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AUG 31 1992

SOUTHWEST DISTRICT
TAMPA

CONTAMINATION ASSESSMENT
PLAN (CAP)

HOWCO ENVIRONMENTAL
SERVICES, INC. FACILITY
843 43RD STREET SOUTH
ST. PETERSBURG, FLORIDA

AUGUST, 1992

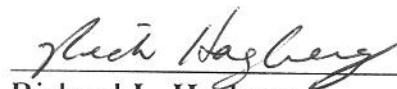
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843 43RD STREET SOUTH, ST. PETERSBURG, FLORIDA
AUGUST, 1992

Prepared for:

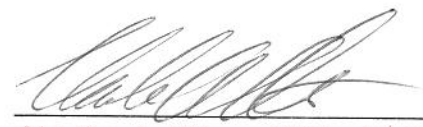
HOWCO ENVIRONMENTAL SERVICES, INC. (HOWCO)

Prepared by:

FLORIDA GROUNDWATER SERVICES, INC.
308 SOUTH BOULEVARD
TAMPA, FLORIDA



Richard L. Hagberg
Project Manager



Charles A. Otero, P.E. 8/28/92
Principal

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SECTION 1.0 INTRODUCTION

1.1 Project Background Information

Florida Groundwater Services, Inc. (FGS) was retained by HOWCO Environmental Services, Inc. (HOWCO) to formulate a Contamination Assessment Plan (CAP) and an associated Quality Assurance Project Plan (QAPP) for the property located at 843 43rd Street South, St. Petersburg, Florida. The CAP has been prepared in accordance with the requirements set forth in Exhibit III of the Consent Order (CO) entered into between the Florida Department of Environmental Regulation (FDER) and HOWCO Environmental Services, Inc. dated June 19, 1992.

1.2 Site Location and Description

The site is located in an industrialized area of the City approximately 3/4 mile west of U.S. 19 in Section 27, Range 31 South, Range 16 East, St. Petersburg, Florida (Figure 1). To the north of the site is the General Roofing warehouse and yard, and automotive repair yard and Patrist Oil Company are located to the northeast of the site and other light industrial properties are located to the west and south. The site is at an approximate elevation of 35' above mean sea level (MSL) and slopes gently to the north-northeast (see Figure 1).

1.3 Regional Geology

Based upon available information from the Southwest Florida Water Management District (SWFWMD), Pleistocene undifferentiated deposits in the immediate site vicinity consist predominantly of fine quartz sands grading to silty sands. Sand thicknesses extend to fifty-seven (57) feet, with the uppermost sands comprising the more permeable sections of the surficial aquifer. Depth to the surficial aquifer in the site vicinity is approximately four feet.

Sandy clay and clay deposits of the underlying Hawthorn Group (Miocene), when present, act as a confining or semi-confining unit unconformably overlying the Tampa Member and Suwannee limestones (Oligocene). The upper Hawthorn is characterized as a grayish-green clay and quartz sand containing shell and limestone fragments. In the vicinity of the project area, the Hawthorn Group is relatively thin, and sediments of this type are estimated to be approximately thirty (30) to eighty (80) feet thick (Eddy, 1981).

Underlying the Hawthorn Group are the Tampa and Suwannee limestones. These limestones comprise the consolidated bedrock which represent the upper portions of the regional Floridan aquifer system. These limestones are gray or light tan to white, sandy, fossiliferous in part and commonly contain clay lenses and open cavities. The

limestone is typically dense and hard but is occasionally soft in places where excessively weathered. Commonly, the upper surface of the limestone is variegated. In the vicinity of the HOWCO site, the Tampa formation has been encountered from 80 to 310 feet below land surface (BLS). Based on driller logs on record at SWFWMD, the Suwannee formation has been encountered from 310 to 500 feet BLS.

1.4 Previous Investigations

ERM-South, Inc. (ERM) performed a preliminary environmental audit of the facility in 1991. Specific findings of their investigations can be summarized as follows:

- 1) The property was purchased by Mr. Art Hagan in 1973. Until approximately 1975, no active property use or development occurred. Until 1975, the aerial photographs show the property was covered with grass, trees and bare soil. Some petroleum product storage activities, trucks, and paving equipment are evident in the 1975 aerial photograph. Until around 1977, the facility accepted used oils, stored in drums and tanks, and sold it for road construction. Until approximately 1977, the City of St. Petersburg dumped street sweepings on the northwestern portion of the property.

The facility was expanded in 1980 to process more oil. In 1986, the existing tanks and oil cooker had been retrofit with concrete slabs, and the WWTP was added. In 1988, the wash rack was moved from the current parking lot to its present location (see Figure 2), additional concrete slaps were added, and sludge handling began. During this same time period, a concrete containment structure was built for the wash rack facility and sludge processing areas. A soil berm was also constructed in the north part of the facility.

- 2) The Florida Department of Environmental Regulation (FDER) conducted an inspection of the facility in April 1990, and issued a warning notice (WN90-0033HW52SWD) to HOWCO on April 12, 1990, alleging violations concerning manifest recordkeeping, entry control to the facility, inadequate training records, inadequate inspection records, etc.
- 3) On March 13, 1991, representatives from the U.S. Environmental Protection Agency (EPA) Region IV collected samples of certain materials stored in roll-off bins at the facility. The roll-off bins contained a mixture of dirt remaining from the processing of oil/water

emulsion, primarily from oil/water separators and filter press cake from the WWTP. Historically, these materials have been tested for the appropriate analyte list and disposed of properly.

Samples of this material were reportedly collected by EPA personnel from five of the approximately 8 feet by 20 feet by 4 feet deep roll-off bins located in the storage area. The samples were collected at depths of approximately 18 inches, 24 inches, and also from the bottom of the bins, and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals and volatile organic compounds by the EPA laboratory in Athens, Georgia. Analytical results indicate that TCLP standards were not exceeded. The EPA has not pursued the matter any further.

Preliminary soil investigations were conducted by ERM at the site in August 1991. The purpose of their investigations were to identify areas of petroleum-impacted soil samples from selected locations using backhoe test pits and hand auger borings. In February, 1992, ERM completed a Preliminary Contamination Assessment (PCA) of the subject site to determine the impact and extent of excessively contaminated soil. Groundwater quality and flow

direction assessments were not included in the PCA. Based on the results of the twenty-seven test pit excavations and up to forty soil auger borings, ERM estimate the total volume of excessively contaminated soil to be 3,035 cubic yards. ERM's complete report is contained in the PCAR provided as Appendix A. The results of their work will be included in the CAR.

SECTION 2.0

PLAN OBJECTIVES AND SCOPE OF WORK

2.1 Plan Objectives

The overall objective of the following CAP is to verify the presence or absence of and if necessary, determine the extent of groundwater and/or soil contamination at the HOWCO Environmental, Inc. site. The tasks necessary to meet the objectives will include:

1. Address the proposed sampling and analytical methodologies to be implemented associated with the CAR as specified by the requirements of the Chapter 17-160, F.A.C. criteria.
2. Determine the physical properties of the surficial and Floridan aquifers.
3. Determine the hydrogeologic properties of the lithology underlying and surrounding the HOWCO site.
4. Verify the presence of, and if present, establish the areal and vertical extent of the soil contamination.

5. Verify the presence of, and if present, establish the areal and vertical extent of groundwater contamination.
6. If contamination is present, attempt to determine the rate and direction of movement of the contaminant plume within the groundwater.
7. Qualitatively characterize the contaminant plume.

The results of these investigations and a discussion of the conclusions will be presented subsequent to implementation of this plan in a Contamination Assessment Report (CAR).

2.2 Scope of Work

The general procedures utilized in this assessment are based upon a review of the site history and visits to the site conducted by representative from Florida Groundwater Services, Inc. (FGS) and the previous subsurface investigations performed by others (Environmental Resources Management and South, Inc. (ERM). The plan for the assessment was prepared with regard to the provisions of the Consent Order and criteria pursuant to the Florida Administrative Code, Chapter 17-770. All work performed by FGS will be conducted pursuant to the criteria outlined

in FGS' Generic Quality Assurance Plan (GQAP) and with the site specific quality assurance project plan QAPP completed for this project.

2.2.1 Soil Investigations

The initial step in the overall assessment of the site was conducted by ERM-South to determine the horizontal and vertical extent of the excessively contaminated soil at the HOWCO site. The PCAR conducted by ERM-South dated June, 1992, indicates that the extent of excessively petroleum contaminated soil has been determined (see Appendix A).

2.2.2 Hydrogeologic Investigations

The determination of hydraulic parameters shall be made by the placement of five (5) soil borings to the water table. OVA testing using an FID/OVA will be conducted at two (2) feet intervals within each soil boring to determine the potential for the existence of the excessively contaminated soil defined for this site as soil with readings of 50 ppm or greater.

