO: ____________________

GEOSYNTEC CONSULTANTS

Omni Waste of Osceola County LLC

SUBMITTAL COVER SHEET

REFERENCE NO.: ____________

PROJECT: ____________

LOCATION: ____________ PROJECT NO.: ____________ TASK NO.: ____________

DESCRIPTION: ____________ YEAR: ____________

CONTRACTOR: ____________

SUBMITTAL NO.: .... REVISION NO.: ....

SUBMITTAL TITLE: ....

SPECIFICATION SECTION: .... CQA PLAN SECTION: ....

DATE SUBMITTED: .... (day/ month/ year) DATE REVIEWED: .... (day/ month/ year)

RESUBMITTAL REQUIRED: ☐ YES ☐ NO

DATE APPROVED: .... (day/ month/ year)

COMMENTS: ....

DISTRIBUTION:

PREPARED BY: ____________

APPROVED BY: ____________

GEOSYNTEC CONSULTANTS

Omni Waste
of Osceola County LLC

PHOTOGRAPHIC LOG

ROLL REFERENCE NO.: ____________________

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: __________ TASK NO.: __________

DESCRIPTION: ____________________ YEAR: __________

REFERENCE NO.	DATE (day/month)	DESCRIPTION

 FILE NO. 1-15-PLF

GeoSyntec Consultants

OmniWaste of Osceola County LLC

MEETING SIGN-IN SHEET

REFERENCE NO.: ____________________

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: __________ TASK NO.: __________

DESCRIPTION: ____________________ DATE: ______ day ______ month ______ year

SUBJECT: ____________________

NAME	ORGANIZATION	TELEPHONE

NOTE: FOR FIRST TIME ATTENDEES, PLEASE ATTACH A BUSINESS CARD.

GeoSyntec Consultants

OmniWaste of Osceola County LLC

MATERIAL INVENTORY

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: __________ TASK NO.: __________

DESCRIPTION: ____________________ YEAR: __________

PRODUCT TYPE: ____________________ MANUFACTURER: ____________________

INVENTORY			Q.A. CONFORMANCE				Q.C. DOCUMENTS			
DATE (day/mo)	BATCH / ROLL NO.	QA ID	DATE SAMPLED (day/mo)	SAMPLE NO.	PASS/ FAIL	QA ID	DATE RECEIVED (day/mo)	DATE CHECKED (day/mo)	PASS/ FAIL	QA ID

AVG. ROLL WIDTH: ____________________ AVG. ROLL LENGTH: ____________________

NUMBER OF ROLLS ABOVE: ____________________ ACCUMULATIVE NUMBER OF ROLLS: ____________________

CUMULATIVE AREA: ____________________ NO. OF CONFORMANCE TESTS (page/total): ______/______

CERTIFICATE OF ACCEPTANCE
SUBGRADE SURFACE

INSTALLER	PROJECT
NAME: ______________________	NAME: ______________________
ADDRESS: ______________________	______________________
______________________	LOCATION: ______________________
______________________	______________________
	______________________
INSTALLER AUTHORIZED REPRESENTATIVE: ______________________	OWNER: ______________________

I, The undersigned, duly authorized representive of ______________________ do hereby accept the surface on which the geosynthetics will be installed and shall be responsible for maintaining the suitability of this surface, in accordance with the project specifications. (i.e., The contractor shall not install the geosynthetics until the subgrade surface is acceptable. Installation of the geosynthetics will be considered acceptance of the subgrade.)

PRIMARY: ☐ SECONDARY: ☐ OTHER: ☐ ______________________

DATE	PANEL NOS.	SIGNATURE

GEOSYNTEC CONSULTANTS

OmniWaste of Osceola County LLC

GEOMEMBRANE TEST REQUEST FORM NO. ______

PROJECT: ______

LOCATION: ______ PROJECT NO.: ______ TASK NO.: ______

DESCRIPTION: ______ YEAR: ______

SAMPLED: ______ day ______ mo SAMPLER ID: ______ SHIPPED: ______ day ______ mo SHIPPER ID: ______ RECEIVED: ______ day ______ mo LAB ID: ______

MANUFACTURED BY: ______

SITE CONTACT: ______ SITE PHONE: ______ SITE FAX: ______

SAMPLE NO. GM–	BATCH NO./ ROLL NO.	SPECIFIC GRAVITY									
		TENSILE ASTM D638	DENSITY ASTM D792	MELT INDEX ASTM D1238	THICKNESS ASTM D5199/D751 D3342/D1593	CARBON BLACK CONTENT ASTM D1603	CARBON DISP. ASTM D5596	TEAR RESISTANCE ASTM D1004	PUNCTURE RESISTANCE FTMS 101C METHOD 2065	ESCR/NCTL SINGLE POINT ASTM D1693 D5397	OTHER

SMOOTH OR TEXTURED MATERIAL

COMMENTS/SPECIAL INSTRUCTIONS/DISTRIBUTION: Strikeout nonapplicable items

GEOSYNTEC CONSULTANTS

OmniWaste of Osceola County LLC

GEOSYNTHETIC CLAY LINER TEST REQUEST FORM NO. ______

PROJECT: ______

LOCATION: ______ PROJECT NO.: ______ TASK NO.: ______

DESCRIPTION: ______ YEAR: ______

SAMPLED: ______ day ______ mo SAMPLER ID: ______ SHIPPED: ______ day ______ mo SHIPPER ID: ______ RECEIVED: ______ day ______ mo LAB ID: ______

MANUFACTURED BY: ______ SAMPLE SHIPPED VIA: ______

SITE CONTACT: ______ SITE PHONE: ______ SITE FAX: ______

SAMPLE NO. GCL–	BATCH NO./ ROLL NO.	MASS PER UNIT WEIGHT ASTM D3776	MOISTURE CONTENT ASTM D2216	FREE SWELL A.P.I. TEST NO. 1010	HYDRAULIC CONDUCTIVITY ASTM D5084	THICKNESS ASTM D5199	OTHER

REINFORCED OR NONREINFORCED MATERIAL

COMMENTS/SPECIAL INSTRUCTIONS/DISTRIBUTION: Strikeout nonapplicable items

GeoSyntec Consultants

Omni Waste of Osceola County LLC

GEOCOMPOSITE TEST REQUEST FORM NO. ____________

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ YEAR: ________

SAMPLED: ______ day______mo SAMPLER ID:______ SHIPPED: ______ day______mo SHIPPER ID:______ RECEIVED:______ day______mo LAB ID:____

MANUFACTURED BY: ____________________ SAMPLE SHIPPED VIA: ____________________

SITE CONTACT: ____________________ SITE PHONE:______________ SITE FAX:______________

SAMPLE NO. GDL–	BATCH NO./ ROLL NO.	GEOCOMPOSITE					GEONET					GEOTEXTILE				
		PEEL STRENGTH ASTM D413 F904	MASS PER UNIT AREA ASTM D3776	THICKNESS ASTM D374C D5199	TRANS–MISSIVITY ASTM 4716	OTHER	CARBON BLACK CONTENT ASTM D1603	MASS PER AREA ASTM D3776	CARBON DISPERSION ASTM D5596	THICKNESS ASTM D5199	OTHER	MASS PER UNIT AREA ASTM D3776	TENSILE ASTM D638	APPARENT OPENING SIZE ASTM D4751	PERMITTIVITY ASTM D4491	OTHER

DOUBLE SIDED OR SINGLE SIDED MATERIAL

COMMENTS/SPECIAL INSTRUCTIONS/DISTRIBUTION: Strikeout nonapplicable items/Recommend that each component be sampled separately

GeoSyntec Consultants

Omni Waste
of Osceola County LLC

PANEL PLACEMENT LOG

PROJECT: ______________________________

LOCATION: ______________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ______________________________ YEAR: ________

PRIMARY: ☐ SECONDARY: ☐ OTHER: ________ PRODUCT TYPE: ________________

PANEL NO.	BATCH / ROLL NO.	DATE (day/mo)	TIME	PLACEMENT LOCATION COMMENTS	APPROX WIDTH (ft)	APPROX LENGTH (ft)	QA ID
				TOTALS:(1)			

NOTE: (1) APPROXIMATE AREA: THIS PAGE: ______________ (ft^2) ACCUMULATED: ______________ (ft^2)

NOTES: ______________________________

____

____

GEOSYNTEC CONSULTANTS

Omni Waste
of Osceola County LLC

TRIAL SEAM LOG - EXTRUSION

PROJECT: ______________________________

LOCATION: ______________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ______________________ YEAR: ______________

CONTRACTOR: ______________ TENSIOMETER DESCRIPTION: ______________

TRIAL SEAM NO.	DATE (day/mo)	TIME	MACHINE NO.	OPER ID	(1) MATERIAL DESCRIPTION	EXTRUSION		TEST RESULTS				RE-TEST NO.	QA ID
						PREHEAT (SET/°C/°F)	BARREL (°C/°F)	PEEL (ppi/psi)	SHEAR (ppi/psi)	PASS	FAIL		

NOTE: (1) MATERIAL DESCRIPTION REFERS TO EITHER SMOOTH/SMOOTH (S/S); SMOOTH/TEXTURED (S/T); OR TEXTURED/TEXTURED (T/T).