The initial characterization of groundwater shall be conducted using temporary monitoring wells drilled subsequent to the installation of each of the five (5) soil borings. Water samples obtained from the temporary wells

will be analyzed by Howco Environmental's in-house laboratory for solvent and petroleum related parameters. By using HOWCO's in-house laboratory, the number of wells required to define the horizontal and vertical extent of the plume will be minimized. Subsequent to analysis, these temporary wells will be converted to permanent monitoring wells by adding water tight seals and locking protective covers if the Chapter 17-770.730(5) groundwater contaminant action levels are not exceeded (i.e. converted to background/upgradient wells). Subsequent to sampling, an elevation survey of the five temporary monitoring wells will be conducted to preliminarily determine the direction of groundwater flow. This elevation data will be used in conjunction with the results of the groundwater quality analysis to determine the final placement of the perimeter wells. If groundwater concentrations exceed the above criteria, the well screen will be removed, boring grouted with portland cement and a supplemental boring and well will be installed and sampled further downgradient. This process would be repeated until the horizontal extent of the dissolved phase plume has been defined (see Figure 2 for Soil Boring and Temporary Monitor Well Locations).

Based upon field determinations at the completion of the above tasks, it is believed that six shallow monitoring wells and one deeper aquifer monitoring well will be required to define the dissolved phase plume. Once preliminarily

defined, a final round of groundwater samples obtained shall be analyzed by Orlando Laboratories, Inc. for EPA Methods 601, 602, 610, 418.1 parameters, EDB and lead (i.e. the Kerosene Analytical Group), per criteria set forth in Chapter 17-770, F.A.C., as well as arsenic, barium, cadmium, chromium, mercury, selenium, and silver pursuant to the project QA document. This data will be used as the basis for completion of the CAR.

2.2.2.1 Permanent Well Installation

The shallow monitor wells will be installed using augers in accordance with American Society for Testing and Materials D-1452 procedures. Monitoring wells will consist of 2 inch I.D. by 10 foot, #10 slot PVC well screens connected to the ground surface by 2 inch I.D. PVC water well casing. The shallow wells will be screened to intercept potential floating contaminants and allow for seasonal fluctuation of the water table. Threaded joints will be used for coupling the sections of casing and screen. Glued or heat-welded joints were not used. The borehole annulus from the bottom of the boring to a point approximately 1 foot above the top of the screen will be backfilled with clean, medium grained, silica sand. The remaining borehole annulus will be backfilled with bentonite/cement grout to the surface. All wells will be

completed as flush grade wells and were protected by an 8 inch steel manhole cover in a two foot square diameter, three inch thick concrete pad (see Figure 3 and 3A for Temporary and Permanent Shallow Monitor Well Detail).

For the installation of the deep monitoring well (DW-1), a two phased approach will be used in an effort to set a surface casing to prevent a possible avenue for cross contamination between the water table and underlying aquifers or zones within the same aquifer. In a clean area of the site (identified during the soil boring and sampling programs), a test boring will be installed to a depth of approximately 35 to 40 feet BLS to determine the site specific hydrogeologic conditions. Based upon the results of this boring, a surface casing will be installed to isolate of the upper portion of the water table aquifer from the deeper water bearing zones. Once the surface casing is centered, a bentonite/cement grout was trimmed from the outside bottom of the surface casing to the top of the surface casing. After the grout has set, approximately 24 hours, drilling activities will resumed using a 5-3/8 inch bit to complete the drilling within and below the surface casing. The anticipated depth of the interior borehole 30 feet. A 2-inch I.D. by 5 foot,

#10 slot PVC well screen will be placed from 30 to 35 feet BLS. The interior borehole annulus from the bottom of the boring to a point approximately 1 foot above the top of the screen will be backfilled with clean, medium grained, silica sand. A one foot thick seal of bentonite will be placed above the silica sand. The remaining interior of the surface casing will be backfilled with cement/bentonite grout to the surface. The well will be completed as a flush grade well and was protected by a steel manhole cover which was placed in a two foot square, three inch thick concrete pad (see Figure 4 for Deeper Well Construction Detail).

Well development will be performed following well installation. Development will be accomplished with a centrifugal or submersible pump as necessary.

2.2.2.2 Elevation Survey and Aquifer Characteristic Determination

Measuring point (MP) elevations for all monitor wells will be surveyed by FGS personnel on the north side of the top of the casing (TOC) for measuring point elevations. The TOC elevations of each monitoring well will be determined to 0.01 foot accuracy. Monitor well measuring points (top of casings)

will be surveyed with reference to an assumed elevation of +35.0 feet above mean sea level by FGS personnel. The elevation of the datum points will be based on the USGS topographic map of the site. Water level measurements will be obtained with an electronic water level indicator from the monitor wells. The results of the above survey will be used to construct water table contour and flow maps.

Following monitor well construction, development and sampling, hydraulic conductivity (slug) tests will be conducted on three (3) monitor wells to determine the hydraulic conductivity of the aquifer underlying the site. During these tests, a volume of water will be instantaneously displaced from the monitor wells by the use of a pump, or slug device. The changing water level in the well will be monitored and recorded with a down-hole pressure transducer and data logger. Resultant water level responses will then be used to calculate the hydraulic conductivity of the water table aquifer.

SECTION 3.0

SUMMARY OF PRELIMINARY CONTAMINATION ASSESSMENT

3.0 Interpretation of Field and Technical Investigations

Once all the data from the field investigations has been collected, the data will be summarized and tabulated and presented graphically, as needed to fully document all aspects of the assessment. Soil boring logs, monitor well construction details, soil boring and permanent well locations will be represented. Furthermore, the extent of soil contamination and groundwater contaminant plumes will be presented graphically as well as water table elevation and flow direction information.

The results of all calculation and analytical data will be tabulated and presented. All information obtained during potable well survey and regulatory agency file review will be included as an appendix to the CAR.

SECTION 4.0

SCHEDULE OF IMPLEMENTATION

A proposed schedule to accomplish the previously discussed tasks is presented in Table 1. The time frames reflected by this schedule are based on an expected normal level of performance for the various tasks and may vary depending upon field conditions or other factors.

After completion of the FDER review and approval of this plan, the preliminary soil and temporary monitor well installation and sampling should take approximately three to four weeks. Subsequent to the initial investigations, finalization of permanent wells should take approximately four to six weeks depending upon off-site permitting requirements. Laboratory analysis of the soil and data assessment/validation will follow and will take approximately three weeks. The installation of deeper interval monitoring well will be performed after the hydrogeologic characteristics have been fully determined so as to ensure proper placement and will take approximately one week. The final groundwater quality sampling event and analysis will occur approximately one week after well installation and development and results will be available approximately two weeks later. The final contamination assessment report (CAR) will be completed within two weeks after the laboratory results are received. Time frame for CAR completion is approximately 12 to 16 weeks.

TABLE 1
SCHEDULE OF COMPENSATION

	<u>Task</u>	<u>Timing</u>
I.	Preliminary Investigations	2 to 4 Weeks
II.	Permanent Well Installation	2 to 4 Weeks
III.	Laboratory Analysis of Soil and Data Assessment	3 Weeks
IV.	Deeper Interval Well Installation and Sampling	1 Week
V.	Laboratory Analysis of Groundwater and Data Assessment	2 Weeks
VI.	Preparation of CAR	<u>2 Weeks</u>
		12 to 16 Weeks

Scale: 1" = 2000'

SITE LOCATED IN:

SECTION: 27

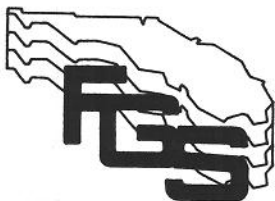
TOWNSHIP: 31 South

RANGE: 16 East



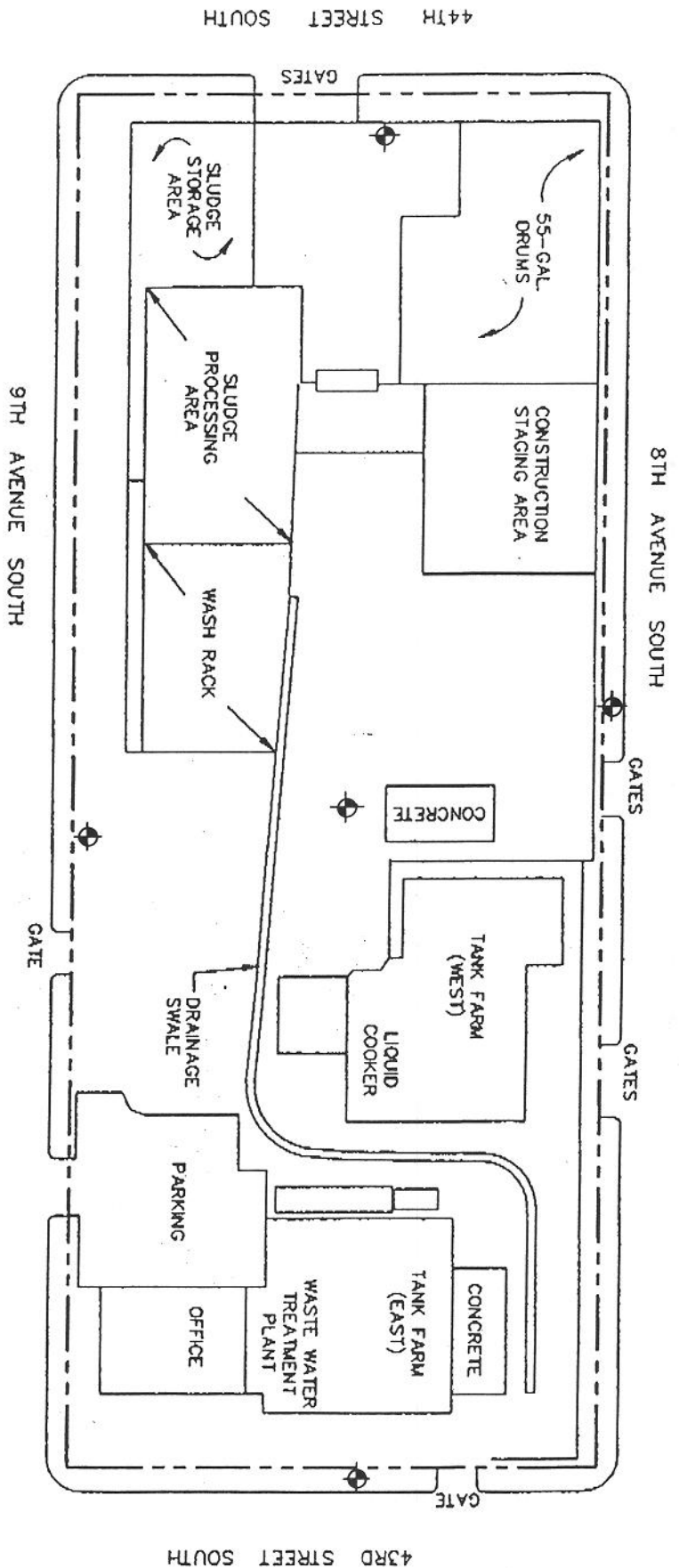
SOURCE:

BASE MAP TAKEN FROM U.S. GEOLOGICAL SURVEY "ST. PETERSBURG, FL.", QUADRANGLE MAP DATED 1956 AND PHOTOREVISED 1987.



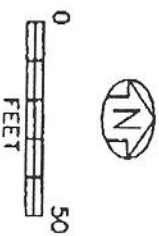
FLORIDA
GROUNDWATER
SERVICES, INC.

FIGURE 1
SITE VICINITY MAP



LEGEND

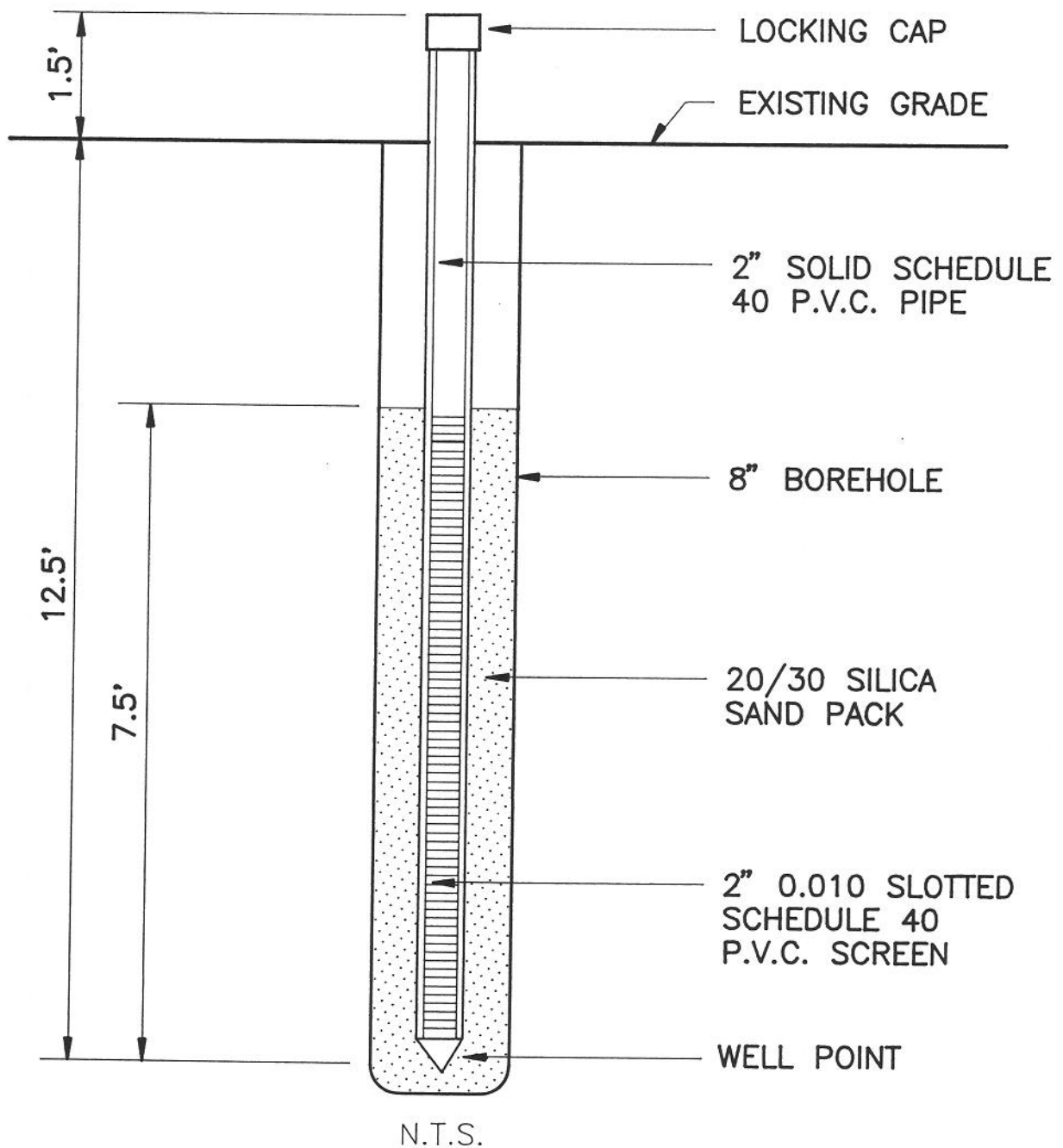
 SOIL BORING AND MONITOR
 WELL LOCATIONS