GeoSyntec Consultants

OmniWaste of Osceola County LLC

TRIAL SEAM LOG - FUSION

PROJECT: ______________________________

LOCATION: ______________________ PROJECT NO.: __________ TASK NO.: __________

DESCRIPTION: ______________________ YEAR: __________

CONTRACTOR: ______________ TENSIOMETER DESCRIPTION: ______________

TRIAL SEAM NO.	DATE (day/mo)	TIME	MACHINE NO.	OPER ID	(1) MATERIAL DESCRIPTION	FUSION		TEST RESULTS				QA ID
						WEDGE (SET/°C/°F)	MEASURED SPEED (ft/min)	PEEL (ppi/psi)	SHEAR (ppi/psi)	PASS	FAIL	

NOTE: (1) MATERIAL DESCRIPTION REFERS TO EITHER SMOOTH/SMOOTH (S/S); SMOOTH/TEXTURED (S/T); OR TEXTURED/TEXTURED (T/T).

GEOSYNTEC CONSULTANTS

Omni Waste of Osceola County LLC

PRODUCTION SEAM AND NON-DESTRUCTIVE TESTING SUMMARY LOG

PROJECT: ______

LOCATION: ______ PROJECT NO.: ______ TASK NO.: ______

DESCRIPTION: ______ YEAR: ______

PRIMARY: ☐ SECONDARY: ☐ OTHER: ☐ ______ CONTRACTOR: ______

PRODUCTION SEAM				LOCATION					NONDESTRUCTIVE TEST						
DATE (day/mo)	TIME	MACHINE NO.	OPERATOR ID	SEAM NO.	BEGIN	END	ACTUAL SEAM LENGTH (ft)	QA ID	TEST INTERVAL (ft)	AIR PRESSURE (__±__psi for 5 min.)	VACUUM BOX (____sec.)	OPERATOR ID	PASS/ FAIL	ACTION	QA ID
				TOTAL (1)											

NOTE: (1) SEAM LENGTH: THIS PAGE ______ (ft) ACCUMULATED ______ (ft)

GeoSyntec Consultants

Omni Waste
of Osceola County LLC

SEAM AND PANEL REPAIR LOCATION LOG

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ DATE: ______ day ______ month ______ year

CONTRACTOR: ____________________

PRIMARY: ☐ SECONDARY: ☐ OTHER: ☐ PRODUCT TYPE: ____________________

NORTH

NOTE:
SEE OTHER SIDE FOR SYMBOLS

QA ID: ________

SYMBOLS

S11/P12	SECONDARY/PRIMARY GEOMEMBRANE PANEL NUMBER
NDT =	NONDESTRUCTIVE TEST
VT =	VACUUM TEST
AT =	AIR TEST

℄ X——X——X LEACHATE COLLECTION PIPE

TOE OF SLOPE

CREST OF SLOPE

xxxxxxxxxxxxxxxxxxxxxxxx ANCHOR TRENCH

EXTRUSION WELD

GEOGRID

GEONET

GEOTEXTILE

GEOCOMPOSITE LAYER

CAPPED SEAM (FUSION) — NDT TESTED

DESTRUCTIVE SAMPLE (DS) LOCATION P=PRIMARY S=SECONDARY — (FAILED) — (PASSED) — NDT TESTED

EXTRUSION WELD REPAIR (GRIND & WELD) — NDT TESTED

COUPON SAMPLE LOCATION — NDT TESTED

PATCH REPAIR LOCATION (EXTRUSION) — NDT TESTED

PIPE PENETRATION

SUMP AREA

60 THICKNESS MEASUREMENT

ADJACENT PANEL REFERENCE

 FILE NO. 3-08B-SYM

GEOSYNTEC CONSULTANTS

OMNI WASTE of Osceola County LLC

REPAIR SUMMARY LOG

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: __________ TASK NO.: __________

DESCRIPTION: ____________________ YEAR: __________

PRIMARY: ☐ SECONDARY: ☐ OTHER: ☐ __________ CONTRACTOR: __________

DATE (day/mo)	LOCATION				REPAIR NO. AND CODE (1)	REPAIR TYPE (2)	SIZE			WELDER ID		QA ID	NON-DESTRUCTIVE TESTING				
	SEAM	PANEL	DIST. (ft)	OFFSET (ft)			LENGTH (ft)	WIDTH (ft)	DIA (ft)	MACH NO.	OPER ID		DATE (day/mo)	OPER ID	PASS/FAIL	ACTION	QA ID
(15)																	

NOTES: (1) REPAIR NO.: REPAIRS CAN BE NUMBERED SEQUENTIALLY, IF NECESSARY.
(1) REPAIR CODES: P = PATCH, C = CAP, S= ANCHOR TRENCH EXTENSION (SKIRT), DS = DESTRUCTIVE SAMPLE, G = GRIND & WELD, T = TOPPING ALONG FUSION SEAM, R = RECONSTRUCTION
(2) REPAIR TYPES: E = EXTRUSION, F = FUSION

 FILE NO. 3-09-RSL RE[illegible]ED BY: __________ SHEET NO.___ OF______

GeoSyntec Consultants

Omni Waste of Osceola County LLC

DESTRUCTIVE TEST LOG

PROJECT: ______

LOCATION: ______ PROJECT NO.: ______ TASK NO.: ______

DESCRIPTION: ______ YEAR: ______

CONTRACTOR: ______ TEST REQUIREMENTS: ______

PRIMARY: ☐ SECONDARY: ☐ RE-TEST: ☐ OTHER: ☐ ______

DISTRIBUTION: LABORATORY: ☐ ARCHIVE: ☐ INSTALLER: ☐ OTHER: ______

SAMPLE DATA							FIELD DATA						LABORATORY DATA						
D.S. NO.	TRACK (1)		LOCATION		MACH NO.	OPER ID	AVG PEEL (PPI/PSI)		AVG SHEAR (PPI/PSI)	PASS/ FAIL	DATE SAMPLED/ SHIPPED (day/mo)	QA ID	DATE OF RESULTS (day/mo)	AVG PEEL (PPI/PSI)		AVG SHEAR (PPI/PSI)	PASS/ FAIL	RE-TEST	QA ID
	SINGLE	DOUBLE	SEAM	DISTANCE (ft)			INSIDE	OUTSIDE						INSIDE	OUTSIDE				

NOTES: (1) TRACK TYPES: E = EXTRUSION F = FUSION ______

GEOSYNTEC CONSULTANTS

Omni Waste of Osceola County LLC

PRESSURE TEST LOG

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ YEAR: ________

CONTRACTOR: ____________________

TEST DESCRIPTION: ____________________

PASS/FAIL CRITERION: ____________________

MATERIAL DESCRIPTION: FORCEMAIN: ☐ CONTAINMENT: ☐ MANHOLE: ☐ OTHER: ________

TEST LOCATION: ____________________

READING NO.	DATE (day/mo)	TIME	READING	CHANGE IN READING	PASS/FAIL	QA ID

VISUAL MONITORING:

________________________________ ________________________________

CONTRACTOR'S REPRESENTATIVE day/mo/yr CQA REPRESENTATIVE day/mo/yr

FINAL APPROVAL:

________________________________ ________________________________

CONTRACTOR'S REPRESENTATIVE day/mo/yr CQA REPRESENTATIVE day/mo/yr

COPY TO: ____________________

GEOSYNTEC CONSULTANTS

OmniWaste of Osceola County LLC

CONCRETE PLACEMENT FORM

PROJECT: ______

LOCATION: ______ PROJECT NO.: ______ TASK NO.: ______

DESCRIPTION: ______ DATE: ______ day ______ month ______ year

DESIGN MIX DATA: DESIGN MIX NO.: ______

COMPRESSIVE STRENGTH: ______ (psi) AT ______ (days) SLUMP RANGE (in.): ______ to ______ AIR CONTENT (%): ______

FIELD AND LABORATORY: CONCRETE SUPPLIER: ______ TESTING LABORATORY ______

			TIME					TEMPERATURE		TESTING					
TRUCK NO.	TICKET NO.	SIZE OF LOAD (yd^3)	LOAD BATCHED	BEGIN PLACEMENT	FINISH PLACEMENT	SAMPLED	LOCATION	AMBIENT (°F/C)	ASTM C 1064 CONCRETE (°F/C)	WATER ADDED (gal)	ASTM C 143 SLUMP (in.)	ASTM C 173 AIR CONTENT (%)	PASS/ FAIL	QA ID	NO. OF CYLINDERS

LOCATION NOTES: ______

 FILE NO. 1-19-CPF

SHEET NO. ______ OF ______

GeoSyntec Consultants

Omni Waste of Osceola County LLC

SOIL SAMPLE LOG

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ YEAR: ________

SITE SAMPLE NO.	OFF-SITE LAB SAMPLE NO.	VISUAL DESCRIPTION	SOURCE (LOCATION/DEPTH)	MATERIAL TYPE	DATE SAMPLED (day/mo)	TEST METHODS	QA ID

NOTES: ____________________

GEOSYNTEC CONSULTANTS

OmniWaste of Osceola County LLC

LABORATORY TEST SUMMARY ____________

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ DATE: ______ day ______ month ______ year

MATERIAL TYPE: ____________________ QA ID: ________

NOTE: Separate forms are required for each material type and source. Strike out nonapplicable tests.

SITE SAMPLE NO.	LAB SAMPLE NO.	MOISTURE CONTENT ASTM D 2216/ D 4643 (%)	GRAIN SIZE			ATTERBERG LIMITS ASTM D 4318			SP. GR. ASTM D 854	SOIL CLASS. ASTM D 2487	LOI	CARBO CONT.	COMPACTION ASTM D 698 (or) ASTM D 1557		PERMEABILITY ASTM D 2434[1] (or) ASTM D 5084[2]			PASS/ FAIL	ACUMUL. QUANT. PLACED (APPROX) (yd³)
			PASSING NO. 200 SIEVE ASTM D 1140 (%)	ASTM D 422 SIEVE	ASTM D 422 HYDR.	LL (%)	PL (%)	PI			ASTM C311 (%)	ASTM D3042 (%)	MAX. DRY UNIT WT. (pcf)	OPT. MOIST. CONT. (%)	DRY UNIT WT. (pcf)	MOIST. CONT. ASTM D 2216 (%)	HYDRAULIC COND'VITY (cm/sec)		

COMMENTS: ____________________

NOTES: (1) HYDRAULIC CONDUCTIVITY DETERMINED AT A HYDRAULIC GRADIENT OF ____.
(2) HYDRAULIC CONDUCTIVITY DETERMINED AT AN EFFECTIVE CONFINING STRESS OF ____.

 FILE NO. 2-22-LTS

CHECKED BY: ________

GEOSYNTEC CONSULTANTS

OmniWaste of Osceola County LLC

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD A)

PROJECT: ______

LOCATION: ______ PROJECT NO.: ______ TASK NO.: ______

DESCRIPTION: ______ DATE: ______ day ______ month ______ year

MATERIAL TYPE: ______ SAMPLE NO.: ______ SAMPLE NO.: ______

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4–in. (19–mm) SIEVE IS LESS THAN 30%, AND IF THE MATERIAL RETAINED ON THE NO. 4 (4.75–mm) SIEVE IS LESS THAN 20%
ALL MATERIAL RETAINED ON THE NO. 4 (4.75–mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4–in. DIAMETER MOLD / 5.5–lb RAMMER / 12–in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: ______

	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)					
B	WT. OF MOLD	(grams)					
C	WT. OF SOIL = A – B	(grams)					
D	WET UNIT WT.(1) = C X 0.066	(pcf)					
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)					

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: ______

	TARE NO.						
F	WT. OF TARE	(grams)					
G	WT. OF WET SOIL & TARE	(grams)					
H	WT. OF DRY SOIL & TARE	(grams)					
I	WT. OF WATER = G – H	(grams)					
J	WT. DRY SOIL = H – F	(grams)					
K	MOISTURE CONTENT = (I/J) X 100	(%)					

GEOSYNTEC CONSULTANTS

Omni Waste of Osceola County LLC

MOISTURE-DENSITY RELATIONSHIP

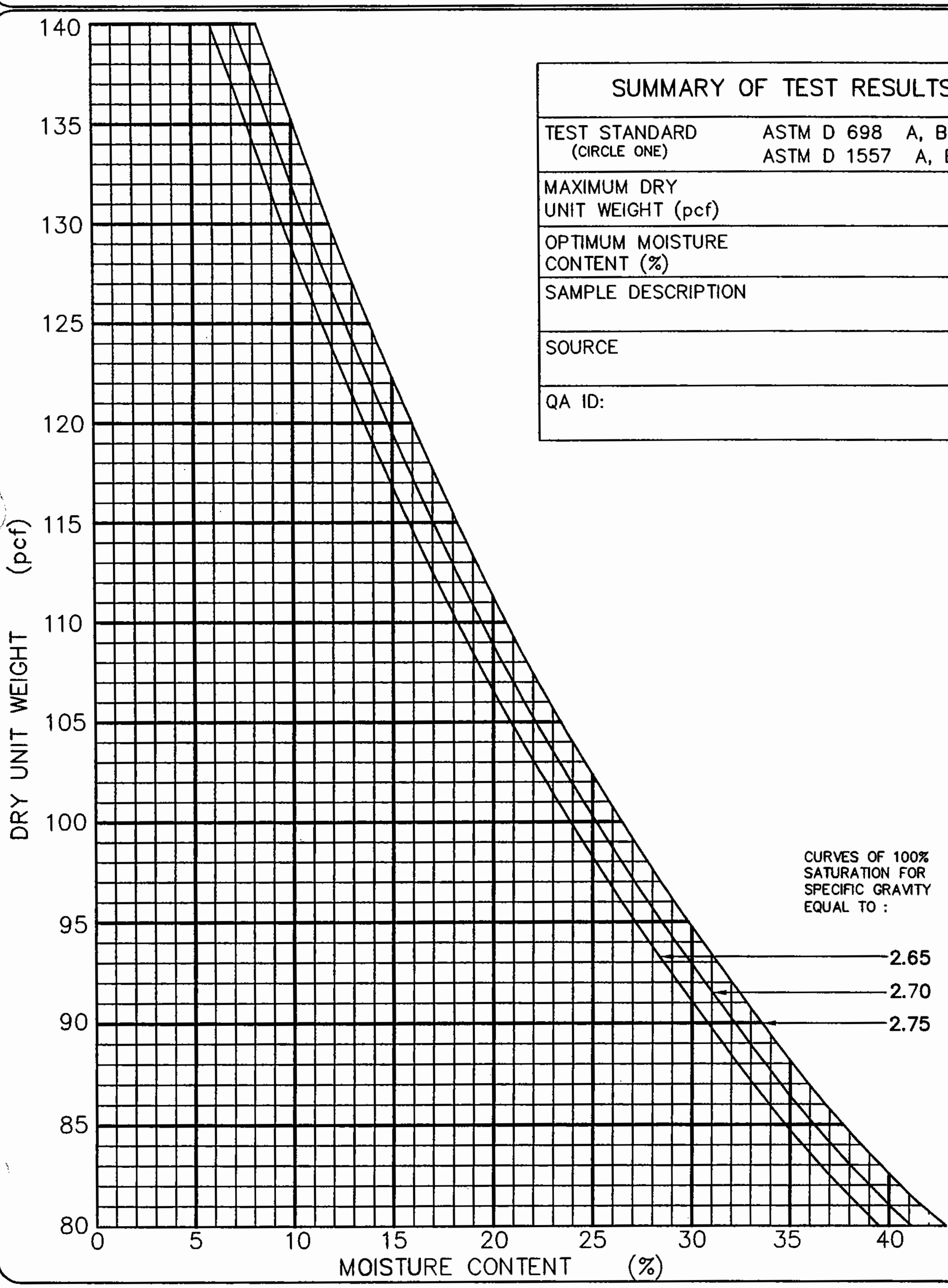
PROJECT: ______________________________

LOCATION: ______________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ______________________ DATE: ______ day ______ month ______ year

MATERIAL TYPE: ____________ SOURCE NO.: ____________ SAMPLE NO.: ____________

SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	
OPTIMUM MOISTURE CONTENT (%)	
SAMPLE DESCRIPTION	
SOURCE	
QA ID:	



 FILE NO. 2-12-MDR CHECKED BY: ________ SHEET NO. ______ OF ______

GEOSYNTEC CONSULTANTS

Omni Waste of Osceola County LLC

DETERMINATION OF DENSITY (DRIVE CYLINDER) (ASTM D 2937)

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ DATE: ______ day ______ month ______ year

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ____________________
(CIRLCLE ONE)

% COMPACTION: ____________________ MOISTURE CONTENT RANGE: ____________________

TEST LOCATION: ____________________ TEST NO.: ____________________

FIELD TEST DATA – ASTM D 2937 QA ID: ________

A	CYLINDER NO. ______ VOLUME(1) (cf)		D	WEIGHT OF WET SAMPLE = B–C (lbs)	
B	WEIGHT OF SAMPLE & CYLINDER (lbs)		E	WET UNIT WEIGHT = D/A (lbs)	
C	WEIGHT OF CYLINDER (lbs)		F	DRY UNIT WEIGHT = E/[1+(T/100)] (pcf)	
			G	PERCENT COMPACTION = F/L (%) PASS/FAIL	

NOTE: CYLINDER VOLUME IS OBTAINED BY MEASURING THE HEIGHT AND DIAMETER, OF FOUR EQUALLY SPACED POINTS, TO AN ACCURACY OF 0.01-in., AND CALCULATING VOLUME USING AVERAGE HEIGHT AND DIAMETER.

FIELD MOISTURE CONTENT – ASTM D 2216 QA ID: ________

O	WT. OF TARE NO. ______ (grams)		R	WT. OF WATER = P–Q (grams)	
P	WT. OF WET SOIL & TARE (grams)		S	WT. OF DRY SOIL = Q–O (grams)	
Q	WT. OF DRY SOIL & TARE (grams)		T	MOISTURE CONTENT = (R/S)X100 (%)	

PROCTOR TEST DATA ______ MAXIMUM DRY UNIT WT. (pcf) ______ OPTIMUM MOISTURE CONTENT (%) ______

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017 QA ID: ________

TEST NO.		U	MOISTURE CONTENT (%)	
WET UNIT WT. (pcf)		V	DRY UNIT WT. (pcf)	
DELTA DRY UNIT WT. = F – V			DELTA MOISTURE CONTENT = T – U	

COMMENTS: ....