**FLORIDA
GROUNDWATER
SERVICES, INC.**

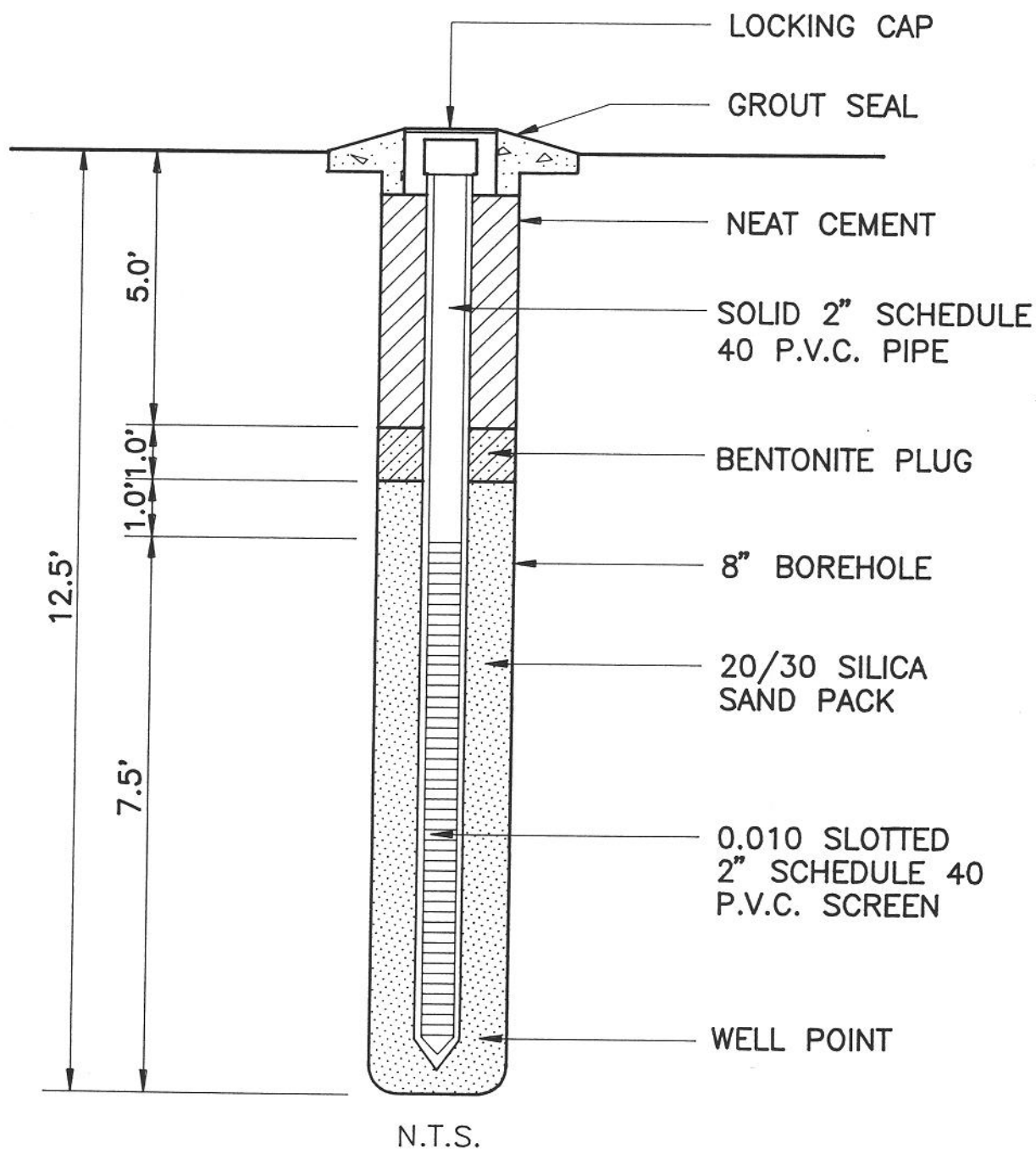
FIGURE 2
SITE PLAN SHOWING
SOIL BORING AND MONITOR
WELL LOCATIONS

TMW-1



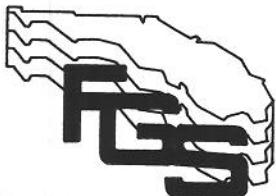
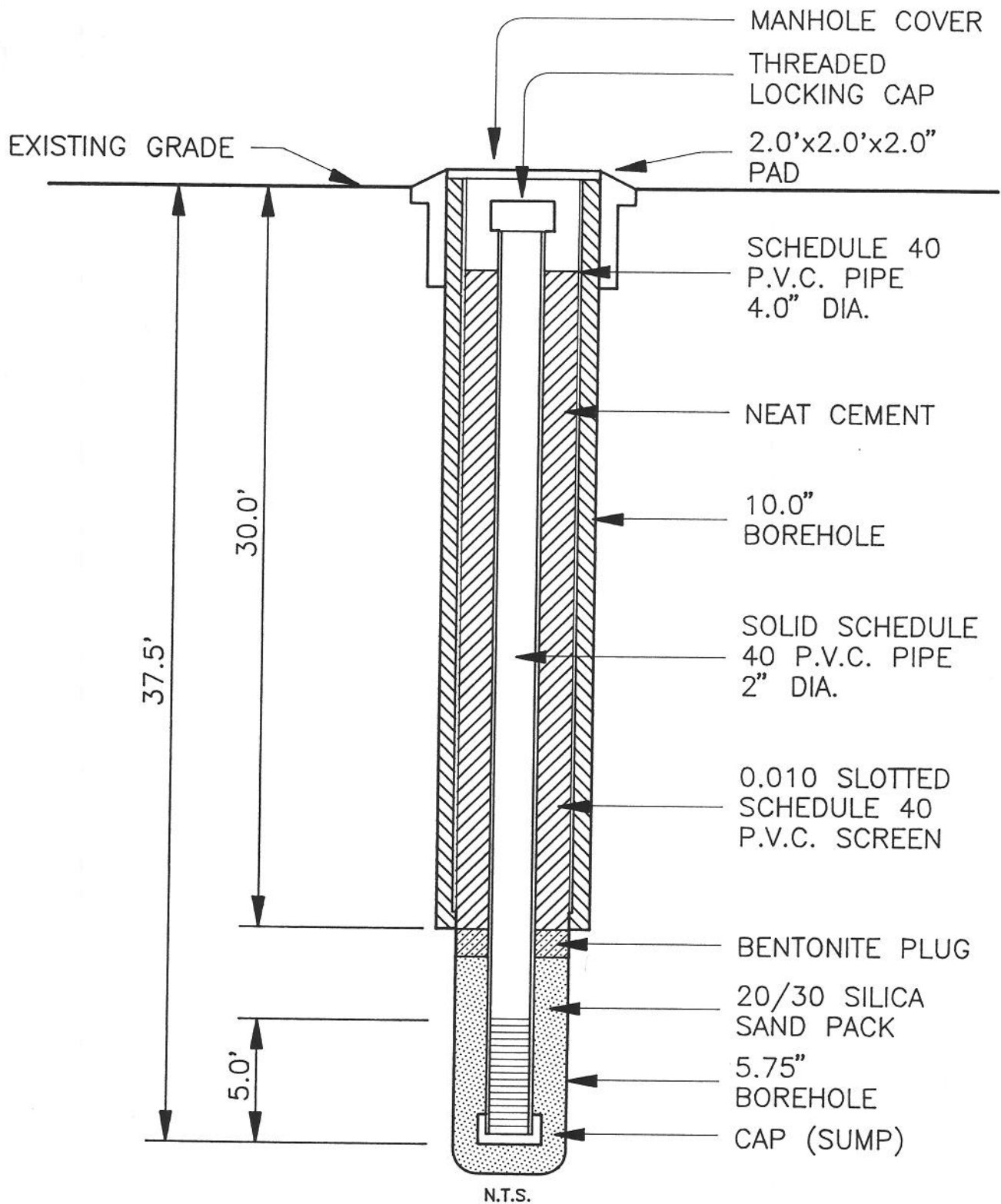
FLORIDA
GROUNDWATER
SERVICES, INC.

**FIGURE 3
TEMPORARY WELL
CONSTRUCTION DETAIL**



FLORIDA
GROUNDWATER
SERVICES, INC.

**FIGURE 3A
MONITOR WELL
CONSTRUCTION DETAIL**



FLORIDA
GROUNDWATER
SERVICES, INC.

**FIGURE 4
DEEP MONITOR WELL
CONSTRUCTION DETAIL**

**PRELIMINARY CONTAMINATION
ASSESSMENT REPORT
HOWCO ENVIRONMENTAL SERVICES, INC.**

FEBRUARY 1992

Prepared for:

Carlton, Fields, Ward, Emmanuel, Smith & Cutler, P.A.
One Harbour Place, 5th Floor
Tampa, FL 33601

Prepared by:

Environmental Resources Management-South, Inc.
9501 Princess Palm Avenue, Suite 100
Tampa, Florida 33619
(813) 622-8727



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SECTION 1.0
INTRODUCTION



SECTION 1.0 INTRODUCTION

1.1 SITE LOCATION AND FACILITY DESCRIPTION

HOWCO Environmental Services, Inc. is an oil reclamation facility located in St. Petersburg, Florida. The site location and layout are shown in Figures 1-1 and 1-2, respectively. HOWCO accepts different types of non-hazardous petroleum-contaminated soils, sludges, and liquids which are directed through an oil recovery recycling process. All oil recovered from the process is recycled and reused. Table 1-1 summarizes the 11 main waste streams accepted by HOWCO.

Once material is received at the plant, it goes to one of three locations: soil and solids go to the soil processing area; oily liquids go to the liquid cooker; and water goes directly to the wastewater treatment plant. These areas are shown in Figure 1-2 along with the locations of processed soil, tankers containing liquids and sludges waiting to be processed, and the drum accumulation center (material waiting for processing).

The liquid cooker uses heat and emulsifiers to help separate oil from the water. The oil product is sold to permitted burn facilities, and the water is directed to the onsite wastewater treatment plant where it is processed and tested for chemical oxygen demand, ph, and phenols prior to being released to the St. Petersburg Wastewater Treatment Plant.

Stormwater is collected in a centrally located concrete swale as shown on Figure 1-2. Stormwater which collects in the swale flows to the east for treatment in the onsite waste water treatment plant (WWTP). Stormwater is treated with wastewater generated during the recycling procedure, processed, tested for compliance with applicable requirements, and then discharged to the St. Petersburg Wastewater Treatment Facility.