GeoSyntec Consultants

OmniWaste of Osceola County LLC

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ DATE: ______ day ______ month ______ year

MATERIAL TYPE: ____________________ SAMPLE NO.: ____________________

SOIL SAMPLE SIZE

	SAND	FINE GRAIN
APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	115	65

	BEFORE WASH	AFTER WASH
TARE NO.		
WT. OF DRY SAMPLE PLUS TARE (grams)		
WT. OF TARE (grams)		
WT. OF DRY SAMPLE (grams)		

SIEVE ANALYSIS

QA ID: ________

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS

$\%FINER = 100 - \Sigma\%\ RETAINED$

 FILE NO. 2-14A-PMS CHECKED BY: ________ SHEET NO. ______ OF ______

GEOSYNTEC CONSULTANTS

Omni Waste of Osceola County LLC

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

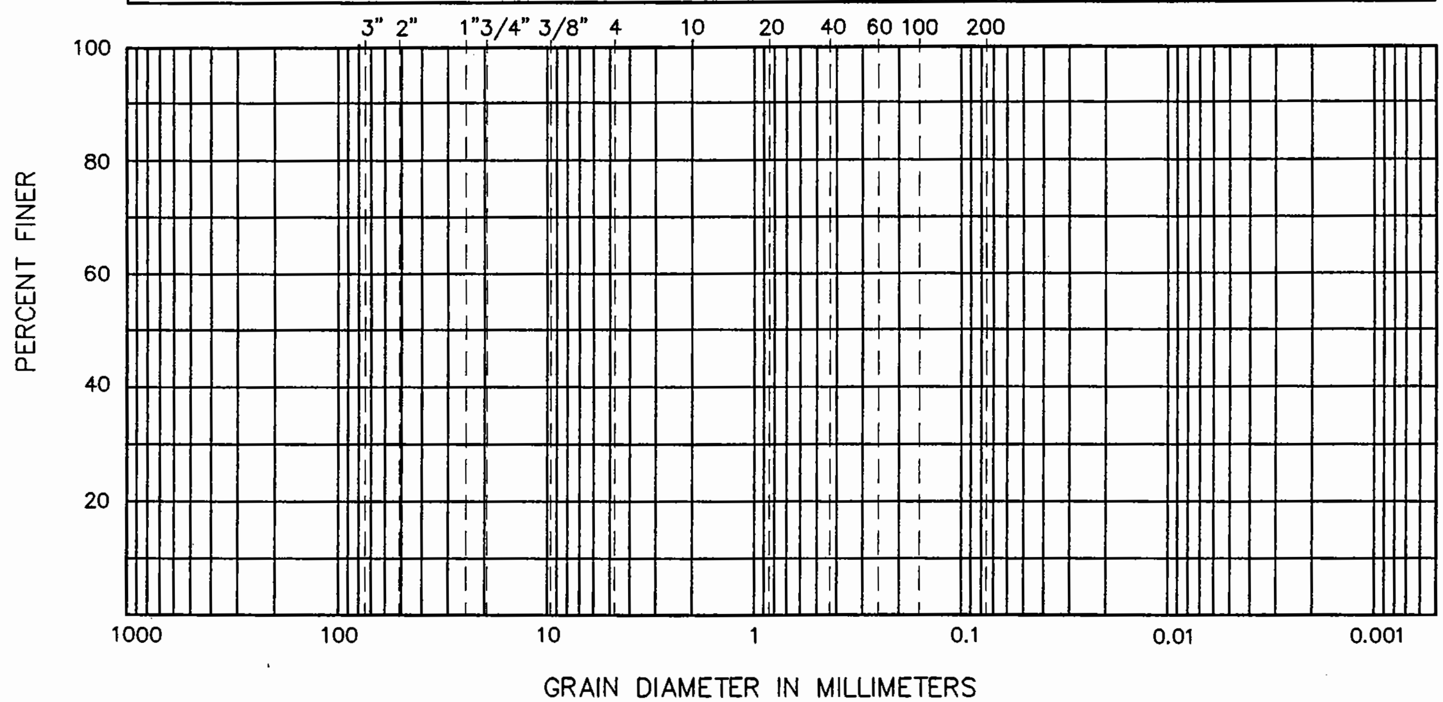
DESCRIPTION: ____________________ DATE: ____ day ____ month ____ year

MATERIAL TYPE: ____________ SOURCE NO.: ____________ SAMPLE NO.: ________ QA ID: ________

CURVE COEFFICIENTS: (C_u).................... (C_c)....................

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

U.S. STANDRARD SIEVE SIZES



SOIL CLASSIFICATION (ASTM D 2487): ____________________

ATTERBERG LIMITS

(LL)................

(PL)................

(PI)................

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	
3/8-in.	
NO. 4	
NO. 10	
NO. 20	
NO. 40	
NO. 60	
NO. 100	
NO. 200	

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

GeoSyntec Consultants

Omni Waste of Osceola County LLC

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ______

LOCATION: ______ PROJECT NO.: ______ TASK NO.: ______

DESCRIPTION: ______ DATE: ______ day ______ month ______ year

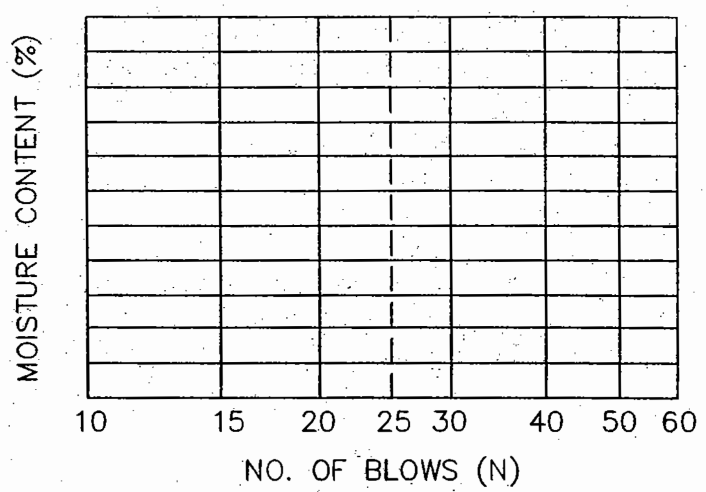
MATERIAL TYPE: ______ SOURCE NO.: ______ SAMPLE NO.: ______

LIQUID LIMIT DETERMINATION

QA ID: ______

	TARE NO.				
A	WT. OF TARE (grams)				
B	WT. OF WET SOIL & TARE (grams)				
C	WT. OF DRY SOIL & TARE (grams)				
D	WT. OF WATER = B−C (grams)				
E	WT. OF DRY SOIL = C−A (grams)				
F	MOISTURE CONTENT = (D/E)X100 (%)				
N	NUMBER OF BLOWS				

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: ______

	TARE NO.				
A	WT. OF TARE (grams)				
B	WT. OF WET SOIL & TARE (grams)				
C	WT. OF DRY SOIL & TARE (grams)				
D	WT. OF WATER = B−C (grams)				
E	WT. OF DRY SOIL = C−A (grams)				
F	MOISTURE CONTENT = (D/E)X100 (%)				

LIQUID LIMIT (LL) = ______ PLASTIC LIMIT (PL) = ______ PLASTICITY INDEX (PI) = ______ PASS/FAIL ______

GEOSYNTEC CONSULTANTS

OmniWaste of Osceola County LLC

NUCLEAR GAUGE STANDARD COUNT LOG (ASTM D 2922 & ASTM D 3017)

PROJECT: ______________________________

LOCATION: ______________________ PROJECT NO.: __________ TASK NO.: __________

DESCRIPTION: ______________________________ YEAR: __________

NUCLEAR GAUGE MODEL: ______________________ SERIAL NO.: ______________________

DATE ARRIVED ON SITE: ______________________ DATE DEPART SITE: ______________________

DATE OF MOST RECENT LEAK TEST: ______________________

DATE (day/mo)	MOISTURE COUNT	DENSITY COUNT	PASS/ FAIL	QA ID	DATE (day/mo)	MOISTURE COUNT	DENSITY COUNT	PASS/ FAIL	QA ID

NOTE: A COPY OF THIS FORM SHOULD ACCOMPANY GAUGE WHEN SHIPPED FROM SITE.

GEOSYNTEC CONSULTANTS

OmniWaste of Osceola County LLC

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ____

LOCATION: ____ PROJECT NO.: ____ TASK NO.: ____

DESCRIPTION: ____ DATE: ____ day ____ month ____ year

SPECIFICATION REQUIREMENTS

SOURCE: ____ MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ____ LIFT THICKNESS (LOOSE/COMPACTED): (CIRCLE ONE) ____

% COMPACTION: ____ MOISTURE RANGE: ____ ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE) ____

NUCLEAR GAUGE TYPE: ____ NUCLEAR GAUGE SERIAL NO. ____ COR. FACTOR: ____ QA ID: ____

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL

COMMENTS: ____

GEOSYNTEC CONSULTANTS

OmniWaste of Osceola County LLC

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ____________________

LOCATION: ____________________ PROJECT NO.: ________ TASK NO.: ________

DESCRIPTION: ____________________ DATE: ______ day ______ month ______ year

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ____________

% COMPACTION: ____________ MOISTURE CONTENT RANGE: ____________

TEST LOCATION: ____________ TEST NO.: ____________

FIELD TEST DATA – ASTM D 1556

QA ID: ________

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM) (pcf)		H	WT. OF WET SOIL & TARE FROM HOLE (lbs)	
B	INITIAL WT. OF SAND & JAR (lbs)		I	WT. OF TARE NO.: ______ (lbs)	
C	FINAL WT. OF SAND & JAR (lbs)		J	WT. OF WET SOIL FROM HOLE = H–I (lbs)	
D	WT. OF SAND IN FUNNEL & HOLE = B–C (lbs)		K	WET UNIT WT. = J/G (pcf)	
E	WT. OF SAND IN FUNNEL (1) (lbs)		M	DRY UNIT WT. = K/[1+(T/100)] (pcf)	
F	WT. OF SAND IN HOLE = D–E (lbs)		N	PERCENT COMPACTION = M/L (%)	
G	VOLUME OF HOLE = F/A (ft^3)			PASS/FAIL	

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: ________

O	WT. OF TARE NO. ______ (grams)		R	WT. OF WATER = P–Q (grams)	
P	WT. OF WET SOIL & TARE (grams)		S	WT. OF DRY SOIL = Q–O (grams)	
Q	WT. OF DRY SOIL & TARE (grams)		T	MOISTURE CONTENT = (R/S)X100 (%)	

PROCTOR SAMPLE NO. ______ MAXIMUM DRY UNIT WT. =L(pcf) ______ OPTIMUM MOISTURE CONTENT (%) ______

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: ________

TEST NO.		U	MOISTURE CONTENT (%)	
WET UNIT WT. (pcf)		V	DRY UNIT WT. (pcf)	
DELTA DRY UNIT WT. = M – V			DELTA MOISTURE CONTENT = T – U	

COMMENTS: ....