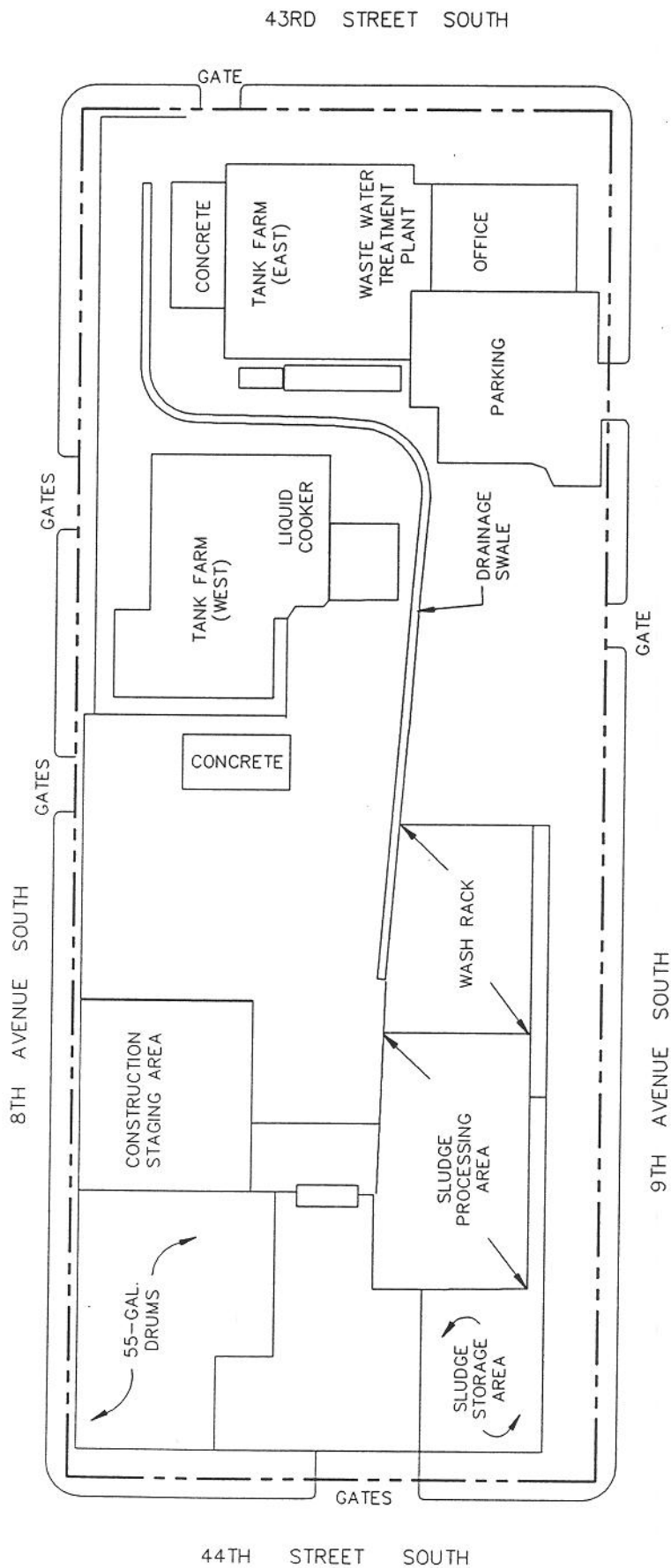
TABLE 1-1

**WASTE STREAMS* ACCEPTED BY HOWCO
ST. PETERSBURG, FLORIDA
MARCH 1991**

1. Oil/water separators--sludge and liquid.
2. Water removed from USTs and terminals.
3. Used oil.
4. Soil cuttings from UST removals/excavations/assessments.
5. Used ethylene glycol (not recycled by HOWCO).
6. Stormwater from terminals.
7. Ground water from recovery wells.
8. Tank cleanings--any petroleum tank.
9. Ship bilges--limited to petroleum and petroleum contaminated water.
10. Water from an aluminum refinisher.
11. Citrus sludge.

* All waste streams accepted by HOWCO are non-hazardous.

Figure 1-2
Site Layout
Howco Facility
St. Petersburg, Florida



1.2 SITE BACKGROUND AND HISTORY

Operational/Environmental Audit

At HOWCO's request, ERM performed an operational/environmental audit of the facility during August-December 1991. Specific tasks accomplished included:

- Reviewing historical aerial photographs to identify past site activities and land uses having potentially adverse environmental impacts;
- Interviewing former owners and longstanding company employees to identify historical used-oil handling practices/procedures;
- Reviewing of title documents to identify past owners who may have been engaged in industrial activities using potentially hazardous materials;
- Reviewing the storage and handling of waste and materials, employee training procedures, and environmental compliance documentation;
- Performing a facility walk-through on August 23, 1991 to identify practices and procedures the facility has initiated in order to minimize the potential for environmental impacts; and
- Contacting federal and state regulatory agencies to determine environmental concerns and review correspondence.

Aerial Photograph/Personnel Interviews

The following descriptive history of site development and operations is based on aerial photographs and interviews with existing and former HOWCO personnel. Copies of aerial photographs for the facility were obtained from the Pinellas County Department

of Transportation for the years 1951, 1957, 1961, 1965, 1967, 1968, 1971, 1973, 1975, 1977, 1979, 1984, 1987, and 1990. A chronological review of the aerials was performed and integrated with supplemental commentary by facility personnel.

The site was purchased by Mr. Art Hagan in 1973. Until approximately 1975, no active site use or development occurred. Until 1975, as shown on aerial photos, the site was covered with grass, trees, and bare soil. Some petroleum storage product activities, trucks, and paving equipment appeared in 1975. Until around 1977, the facility accepted used oils, stored in drums and tanks, and sold it for road construction. Until approximately 1977, the City of St. Petersburg dumped street sweepings on the northwestern portion of the property.

The facility was expanded in 1980 to process more oil. In 1986, the existing tanks and oil cooker were retrofitted with concrete slabs, and the water treatment plant was added. In 1988, the wash rack was moved from the current parking lot to its present location, additional concrete slabs were added, and sludge handling began. During this same time period, a concrete containment structure was built in the southern portion of the site for a wash rack, and sludge processing areas. A soil berm was constructed in the north part of the site.

An interview with Art Hagan indicated that there was an asphalt production operation at the site for two years (1988 through 1989) in the vicinity of the current wash rack area. Art Hagan indicated that some tar was found in 1989 in an area close to the present location of the wash rack area and the fence, but no one has knowledge of what was done with the material. Mr. Tim Hagan purchased the site in 1989.

Title Search

A title search on the property was performed August 20, 1991 by the Tampa Bay Branch of Attorneys' Title Insurance Fund, Inc., Orlando, Florida. A chain of warranty deeds

dating back to August 30, 1940 provide no recognizable names of individuals associated with industrial activities or hazardous materials other than HOWCO.

Regulatory Agency Concerns

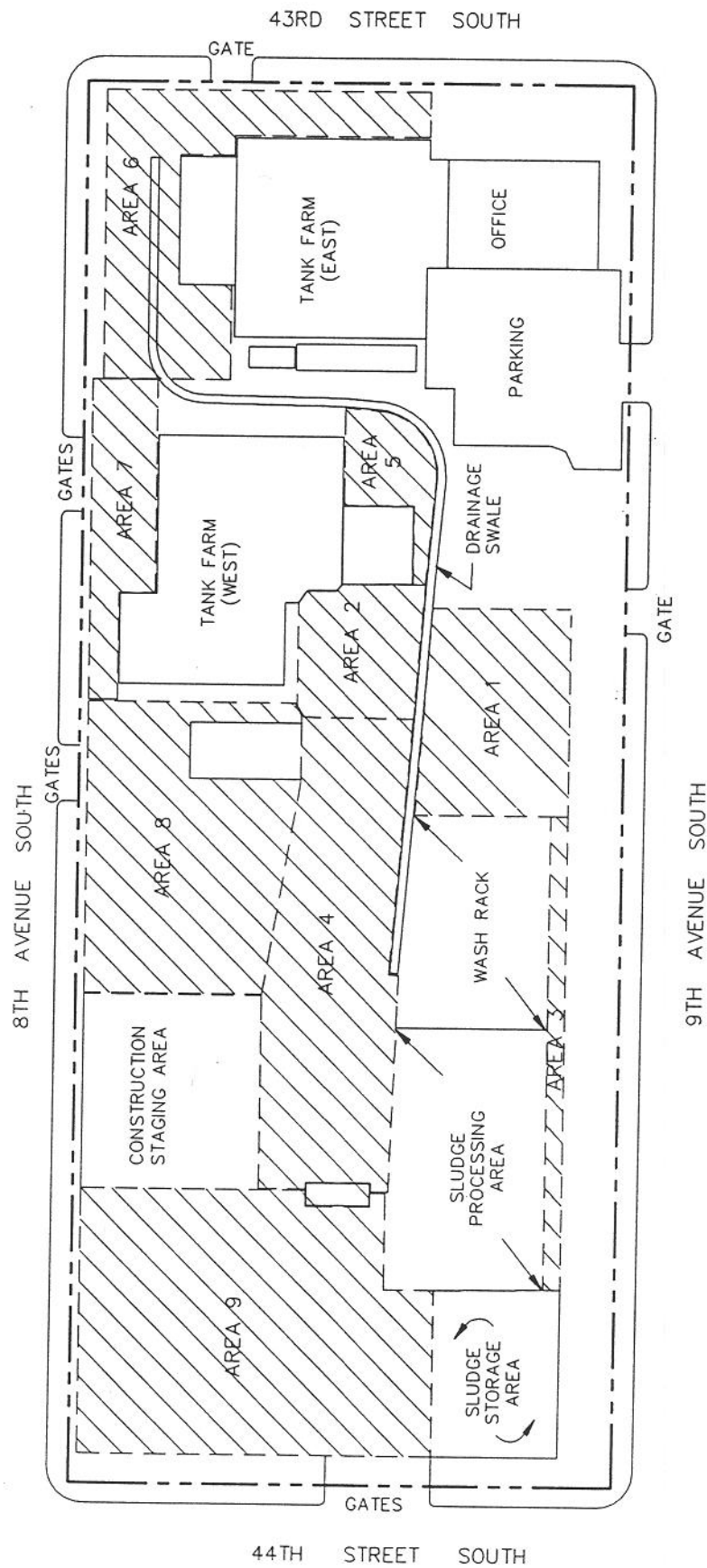
The Florida Department of Environmental Regulation (FDER) conducted an inspection of the facility in April 1990 and issued a warning notice (WN90-0033HW52SWD) to HOWCO on April 12, 1990, alleging violations concerning manifest recordkeeping, entry control to the facility, inadequate training records, inadequate inspection records, etc. HOWCO responded to the notice, and subsequent correspondence and telephone conversations with FDER indicate that the agency has no violations against HOWCO, but will continue to negotiate a settlement for past violations. A consent order has been submitted to FDER by HOWCO for review and comment. These alleged past violations are based primarily on alleged non-compliance with RCRA regulations that HOWCO does not believe apply to used oil recyclers. HOWCO agreed to perform a preliminary contamination assessment in conjunction with FDER's inspection of the facility.