APPENDIX B

TABLE 02770-1 and 02770-2
REQUIRED GEOMEMBRANE PROPERTIES

TABLE 02770-1
REQUIRED HDPE GEOMEMBRANE PROPERTIES

Properties	Qualifiers	Units(1)	Specified Values Textured	Test Method
Physical Properties				
Thickness	Nominal	mils	60	ASTM D 5199 (S) ASTM D 5994 (T)
Specific Gravity	Minimum	N/A	0.94	ASTM D 792 Method A or ASTM D 1505
Carbon Black Content	Range	%	2-3	ASTM D 1603
Carbon Black Dispersion	N/A	none	8 of 10 in Category 1 or 2 and all in Category 1, 2, or 3	ASTM D 5596
Mechanical Properties				
Tensile Properties				
1. Force Per Unit Width at Yield	Minimum	lb/in	132	ASTM D 638 (Modified by NSF 54 Annex A)
2. Tensile Strength (force per unit width at break)	Minimum	lb/in	72	ASTM D 638 (Modified by NSF 54 Annex A)
3. Elongation at Yield	Minimum	%	12	ASTM D 638 (Modified by NSF 54 Annex A)
4. Elongation at Break	Minimum	%	100	ASTM D 638 (Modified by NSF 54 Annex A)
Tear Resistance	Minimum	lb	40	ASTM D 1004 Die C Puncture
Puncture Resistance	Minimum	lb	80	FTMS 101/2065

TABLE 02770-1 (continued)

Properties	Qualifiers	Units[1]	Specified Values Textured	Test Method
Environmental Properties				
Low Temperature Brittleness	Maximum	°C	-60	ASTM D 746 Procedure B
Dimensional Stability (each direction)	Maximum change	%	±2	ASTM D 1204 212°F, 15 min.
Environmental Stress Crack	Minimum	hrs	200[2]	ASTM D 5397

Notes: 1. % = percent
g = grams
min = minutes
lb/in = pounds per inch
lb = pound
°C = degrees Celsius
hrs = hours

2. Time-to-failure at a tensile stress of 30 percent of the tensile yield strength. For textured geomembrane, test is conducted on smooth geomembrane from the same resin lot (batch) as the textured geomembrane furnished.

TABLE 02770-2

REQUIRED HDPE GEOMEMBRANE SEAM PROPERTIES

Properties	Qualifiers	Units[3]	Specified Values		Test Method
			Smooth	Textured	
Shear Strength[1]					
fusion	Minimum	lb/in	120	120	ASTM D 6392
extrusion	Minimum	lb/in	108	108	ASTM D 6392
Peel Adhesion					
			FTB[2]	FTB[2]	
fusion	Minimum	lb/in	78	78	ASTM D 6392
extrusion	Minimum	lb/in	70	70	ASTM D 6392

Notes:
1. Also called "Bonded Seam Strength". Value is at material yield point and failure shall occur in material outside of seam area.
2. FTB = Film Tear Bond. (Maximum 10 percent seam separation)
3. lb/in = pounds per inch

APPENDIX C

TABLE 02780-1
REQUIRED GEOSYNTHETIC CLAY LINER PROPERTY VALUES

TABLE 02780-1

REQUIRED GCL PROPERTY VALUES

PROPERTIES	QUALIFIERS	UNITS(6)	SPECIFIED(1) VALUES	TEST METHOD
GCL Properties				
Bentonite Content(2) (GCL)	Minimum	lb/ft^2	1.0	ASTM D 5261
Bentonite Moisture Content	Maximum	%	25	ASTM D 4643
Bentonite Free Swell	Minimum	ml/2g	24	ASTM D 5890
Hydraulic Conductivity(5)	Minimum	cm/s	5×10^{-9}	ASTM D 5887
Tensile Strength(3)	Minimum	lb/in	35	ASTM D 4595
Peel Strength(3)	Minimum	lb/in	15	ASTM D 4632
Geotextile Properties				
Polymer Composition	Minimum	%	95 polyester or polypropylene	

Notes:
1. All values represent minimum average roll values.
2. Measured at a moisture content not exceeding 25 percent.
3. For geotextile backed GCLs.
4. lb/ft^2 = pounds per square foot
   cm/s = centimeter per second
   % = percent
   lb = pound
   lb/in = pounds per inch
   ml/2g = milliliters per two grams
5. The GCL test specimen shall be hydrated with the fluid which is expected to cause hydration in the field, or similar fluid, for a minimum of 48 hours using sufficient backpressure to achieve a minimum B coefficient of 0.9 and using a confined effective consolidation stress not exceeding five pounds per square inch. Then, the hydraulic conductivity test on the GCL specimen shall be conducted, using the appropriate permeant fluid, at a confined effective consolidation stress not exceeding five pounds per square inch. The hydraulic conductivity test shall continue until steady state conditions are reached or a minimum of two pore volumes of permeant fluid have passed through the test specimen. The permeant fluid shall be either leachate from the landfill (or similar landfill) if the GCL is used in a liner system.

[END OF SECTION]

APPENDIX D

TABLE 02720-1 AND 02720-2
REQUIRED PROPERTY VALUES FOR
GEOTEXTILE FILTER AND SEPARATOR

TABLE 02720-1

REQUIRED PROPERTY VALUES FOR GEOTEXTILE FILTER

PROPERTIES	QUALIFIER	UNITS	SPECIFIED[1] VALUES	TEST METHOD
Type				
nonwoven needlepunched				(-)
Polymer composition	minimum	%	95 polypropylene or polyester by weight	(-)
Mass per unit area	minimum	oz/yd^2	7	ASTM D 5261
Filter Requirements				
Apparent opening size (O_{95})	maximum	mm	0.21	ASTM D 4751
Permittivity	minimum	sec^{-1}	0.5	ASTM D 4491
Mechanical Requirements				
Grab strength	minimum	lb	180	ASTM D 4632[2]
Tear strength	minimum	lb	75	ASTM D 4533[3]
Puncture strength	minimum	lb	75	ASTM D 4833[4]
Burst strength	minimum	psi	350	ASTM D 3786
Durability				
Ultraviolet Resistance	minimum	%	70	ASTM D 4355

Notes:

(1) All values represent minimum average roll values.
(2) Minimum of values measured in machine and cross machine directions with 1 inch clamp on Constant Rate of Extension (CRE) machine.
(3) Minimum value measured in machine and cross machine direction.
(4) Tension testing machine with a 1.75-inch diameter ring clamp, the steel ball being replaced with 0.31-inch diameter solid steel cylinder with flat tip centered within the ring clamp.
(5) mm = millimeter
% = percent
oz/yd^2 = ounce per square yard
sec = second
lb = pound
psi = pound per square inch

TABLE 02720-2

REQUIRED PROPERTY VALUES FOR GEOTEXTILE SEPARATOR

PROPERTIES	QUALIFIER	UNITS	SPECIFIED[1] VALUES	TEST METHOD
Type				
nonwoven needlepunched				(-)
Polymer composition	minimum	%	95 polypropylene or polyester by weight	(-)
Mass per unit area	minimum	oz/yd^2	8	ASTM D 5261
Mechanical Requirements				
Grab strength	minimum	lb	180	ASTM D 4632[2]
Tear strength	minimum	lb	75	ASTM D 4533[3]
Puncture strength	minimum	lb	75	ASTM D 4833[4]
Burst strength	minimum	psi	350	ASTM D 3786
Durability				
Ultraviolet Resistance	minimum	%	70	ASTM D 4355

Notes:

(1) All values represent minimum average roll values.
(2) Minimum of values measured in machine and cross machine directions with 1 inch clamp on Constant Rate of Extension (CRE) machine.
(3) Minimum value measured in machine and cross machine direction.
(4) Tension testing machine with a 1.75-inch diameter ring clamp, the steel ball being replaced with 0.31-inch diameter solid steel cylinder with flat tip centered within the ring clamp.
(5) % = percent
oz/yd^2 = ounce per square yard
lb = pound
psi = pound per square inch

[END OF SECTION]