Based on the results of the operational/environmental audit, ERM recommended corrective measures and a strategy to identify areas of petroleum-impacted soil at the site. The strategy included collecting soil samples from selected locations using backhoe test pits and hand-augered borings for field screening. These locations, designated Areas 1 through 9, are shown on Figure 1-3.

EPA Sampling and Analysis

Representatives from the U.S. Environmental Protection Agency (EPA) Region IV collected samples of filter press sludge on March 13, 1991. The sludge is generated during the separation of sludge-bearing oil. The recovered oil is recycled and the remaining material is placed in rolloff bins for disposal at an offsite landfill.

Figure 1-3
Areas Identified for Soil Assessment
Howco Facility
St. Petersburg, Florida



Samples of filter press material were reportedly collected by EPA personnel from five of the approximately 8 feet by 20 feet by 4 feet deep rolloff bins located in the storage area. The samples were collected at depths of approximately 18 inches, 24 inches, and also from the bottom of the bins, and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals and volatile organic compounds by the EPA laboratory in Athens, Georgia.

Analytical results indicate that TCLP standards were not exceeded. Each of the samples contained nine to ten organic compounds; however, the TCLP for organics was not completed because the analytical scans were reportedly too low. EPA has not pursued the matter any further.

1.3 PRELIMINARY CONTAMINATION ASSESSMENT OBJECTIVES

As described in Section 1.2, HOWCO agreed to conduct a preliminary contamination assessment at the facility. The objectives of this preliminary contamination assessment were to:

- Identify petroleum-impacted soils, if any;
- Assess the areal and vertical extent of excessively contaminated soils as defined in Chapter 17-770 FAC, if any;
- Assess the necessity for initial remedial actions; and
- Evaluate the feasibility of soil remediation using thermal treatment.

Ground water quality and ground water flow direction assessments were not conducted during the preliminary contamination assessment. The areal and vertical extent of ground water quality impacts, if any, and the direction of ground water flow will be assessed

during a contamination assessment to be completed in April 1992. Proposed monitoring well locations for the contamination assessment are provided in Section 5.0 of this report.

SECTION 2.0
SITE INVESTIGATION

SECTION 2.0

SITE INVESTIGATION

Based on the results of the operational audit at the facility described in Section 1.2, ERM personnel conducted soil sampling to identify areas of petroleum-impacted soil, assess the extent of excessively-contaminated soil, assess the need for initial remedial action (IRA), and assess the feasibility of remediating soil using thermal treatment. Assessment activities were conducted in Areas 1 through 9 on August 15, 1991, August 26, 1991, October 9 and 10, 1991, and November 16, 1991 as shown on Figure 2-1, and December 18-20, 1991 as shown on Figure 2-2. The assessment activities completed on these dates are described in detail below.

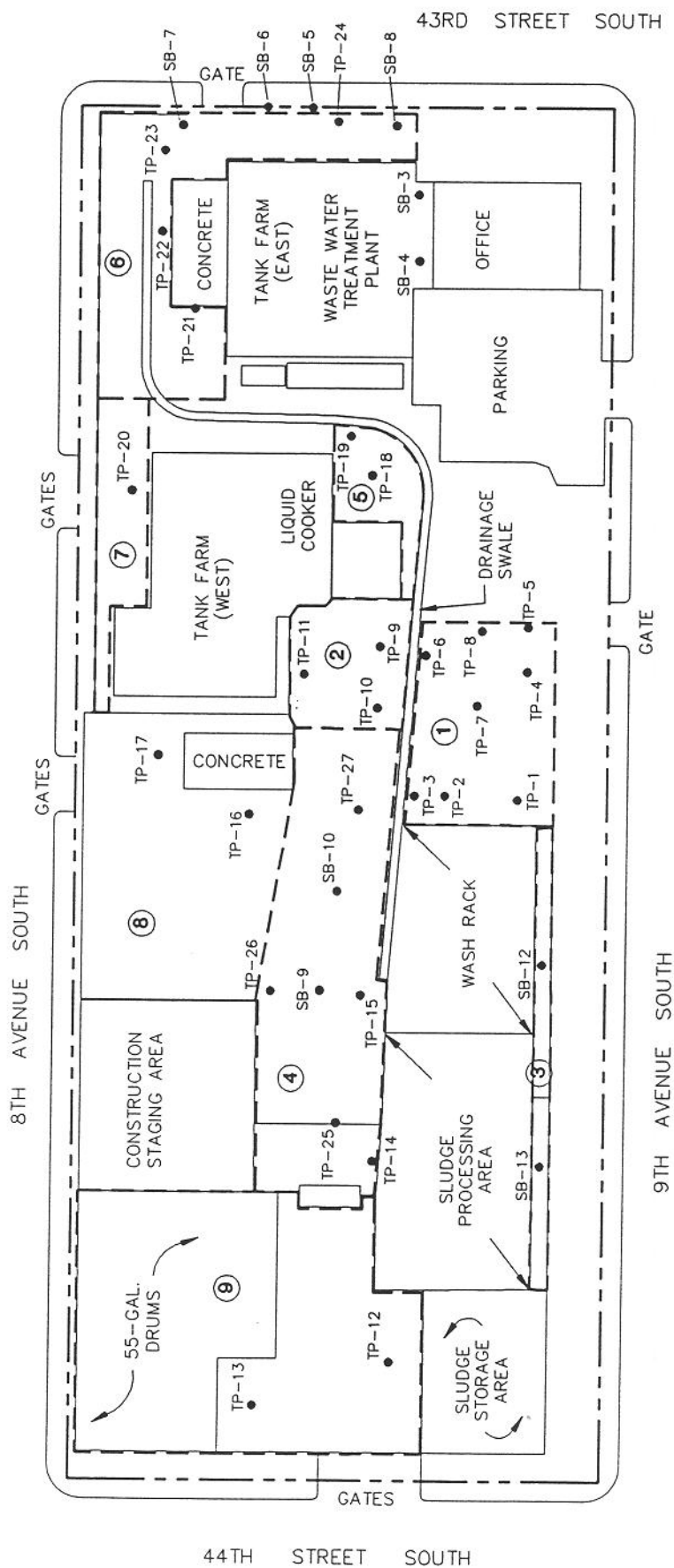
2.1 AUGUST 15, 1991 ACTIVITIES

On August 15, 1991, two areas at the site were investigated: Areas 1 and 2. In each area (Figure 2-1), soil was examined for staining and odor, and then screened using an Organic Vapor Analyzer (OVA) with a Flame Ionization Detector (FID) to identify petroleum-impacted soil and to define the limits of excessively-contaminated soil as defined in Chapter 17-770.200(2), Florida Administrative Code (FAC).

In Area 1, eight test pits were excavated using a backhoe to identify the vertical and horizontal extent of excessively-contaminated soil. As each hole was excavated, ERM personnel examined the soil for obvious signs of staining or odor. If staining or a petroleum-like odor was detected, the excavation was advanced until the vertical extent of the staining and odor was identified.

Soil samples were then collected from the bottom of the excavation and screened using the OVA to determine the organic vapor concentration in the soil. If OVA values exceeded 50 parts per million (ppm) (the assumed lower limit for excessively-contaminated soil), the excavation was advanced vertically in one-foot intervals, and