APPENDIX E

TABLE 02740-1
REQUIRED PROPERTIES VALUES FOR GEOCOMPOSITE

TABLE 02740-1
PRIMARY AND FINAL COVER GEOCOMPOSITE PROPERTY VALUES

PROPERTIES	QUALIFIER	UNITS	SPECIFIED VALUES (1)	TEST METHOD
Geonet Component:				
Polymer composition	Minimum	%	95 polyethylene by weight	--
Polymer density	Minimum	g/cm^3	0.93	ASTM D 1505
Carbon black content	Range	%	2 - 3	ASTM D 1603
Nominal thickness	Minimum	Mil	200	ASTM D 1777
Geotextile Component:				
Type	None	none	needlepunched nonwoven	--
Polymer composition	Minimum	%	95 polyester or polypropylene	
Mass per unit area	Minimum	oz/yd^2	6	ASTM D 5261
Apparent opening size	Maximum	mm	$O_{95} \leq 0.21$ mm	ASTM D 4751
Permittivity	Minimum	sec^{-1}	0.5	ASTM D 4491
Grab strength	Minimum	lb	180	ASTM D 4632 (2)
Tear strength	Minimum	Lb	75	ASTM D 4533 (2)
Puncture strength	Minimum	Lb	75	ASTM D 4833 (3)
Geocomposite				
Transmissivity	Minimum	m^2/s	See notes 4, 5, and 6	ASTM D 4716
Peel strength	Minimum	g/in.	500	ASTM F 904

Notes:

1. All values represent minimum average roll values.
2. Minimum value measured in machine and cross-machine direction.
3. Tension testing machine with a 1.75-inch diameter ring clamp, the steel ball being replaced with 0.31-inch diameter solid steel cylinder with flat tip centered within the ring clamp.
4. The design transmissivity of the geocomposite drainage layer used for the primary leachate collection layer is measured using water at 68°F with a gradient of 0.02 under compressive stresses of 500 psf and of 25,000 psf for 100 hours. For the test, the geocomposite shall be sandwiched between 60-mil textured HDPE geomembrane and soil actually used for the liner protective layer. The minimum required transmissivities are 7.8 x 10^{-3} m^2/s and 2.6 x 10^{-3} m^2/s under the compressive stresses of 500 psf and 25,000 psf, respectively.

TABLE 02740-1 (Continued)

5. The design transmissivity of the geocomposite drainage layer used for the secondary leachate collection layer is measured using water at 68°F with a gradient of 0.02 under compressive stresses of 500 psf and 25,000 psf for 100 hours. For the test, the geocomposite shall be sandwiched between geosynthetic clay liner (GCL) and 60-mil textured HDPE geomembrane. The minimum required transmissivities are 2.4 x 10^{-3} m^2/s and 3.5 x 10^{-4} m^2/s under the compressive stresses of 500 psf and 25,000 psf, respectively.
6. The design transmissivity of the geocomposite drainage layer used for the final cover drainage layer is measured using water at 68°F with gradient of 0.25 under a compressive stress of 500 psf for 100 hours. For the test, the geocomposite shall be sandwiched between 40-mil textured PE geomembrane and soil actually used for the cap protective layer. The minimum required transmissivity is 4.5 x 10^{-3} m^2/s under the compressive stress of 500 psf.

[END OF SECTION]

DEP Form # 62-701.900(28)
Form Title Financial Assurance Cost Estimate Form
Effective Date 05-27-01
DEP Application No. ____ (Filled by DEP)

Florida Department of Environmental Protection
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

FINANCIAL ASSURANCE COST ESTIMATE FORM

Date: 30 APRIL 2002 Date of DEP Approval: ____

I. GENERAL INFORMATION:

Facility Name: OAK HAMMOCK DISPOSAL WACS or GMSID #: ____

Permit / Application No.: ____ Expiration Date: ____

Facility Address: HIGHWAY US. 441

Permittee: OMNI WASTE OF OSCEOLA COUNTY, LLC

Mailing Address: 100 CHURCH ST. KISSIMMEE, FLORIDA 34741

Latitude: 28°03'31" Longitude: 81°05'46" or UTM: ____

Solid Waste Disposal Units Included in Estimate:

PHASE 1 ~~Phase~~ / Cell	Acres	Date Unit Began Accepting Waste	Design Life of Unit From Date of Initial Receipt of Waste
1	18.04	PROPOSED	5 YEARS
2	12.44	PROPOSED	5 YEARS
3	10.98	PROPOSED	5 YEARS
4	10.98	PROPOSED	5 YEARS

Total Landfill Acreage included in this estimate. 52.44 Closure 52.44 Long-Term Care

Type of landfill: X Class I ____ Class III ____ C&D Debris

II. TYPE OF FINANCIAL ASSURANCE DOCUMENT (Check Type) WILL BE PROVIDED TO FDEP PRIOR TO PERMIT ISSUANCE.

____ Letter of Credit*
____ Insurance Certificate
____ Performance Bond*
____ Escrow Account
____ Guaranty Bond*
____ Trust Fund Agreement

*Indicates mechanisms that require use of a Standby Trust Fund Agreement

III. ESTIMATE ADJUSTMENT N/A

40 CFR Part 264 Subpart H as adopted by reference in Rule 62-701.630, Florida Administrative Code sets forth the method of annual cost estimate adjustment. Cost estimates may be adjusted by using an inflation factor or by recalculating the maximum costs of closure in current dollars. Select one of the methods of cost estimate adjustment below.

☐ **(a) Inflation Factor Adjustment**

Inflation adjustment using an inflation factor may only be made when a Department approved closure cost estimate exists and no changes have occurred in the facility operation which would necessitate modification to the closure plan. The inflation factor is derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its survey of Current Business. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year. The inflation factor may also be obtained from the Solid Waste Financial Coordinator at (850)-488-0300.

This adjustment is based on the Department approved closure cost estimate dated: N/A

Latest Department Approved		Current Year		Inflation Adjusted
N/A	x	N/A	=	N/A

This adjustment is based on the Department approved long-term care cost estimate dated: N/A

Latest Department Approved Annual Long-Term Care Cost Estimate:		Current Year Inflation Factor		Inflation Adjusted Annual Long-Term Care Cost Estimate:
N/A	x	N/A	=	N/A

Number of Years of Long Term Care Remaining: x N/A

Inflation Adjusted Long-Term Care Cost Estimate: = N/A

☐ **(b) Recalculate Estimates** (see section V)

IV. CERTIFICATION BY ENGINEER

This is to certify that the Financial Assurance Cost Estimates pertaining to the engineering features of the this solid waste management facility have been examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgement, the Cost Estimates are a true, correct and complete representation of the financial liabilities for closing and long-term care of the facility and comply with the requirements of Florida Administrative Code (F.A.C.), Rule 62-701.630 and all other Department of Environmental Protection rules, and statutes of the State of Florida. It is understood that the Financial Assurance Cost Estimates shall be submitted to the Department **annually**, revised or adjusted as required by Rule 62-701.630(4), F.A.C.

[signature]	[signature]
Signature of Engineer	Signature of Owner/Operator
KENNETH W. CARGILL, P.E. PRINCIPAL	TIMOTHY J. SALOPEK, PRESIDENT
Name & Title (please type)	Name & Title (please type)
54435	(407) 957-7284
Florida Registration Number (affix seal)	Telephone Number
GEOSYNTEC CONSULTANTS 14055 RIVEREDGE DR. SUITE 300 TAMPA, FL 33637	tjsomni@aol.com
Mailing Address	Owner/Operator E-Mail Address
(813) 558-0990	Kcargill@geosyntec.com
Telephone Number	Engineer E-Mail Address

V. RECALCULATE ESTIMATED CLOSING COST

For the time period in the landfill operation when the extent and manner of its operation makes closing **most expensive**.

**** Third Party Estimate / Quote must be provided for each item**

**** Costs must be for a third party providing all material and labor**

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
1. Proposed Monitoring Wells ✱	(Do not include wells already in existence.)			
	EA	N/A	WELLS TO BE INSTALLED PRIOR TO TAKING WASTE	
2. Slope and Fill (bedding layer between waste and barrier layer): ✱				
Excavation	CY			
Placement and Spreading	CY	84,975	$ 6.50	$ 552,338
Compaction	CY			
Off-Site Material	CY			N/A
Delivery	CY			N/A
			Subtotal Monitoring Wells :	$ 552,338
3. Cover Material (Barrier Layer): ✱				
Off-Site Clay	CY			N/A
Synthetics - 40 mil TEXTURED PE GEOMEMBRANE	SY	143,316	$ 5.50	$ 788,238
Synthetics - ~~GCL~~ 40 MIL SMOOTH PE GEOMEMBRANE	SY	111,610	$ 5.00	$ 558,050
Synthetics - ~~Geonet~~ GEOCOMPOSITE	SY	143,316	$ 4.50	$ 644,922
Synthetics - Other	SY			N/A
			Subtotal Barrier Layer Cover:	$ 1,991,210
4. ~~Top Soil~~ VEGETATIVE SOIL Cover: ✱				
Off-Site Material	CY			N/A
Delivery	CY			N/A
Spread	CY	42,488	$ 4.00	$ 169,952
			Subtotal Top Soil Cover:	$ 169,952