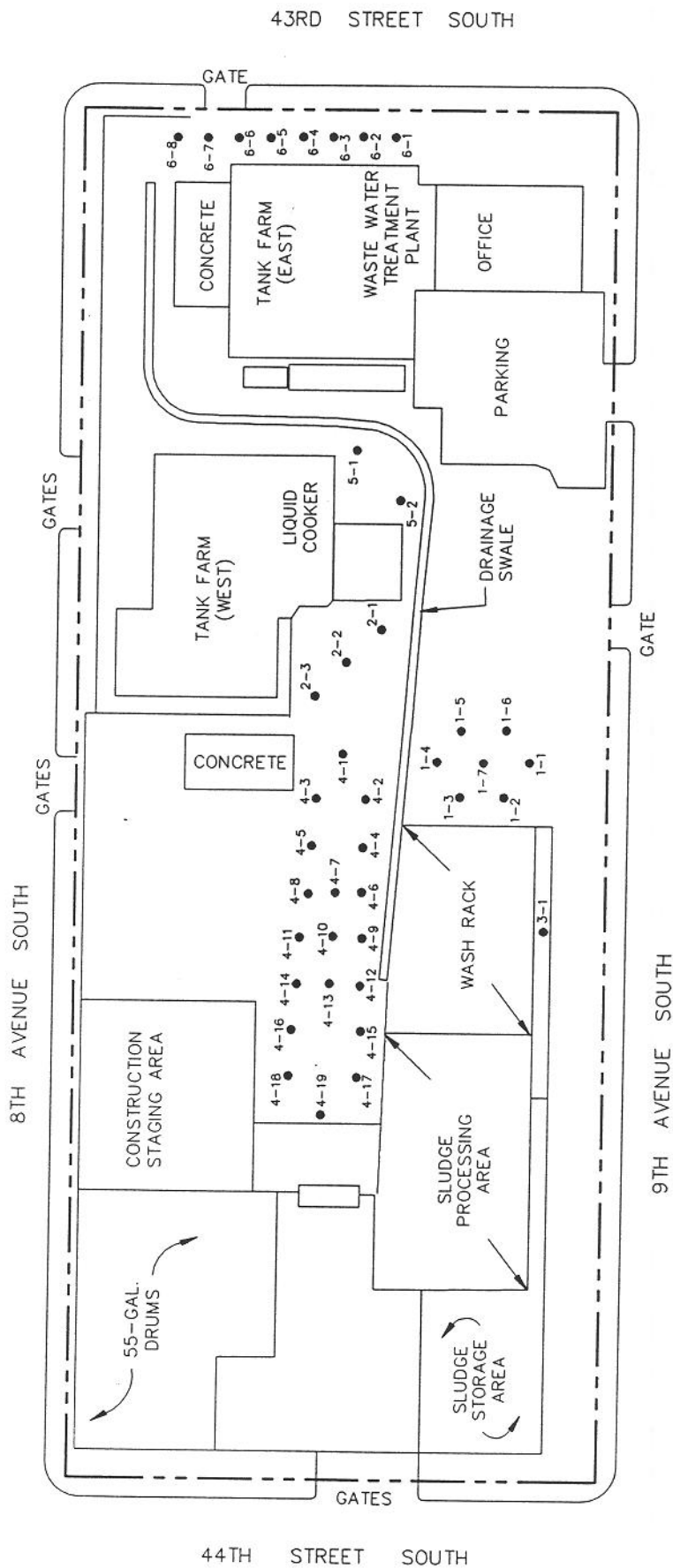
Figure 2-1
 Boring And Test Pit Locations
 August 1991, October 1991 and November 1991
 Howco Facility
 St. Petersburg, Florida



LEGEND

TP TEST PIT
 SB SOIL BORING (HAND AUGER)

Figure 2-2
Soil Boring Locations - December 1991
Howco Facility
St. Petersburg, Florida



LEGEND

• SOIL BORING

samples screened using the OVA, until the extent of excessively-contaminated soil was identified.

If no odor or staining was identified in an excavation, a soil sample was collected near ground surface for OVA screening. If the sample contained organic vapor concentrations above 50 ppm, the hole was advanced until the extent of excessively-contaminated soil was identified as described above. If organic vapor concentrations were less than 50 ppm, the excavation was considered to be outside the areal limits of excessively-contaminated soil. Appendix A contains a diagram of Area 1 showing the locations of backhoe test pits excavated on August 15, 1991, and a description of the material identified in each test pit. The results of the assessment of Area 1 are discussed in Section 3.0.

In Area 2, three backhoe test pits were excavated. The extent of excessively-contaminated soil was identified using the procedures described for Area 1. Appendix A contains a diagram of Area 2 showing the location of the backhoe test pits excavated on August 15, 1991. The results of the assessment of Area 2 are discussed in Section 3.0.

2.2 AUGUST 26, 1991 ACTIVITIES

Based on the results of the August 15, 1991 activities, thermal treatment was considered as a potential remedial alternative for excessively-contaminated soil. On August 26, 1991, ERM personnel collected one soil sample from Area 1 and one sample from Area 2 for laboratory analysis of the constituents listed in Rinker Materials' thermal treatment unit permit. The two samples were composited into a single sample, placed in sample bottles, and submitted to Savannah Laboratories and Environmental Services, Inc. (SL) in Savannah, Georgia for analysis. The samples were analyzed for polychlorinated Biphenyls (PCBs) using EPA Method 8080, Total Recoverable Petroleum Hydrocarbons (TRPH) using EPA Method 418.1, purgeable aromatics using EPA Method 8020,

purgeable halocarbons using EPA Method 8010, total halogens, and eight metals using TCLP procedures. On October 15, 1991, SL was instructed to analyze a remaining portion of the composite sample for total metals (total of eight metals). The results of the analyses are presented in Section 3.0.

2.3 OCTOBER 9 AND 10, 1991 ACTIVITIES

Seven additional areas (Areas 3 through 9) were investigated at the site (Figure 2-1) on October 9 and 10, 1991, according to the methods described for Areas 1 and 2. During October activities, soil samples were collected from 16 backhoe test pits and during excavation of 10 borings using a hand auger. A total of 41 samples were collected for screening using an OVA during the two days of field investigation activities. The purpose of the investigation was assess the horizontal and vertical extent of petroleum-impacted and excessively-contaminated soil in areas 3 through 9.

2.4 NOVEMBER 16, 1991 ACTIVITIES

Two additional soil samples were collected from Areas 1 and 2, composited into one sample, and analyzed for total lead to confirm the results of the October 1991 samples. The results are presented in Section 3.0.

2.5 DECEMBER 18 - 20, 1991 ACTIVITIES

Based on the lead concentrations detected in samples collected during October and November, 1991, additional soil samples were collected for analysis. On December 18 through 20, 1991, 120 soil samples were collected from 40 locations at the site (Figure 2-1). The samples were collected from 3 depths at each of the 40 locations in accordance with the FDER QA Standard Operating Procedures Manual for Soil Thermal Treatment Facilities, dated November 1991. A breakdown of the sample numbers and depths, and resulting composite designations are included in Appendix B. The 120 samples were composited into 10 samples (COMP-1 through COMP-10) according to the

manual and submitted for analysis of total lead. The calculation used to estimate the number of composite samples needed is also included in Appendix B. Based on the results of the total lead analyses, samples with lead concentrations below 77 mg/kg (COMP-1, COMP-2, COMP-3, and COMP-4) were analyzed for TRPH using EPA Method 418.1, purgeable aromatics and purgeable halocarbons using EPA Methods 8020 and 8010, respectively. Two composite samples containing lead concentrations above 77 mg/kg, COMP-7 and COMP-10, were also analyzed for TRPH, purgeable aromatics, and purgeable halocarbons, so that data would be available to evaluate alternative treatment methods for soil containing lead above permitted levels for thermal treatment facilities. The results of the analyses are presented in Section 3.0.

SECTION 3.0
INVESTIGATION RESULTS

SECTION 3.0

INVESTIGATION RESULTS

As described in Section 2.0, investigations were conducted at the site on August 15, 1991, August 26, 1991, October 9 and 10, 1991, November 16, 1991, and December 18 through 20, 1991, to identify areas of impacted soil, assess the extent of excessively-contaminated soil, assess the need for initial remedial action (IRA), and assess the feasibility of remediating soil using thermal treatment. The results of the investigations are presented in this section.

3.1 AUGUST 15, 1991 INVESTIGATION RESULTS

A shell material was observed over much of Area 1 from ground surface to approximately 1.5 feet bgs. The top six inches was observed to be stained in isolated areas. The shell material in all of Area 1 from six inches to approximately 1.5 feet bgs was observed to be stained and had a petroleum-like odor, indicating shell layers may have been laid at different times. Below the shell material, a grey sandy soil was observed to a depth of approximately 5.5 feet bgs. In test pits S-1, S-2, S-4, and S-7 (see the sketch for Area 1 in Appendix A), the grey sandy soil was stained and had a petroleum-like odor. Appendix C contains a cross-section through Area 1 showing the features identified and OVA readings detected in test pits S-1, S-7, and S-8.

Three test pits were excavated in Area 2. The same shell material identified in Area 1 was present over Area 2. The shell material in all three test pits was stained; therefore, the horizontal extent of excessively-contaminated soil is assumed to cover the area from Area 4 to Area 5, and from the concrete swale bordering Area 2, to the bermed area to the north.

Based on the information obtained during the investigation on August 15, 1991, the volume of excessively-contaminated soil (soil with an OVA concentration of 50 ppm or

greater) in Areas 1 and 2 was calculated to be approximately 574 cubic yards (cy) and 255 cy, respectively.

3.2 AUGUST 26, 1991 INVESTIGATION RESULTS

On August 26, 1991, soil samples were collected from Areas 1 and 2. The samples were composited and submitted to SL for analysis of the parameters described in Section 2.0 to assess the feasibility of remediating soil using thermal treatment. The laboratory report is presented in Appendix D and the detected parameters are listed in Table 3-1.

A portion of the sample was reanalyzed to determine the total concentrations of eight metals. The results are presented in Table 3-2. The total lead concentration was 170 mg/kg, which exceeds the pretreatment standard for Rinker's thermal treatment unit. All other parameters met the criteria in Rinker's permit.

3.3 OCTOBER 9 AND 10, 1991 INVESTIGATION RESULTS

On October 9 and 10, 1991, 41 soil samples were collected from 16 test pits and 10 hand-augered soil borings in Areas 3 through 9. The samples were screened using the OVA. OVA results are presented in Table 3-3.

Based on the information obtained during the investigation on October 9 and 10, 1991, excessively-contaminated soil was not detected in Areas 7 through 9. The volume of excessively-contaminated soil (soil with an OVA concentration of 50 ppm or greater) in Areas 3, 4, 5, and 6, was calculated and is listed below.