✱ SEE ATTACHED NOTES AND CALCULATIONS

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
5. Vegetative Layer *				
Sodding	SY			N/A
Hydroseeding	AC			
Fertilizer	AC	53 ACRES	$ 2,000/ACRE	$ 106,000
Mulch	AC			
Other	SY			N/A
			Subtotal Vegetative Layer:	$ 106,000
6. Stormwater Control System: *				
Earthwork	CY	20,000	$ 6.50	$ 130,000
Grading	SY			N/A
Piping / CONNECTORS	LF			$ 17,247
Ditches	LF			N/A
Berms	LF			N/A
Control Structures	EA	6	$ 1,884	$ 11,304
Other	LS			N/A
			Subtotal Stormwater Controls:	$ 158,551
7. Gas Controls: ~~Passive~~ ACTIVE *				
Wells	EA	19	$ 95.75/ft	$ 90,963
Pipe and Fittings	LF			
Monitoring Probes	EA	11	$ 50/ft	$ 11,000
NSPS/Title V requirements	LS			N/A
			Subtotal Passive Gas Control:	$ 101,963

* SEE ATTACHED NOTES AND CALCULATIONS

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
8. Gas Control: Active Extraction *				
Traps	EA	1	$ 850	$ 850
Sump	EA	1	$ 7,500	$ 7,500
Flare Assembly	EA	1	$ 76,550	$ 76,550
Flame Arrestor	EA	1	$ 4,000	$ 4,000
Mist Eliminator	EA	1	$ 3,900	$ 3,900
Flow Meter	EA	1	$ 4,200	$ 4,200
Blowers	EA	1	$ 17,000	$ 17,000
Collection System	~~LF~~ LUMP SUM			$ 21,413
Other (describe)				N/A
		Subtotal Active Gas Extraction:		$ 135,413
9. Security System: *				
Fencing	LF			N/A
Gate(s)	EA	LUMP SUM COST		$ 5,000
Sign(s)	EA			N/A
		Subtotal Security System:		$ 5,000
10. Engineering: *				
Closure Plan report	LS			N/A
Certified Engineer	LS			N/A INCLUDED IN CERTIFICATION REPORT
NSPS/Title V Air Permit	LS			N/A
Final Survey	LS	1	$ 7,500	$ 7,500
Certification of Closure	LS	1	$ 16,500	$ 16,500
Other (detail) CONSTRUCTION DRAWINGS AND TECHNICAL SPECIFICATIONS		1	$ 52,000	$ 52,000
		Subtotal Engineering:		$ 76,000

* SEE ATTACHED NOTES AND CALCULATIONS

11. Professional Services *

	Contract Management		Quality Assurance		
	Hours	LS	Hours	LS	Total
P.E. Supervisor		N/A		N/A	N/A
On-Site Engineer		N/A		N/A	N/A
Office Engineer		N/A		N/A	N/A
On-Site Technician		N/A		N/A	N/A
Other (explain)		$ 128,817		$ 225,430	$ 354,247

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
Quality Assurance Testing	LS	1	$ 128,000	$ 128,000

Subtotal Professional Services: $ 482,247

Subtotal of 1-11 Above: $ 3778,674

12. Contingency * 10 % of Total $ 377,867

Closing Cost Subtotal: $ 4,156,541

13. Site Specific Costs (explain) *

Mobilization	$ 161,021
Waste Tire Facility	N/A
Materials Recovery Facility	N/A
Special Wastes	N/A
Leachate Management System Modification	N/A
Other	N/A
	N/A

Subtotal Site Specific Costs: $ 161,021

TOTAL CLOSING COSTS $ 4,317,562

* SEE ATTACHED NOTES AND CALCULATIONS

VI. ANNUAL COST FOR LONG-TERM CARE

(Check Term Length)

_____ 5 Years _____ 20 Years X 30 Years _____ Other

See 62-701.600(1)a.1., 62-701.620(1), 62-701.630(3)a. and 62-701.730(11)b. F.A.C. for required term length. For landfills certified closed and Department accepted, enter the remaining long-term care length as "Other" and provide years remaining.

**** Third Party Estimate / Quote must be provided for each item**
**** Costs must be for a third party providing all material and labor**

All items must be addressed. Attach a detailed explanation for all items marked not applicable (N/A)

Description	Sampling Frequency (events/yr.)	Number of Wells	$ / Well / Event	$ / Year
1. Groundwater Monitoring (62-701.510(6), and (8)(a)) *				
Monthly	12			N/A
Quarterly	4			N/A
Semi-Annual	2	45	$ 495	$ 44,550
Annual	1			N/A
		Subtotal Groundwater Monitoring:		$ 44,550
2. Surface Water Monitoring (62-701.510(4), and (8)(b) *				
Monthly	12			N/A
Quarterly	4			N/A
Semi-Annual	2			N/A
Annual	1			N/A
		Subtotal Surface Water Monitoring:		N/A
3. Gas Monitoring *				
Monthly	12			N/A
Quarterly	4	1 EVENT	$ 750 / EVENT	$ 3,000
Semi-Annual	2			N/A
Annual	1			N/A
		Subtotal Gas Monitoring:		$ 3,000

* SEE ATTACHED NOTES AND CALCULATIONS

Description	Sampling Frequency (events/yr.)	Number of Locations	$/Location/Event	$ / Year
4. Leachate Monitoring (62-701.510(5), (6)(b) and 62-701.510(8)(c) *				
Monthly	12			N/A
Quarterly	4			N/A
Semi-Annual	2			N/A
Annual	1	4	$ 1,268	$ 5,072
Other				N/A
			Subtotal Leachate Monitoring:	$ 5,072

DESCRIPTION	UNIT	QUANTITY	UNIT COST	ANNUAL COST
5. Leachate Collection/Treatment Systems Maintenance *				
Maintenance				
Collection Pipes	LF			$ 1,333
Sumps, ~~Traps~~ PUMPS	EA			$ 1,733
Lift Stations	EA			N/A
Cleaning	LS			N/A
Tanks	EA			N/A
Impoundments				
Liner Repair	SY			$ 800
Sludge Removal	CY			N/A
Aeration Systems	CY			N/A
Floating Aerators	EA			N/A
Spray Aerators	EA			N/A
Disposal				
Off-site (Include Transportation and Disposal)	LUMP SUM ~~1000 gallon~~			$ 175

* SEE ATTACHED NOTES AND CALCULATIONS

6. Leachate Collection/Treatment Systems Operation *

Operation		Hours	$/Hour	Total
P.E. Supervisor	HR			N/A
On-Site Engineer	HR			N/A
Office Engineer	HR			N/A
OnSite Technician	HR	156	$ 50	$ 7,800
Materials	LS			N/A
Subtotal Leachate Collection/Treatment System Maintenance & Operation:				$ 11,841

7. Maintenance of Groundwater Monitoring Wells *

Monitoring Wells	LF			N/A
Replacement	EA			$ 350
Abandonment	EA			N/A
Subtotal Groundwater Monitoring Well Maintenance:				$ 350

DESCRIPTION	UNIT	QUANTITY	UNIT COST	ANNUAL COST
8. Gas System Maintenance *				
Piping, Vents	LF			N/A
Blowers	EA			$ 1,200 / 30 YRS
Flaring Units	EA			$ 850 / 30 YRS
Meters, Valves	EA			$ 600 / 30 YRS
Compressors	EA			$ 300 / 30 YRS
Flame Arrestors	EA			$ 250 / 30 YRS
Operation	LS			N/A
SubTotal Gas System:				$ 106 / YR
9. Landscape *				
Mowing	AC	60 ACRES x 4 TIMES/YR	$ 100	$ 24,000
Fertilizer	AC			N/A
Subtotal Landscape Maintenance:				$ 24,000

* SEE ATTACHED NOTES AND CALCULATIONS

DESCRIPTION	UNIT	QUANTITY	UNIT COST	ANNUAL COST
10. Erosion Control & Cover Maintenance				
Sodding	SY	500	$ 1.80	$ 900
Regrading	AC			N/A
Liner Repair	SY	1 EVENT	$ 1,200	$ 1,200
Clay	CY			N/A
		Subtottal Erosion Control and Cover Maintenance:		$ 2,100
11. Storm Water Management System Maintenance				
Conveyance Maintenance	LS	1	$ 2,000	$ 2,000
		Subtotal Storm Water System Maintenance:		$ 2,000
12. Security System Maintenance				
Fences	LF	100	$ 7.50	$ 750
Gate(s)	EA	1	$ 310	$ 310
Sign(s)	EA	2	$ 17	$ 34
		Subtotal Security System:		$ 1,094
13. Utilities *	LS			$ 12,000
14. Administrative *		Hours	$/Hour	Total
P.E. Supervisor	HR			N/A
On-Site Engineer	HR			N/A
Office Engineer	HR			N/A
OnSite Technician	HR			N/A
Other (explain)				$ 13,000
		Subtotal Administrative:		$ 13,000
15. Contingency	10 % of Total	10% OF $ 119,113		$ 11,911
		Subtotal Contingency:		$ 11,911

* SEE ATTACHED NOTES AND CALCULATIONS

16. Site Specific Costs (explain) UNIT COST

	LS	N/A
	LS	N/A
	LS	N/A

ANNUAL LONG-TERM CARE COST ($/Year): $ 131,024

NUMBER OF YEARS OF LONG-TERM CARE 30

TOTAL LONG-TERM CARE COST ($) $ 3,930,720

Oak Hammock Disposal

Notes and Calculations to Accompany 2002 Financial Cost Estimate

The items listed below were derived by item/ unit pricing from contractors and manufacturers. Any estimated or assumed quantities are based on State and Federal guidelines. All estimated costs are for work to be performed by a third party.

Closure Costs

1. **Monitoring Wells**

   Ground water monitoring wells will be installed during construction of Phase I (i.e., Cells 1 – 4) and, therefore are not included as part of the closure construction estimate.

2. **Slope and Fill** (Intermediate Cover)

   During construction of the first phase, borrow area soils will be used for future use as initial/intermediate cover. CADD estimated cubic yardage is 84,975 cy for 1 ft. of intermediate cover over waste surface.
   Cost per cubic yard includes excavation, hauling, placement, spreading and compaction.
   84,975 cy @ $6.50 / cy = $ 552,338

3. **Cover Material (Barrier Layer)**

   The final cover system for the Phase I cells is comprised of (from bottom to top) 40-mil PE textured (4:1 slopes) and smooth (5% grades) geomembrane, geocomposite drainage layer on 4:1 side slopes and 18 inch layer of cover protective soil. Cover protective soil will consist of material obtained from on-site borrow area. Cost for cover protective soil includes excavation, hauling, placement, spreading and compaction. Cost for geosynthetics includes material and installation costs. CADD generated quantities are:
   127,463 cy soils @ $6.50 cy = $828,510
   143,316 sy 40-mil PE textured geomembrane @ $5.50 sy = $788,238
   111,610 sy 40-mil PE smooth geomembrane @ $5.00 sy = $558,050
   143,316 sy geocomposite drainage layer @ $4.50 sy = $644,922
   Total = $1,991,210

Closure Costs (Continued)

4. **Top Soil Cover (Vegetative Soil Layer)**

Vegetative soil layer material will be stripped from the Phase I footprint area and stockpiled on-site for use in the cover system. Vegetative soil layer material will also be available from adjacent future cells (i.e., cells 5 – 21). The vegetative soil layer consists of 6 in. layer over entire cover area. Cost per cubic yard includes hauling, placing and spreading. CADD generated quantity: 42,488 cy.
42,488 cy @ $4.00 = $169,952

5. **Vegetative layer**

The final cover area will be hydro-seeded. Hydro-seeding cost includes all labor and materials. CADD generated quantity: 53 acres
53 acres x $ 2,000/ acre = $ 106,000.

6. **Stormwater Control System**

The perimeter and site storm water control system components will be installed as part of the landfill construction and therefore are not included as part of the closure construction estimate. Storm water control components for the Phase I closure will consist of drainage swales, drains and HDPE corrugated pipe downchutes. Drainage swales will be constructed as part of protective cover soil placement and grading. Additional earthwork associated with installation of drains and downchutes is estimated to include 20,000 cy. Earthwork estimate is to include excavation, backfilling and compaction.
Earth work: 20,000 cy @ $6.50 cy = $ 130,000
Piping: 180 lf of 36" HDPE pipe @ $26.28/ft = $4,730
840 lf of 24" HDPE pipe @ $13.24/ft = $11,122
3 x 24" "T" connector @ $430 ea. = $1,290
6 x 24" couplers @ $17.54 ea. = $105
Each downchute requires an energy dissipater (total of 6) @ $1,884 ea. = $11,304
Total cost = $158,551

7. **Gas Controls: Active System**

The Oak Hammock Disposal facility will have an active gas extraction system installed. Nineteen gas extraction wells are to be installed as part of the gas control system. Cost per well: $95.75/ft. Cost per foot includes all labor and materials for installation. Landfill gas monitoring probes will be installed at a minimum spacing of 500 lf around the perimeter of the landfill. Cost per monitoring probe: $50/ft, cost per foot includes all labor and materials for installation.
Gas extraction well installation cost = $95.75/ft x 50 ft. (average depth) x 19 wells = $90,963.

Closure Costs (Continued)

Landfill gas monitoring probe installation cost = $50/ft x 20 ft. (average depth) x 11 = $11,000

8. Gas Control: Active System

Active gas system components based on permit design package. Components and associated costs are listed below. Costs include labor and materials.

1 Trap @ $850
1 Sump @ $7,500
1 Flare Assembly @ $76,550
1 Flame Arrestor @ $4,000
1 Mist Eliminator @ $3,900
1 Flow Meter @ $4,200
1 Blower @ $17,000
Main header pipe: 500 lf 12" solid wall SDR-17 HDPE pipe installed @ $8.76 lf = $4,380
Header pipe: 3,065 lf 8" solid wall SDR-17 HDPE pipe installed @ $3.98 lf = $ 12,199
Collector pipe: 2,912 lf 4" solid wall SDR-17 HDPE pipe installed @ $ 1.66 lf = $ 4,834
Total Active Gas Extraction = $ 135,413

9. Security System

Perimeter fencing, gates and signs will be repaired, if required for closure. A $5,000 lump sum allowance has been estimated for this work. Note that perimeter fencing and gates will be installed as part of the Phase I construction and therefore have not been included as part of the closure costs. Closure signs will be installed as required.

10. Engineering

Certification report to include preparation of report and certification by Florida registered professional engineer: $ 16,500.
Other: Construction Drawings and Technical Specifications: $52,000

11. Professional Services

Estimate that 4% of construction cost will be needed for contract/construction management i.e., 0.04 x $3,220,427 = $128,817

Estimate that 7% of construction cost will be needed for construction quality assurance i.e., 0.07 x $3,220,427 = $225,430

Quality Assurance testing based on requirements of CQA Plan and estimated quantities.

12. Contingency

Estimate contingency of 10 % of closure cost.

13. Site Specific Costs:

Contractor mobilization estimated to be 5 % of construction cost, not including professional services costs (i.e., 5% of $3,220,427) = $161,021.

Annual Costs for Long Term Care

1. **Ground Water Monitoring**

   Forty-five ground water monitoring wells are to be installed for Phase I construction. Assume that all wells are sampled on semi-annual basis per F.A.C. Cost to sample each well: $495. Cost includes all labor, equipment and laboratory analyses required per F.A.C.
   45 x $495 = $22,275 x 2 times/year = <u>$44,550 /year</u>

2. **Surface Water Monitoring**

   The Oak Hammock facility has been designed to retain all water from a 100-year storm event on-site. No off-site discharge of surface water is anticipated, therefore, no associated monitoring costs have been included.

3. **Landfill Gas Monitoring**

   Landfill gas monitoring probes will be installed a minimum of 500 lf around the perimeter of Phase I construction as part of the closure plan. The monitoring probes will be monitored quarterly for concentrations of combustible gases. Quarterly landfill gas monitoring cost: $750 /event x 4 events/year = <u>$3,000 year</u>

4. **Leachate Monitoring**

   Phase I of the Oak Hammock Disposal consists of four cells. A leachate sample would be collected from each cell annually. Each leachate sampling cost includes all labor, equipment and laboratory analyses required per F.A.C. Annual leachate monitoring cost: $1,268 /leachate sample x 4 leachate samples/year = <u>$5,072 year.</u>

5. **Leachate Collection/Treatment System Maintenance**

   For the long term care, assume the following maintenance activities.
   Leachate collection pipes: Estimate that each cell will require one cleaning within the 30-year monitoring period. 4 cells x $10,000 cell = $40,000 / 30 years = <u>$1,333 /year.</u>
   Leachate pumps: Estimate pumps require annual maintenance and each cell will require a replacement pump during the 30-year monitoring period. Annual maintenance = 4 cells x $250/cell = $1,000 /year. Leachate pump replacement cost = 4 pumps x $5,500/pump /30 years = $733. Estimated annual cost for pumps = <u>$1,733</u>

Leachate storage containers: Assume each of the three flexible storage bladders will require replacement over the 30 year monitoring period. Replacement cost of $8,000 per flexible bladder. 3 bladders x $8,000 /bladder / 30 years = $800 /year.

Annual Costs for Long Term Care (Continued)

Leachate disposal: After closure, for each cell estimate leachate production rate of 1.0 gal/day x 365 days/year x 4 cells = 1,460 gallons of leachate/year x $.12 / gallon for transportation and treatment = $175/year.
Total leachate system maintenance = $4,041 /year.

6. Leachate Collection/Treatment Systems Operation

Estimate that leachate system operation is monitored on a weekly basis by a technician for total of 3 hours/week x 52 weeks/year x $50 /hour = $7,800/year.

7. Maintenance of Groundwater Monitoring Wells

Estimate that 3 wells require abandonment and replacement within the 30-year monitoring period. Abandonment cost: $500 per well x 3 wells = $1,500 / 30 years = $50 /year. Replacement cost: 60 ft x 50 /ft x 3 wells = $9,000 / 30 years = $300/ year. Total estimated annual cost = $350 /year

8. Gas System Maintenance

Estimate that the equipment listed on DEP form will require replacement once within the 30-year maintenance period. Annual cost = $3,200 / 30 years = $106 /year.

9. Landscape

Estimate 60-acre area requiring maintenance and that the grass will require cutting four times/year at a cost of $100 per acre. Mowing/maintenance: 4 times year x 60 acres x $100/acre = $24,000

10. Erosion Control and Cover Maintenance

As indicated on DEP form.

11. Storm water Management System Maintenance

As indicated on DEP form.

12. Security System Maintenance

As indicated on DEP form.

Annual Costs for Long Term Care (Continued)

13. Utilities

Estimate power requirements for site equipment (i.e., pumps, lights, blowers, etc.) to be $1,000 /month x 12 months = $12,000 /year.

14. Administrative

Estimate that lump sum administrative/overhead costs for Phase I: = $13,000 /year.

15. Contingency

Estimate contingency of 10 % of total long term annual care cost (i.e., 0.10 x $119,113 = $11,911 / year).