- Area 3 - 46 cy
- Area 4 - 1435 cy
- Area 5 - 133 cy
- Area 6 - 593 cy

TABLE 3-1

ANALYTICAL RESULTS
SOIL SAMPLES COLLECTED FROM AREAS 1 AND 2 - AUGUST 1991
HOWCO
ST. PETERSBURG, FLORIDA

PARAMETERS	UNITS	CONCENTRATION
Barium* (TCLP)	mg/l	0.097/0.085
Lead* (TCLP)	mg/l	0.45/0.41
Ethylbenzene	$\mu\text{g/l,dw}$	110
Toluene	$\mu\text{g/l,dw}$	19
Trichloroethene	$\mu\text{g/l,dw}$	9.8
Xylene	$\mu\text{g/l,dw}$	160
TRPH	mg/kg,dw	15,000
Total halogens	mg/l,dw	820

Note:

* = First result is corrected, second is analytical for matrix spike.

dw = Dry weight

TABLE 3-3 (Continued)
ORGANIC VAPOR CONCENTRATIONS
OCTOBER 9 AND 10, 1991
HOWCO
ST. PETERSBURG, FLORIDA

Boring/Depth	Organic Vapor Concentration (PPM)			Comment
	Unfiltered	Filtered	Difference	
TP-10, 1'	0	0	0	No odor
TP-10, 3'	0	0	0	No odor
TP-11, 1'	0	0	0	No odor
TP-11, 3'	0	0	0	No odor
TP-12, 1'	0	0	0	No odor
TP-12, 3'	0	0	0	No odor
TP-13, 1.5'	510	50	460	Strong odor
TP-13, 5'	600	150	450	Strong odor
SB-5, 3'	950	70	8	Strong odor
SB-5, 7'	> 1,000	80	> 1,000	Strong odor
SB-6, 7'	> 1,000	80	> 1,000	Strong odor
SB-7, 3'	0	0	0	No odor
SB-8, 3'	0	0	0	No odor
SB-9, 4'	380	160	220	Strong odor
SB-9, 6'	180	60	120	Slight odor
TP-14, 3'	7	4	3	No odor
TP-15, 3'	20	3	17	No odor
SB-10, 3'	380	160	220	No odor
TP-16, 2'	150	55	95	Slight odor

TABLE 3-3

**ORGANIC VAPOR CONCENTRATIONS
OCTOBER 9 AND 10, 1991
HOWCO
ST. PETERSBURG, FLORIDA**

Boring/Depth	Organic Vapor Concentration (PPM)			Comment
	Unfiltered	Filtered	Difference	
TP-1, 3'	0	0	0	No odor
TP-2, 3'	30	0	30	Slight odor
TP-3, 2'	30	0	30	Slight odor
TP-3, 4'	80	55	25	Slight odor
TP-4, 2'	60	40	20	Slight odor
TP-4, 4'	200	72	128	Strong odor
TP-5, 1.5'	0	0	0	No odor
TP-5, 5'	2	0	0	No odor
TP-6, 2'	0	0	0	No odor
TP-6, 6'	0	0	0	No odor
SB-1, 1.5'	650	400	250	Strong odor
SB-1, 3'	2	0	2	No odor
SB-2, 2'	0.2	0	0.2	No odor
SB-2, 4'	0.2	0	0.2	No odor
SB-3, 2'	0	0	0	No odor
SB-3, 3'	0	0	0	No odor
SB-4, 1'	0	0	0	No odor
SB-4, 3'	0	0	0	No odor
TP-7, 2'	110	35	75	Slight odor
TP-7, 4'	45	25	20	Slight odor
TP-9, 1'	1.2	0	1.2	No odor
TP-9, 3'	1.8	0	1.8	No odor

TABLE 3-2

TOTAL METALS RESULTS
SOIL SAMPLES COLLECTED FROM AREAS 1 AND 2 - AUGUST 1991
HOWCO
ST. PETERSBURG, FLORIDA

PARAMETER	UNIT	CONCENTRATION
Arsenic	mg/kg	< 1.0
Barium	mg/kg	4.9
Cadmium	mg/kg	< 0.50
Chromium	mg/kg	2.4
Lead	mg/kg	170
Mercury	mg/kg	0.026
Selenium	mg/kg	< 1.0
Silver	mg/kg	< 1.0

mg/kg = milligrams per kilogram

greater) in Areas 1 and 2 was calculated to be approximately 574 cubic yards (cy) and 255 cy, respectively.

3.2 AUGUST 26, 1991 INVESTIGATION RESULTS

On August 26, 1991, soil samples were collected from Areas 1 and 2. The samples were composited and submitted to SL for analysis of the parameters described in Section 2.0 to assess the feasibility of remediating soil using thermal treatment. The laboratory report is presented in Appendix D and the detected parameters are listed in Table 3-1.

A portion of the sample was reanalyzed to determine the total concentrations of eight metals. The results are presented in Table 3-2. The total lead concentration was 170 mg/kg, which exceeds the pretreatment standard for Rinker's thermal treatment unit. All other parameters met the criteria in Rinker's permit.

3.3 OCTOBER 9 AND 10, 1991 INVESTIGATION RESULTS

On October 9 and 10, 1991, 41 soil samples were collected from 16 test pits and 10 hand-augered soil borings in Areas 3 through 9. The samples were screened using the OVA. OVA results are presented in Table 3-3.

Based on the information obtained during the investigation on October 9 and 10, 1991, excessively-contaminated soil was not detected in Areas 7 through 9. The volume of excessively-contaminated soil (soil with an OVA concentration of 50 ppm or greater) in Areas 3, 4, 5, and 6, was calculated and is listed below.

- Area 3 - 46 cy
- Area 4 - 1435 cy
- Area 5 - 133 cy
- Area 6 - 593 cy

TABLE 3-1

ANALYTICAL RESULTS
SOIL SAMPLES COLLECTED FROM AREAS 1 AND 2 - AUGUST 1991
HOWCO
ST. PETERSBURG, FLORIDA

PARAMETERS	UNITS	CONCENTRATION
Barium* (TCLP)	mg/l	0.097/0.085
Lead* (TCLP)	mg/l	0.45/0.41
Ethylbenzene	$\mu\text{g/l,dw}$	110
Toluene	$\mu\text{g/l,dw}$	19
Trichloroethene	$\mu\text{g/l,dw}$	9.8
Xylene	$\mu\text{g/l,dw}$	160
TRPH	mg/kg,dw	15,000
Total halogens	mg/l,dw	820

Note:

* = First result is corrected, second is analytical for matrix spike.

dw = Dry weight



TABLE 3-2

TOTAL METALS RESULTS
SOIL SAMPLES COLLECTED FROM AREAS 1 AND 2 - AUGUST 1991
HOWCO
ST. PETERSBURG, FLORIDA

PARAMETER	UNIT	CONCENTRATION
Arsenic	mg/kg	< 1.0
Barium	mg/kg	4.9
Cadmium	mg/kg	< 0.50
Chromium	mg/kg	2.4
Lead	mg/kg	170
Mercury	mg/kg	0.026
Selenium	mg/kg	< 1.0
Silver	mg/kg	< 1.0

mg/kg = milligrams per kilogram

TABLE 3-3

**ORGANIC VAPOR CONCENTRATIONS
OCTOBER 9 AND 10, 1991
HOWCO
ST. PETERSBURG, FLORIDA**

Boring/Depth	Organic Vapor Concentration (PPM)			Comment
	Unfiltered	Filtered	Difference	
TP-1, 3'	0	0	0	No odor
TP-2, 3'	30	0	30	Slight odor
TP-3, 2'	30	0	30	Slight odor
TP-3, 4'	80	55	25	Slight odor
TP-4, 2'	60	40	20	Slight odor
TP-4, 4'	200	72	128	Strong odor
TP-5, 1.5'	0	0	0	No odor
TP-5, 5'	2	0	0	No odor
TP-6, 2'	0	0	0	No odor
TP-6, 6'	0	0	0	No odor
SB-1, 1.5'	650	400	250	Strong odor
SB-1, 3'	2	0	2	No odor
SB-2, 2'	0.2	0	0.2	No odor
SB-2, 4'	0.2	0	0.2	No odor
SB-3, 2'	0	0	0	No odor
SB-3, 3'	0	0	0	No odor
SB-4, 1'	0	0	0	No odor
SB-4, 3'	0	0	0	No odor
TP-7, 2'	110	35	75	Slight odor
TP-7, 4'	45	25	20	Slight odor
TP-9, 1'	1.2	0	1.2	No odor
TP-9, 3'	1.8	0	1.8	No odor

TABLE 3-3 (Continued)

ORGANIC VAPOR CONCENTRATIONS
OCTOBER 9 AND 10, 1991
HOWCO
ST. PETERSBURG, FLORIDA

Boring/Depth	Organic Vapor Concentration (PPM)			Comment
	Unfiltered	Filtered	Difference	
TP-10, 1'	0	0	0	No odor
TP-10, 3'	0	0	0	No odor
TP-11, 1'	0	0	0	No odor
TP-11, 3'	0	0	0	No odor
TP-12, 1'	0	0	0	No odor
TP-12, 3'	0	0	0	No odor
TP-13, 1.5'	510	50	460	Strong odor
TP-13, 5'	600	150	450	Strong odor
SB-5, 3'	950	70	8	Strong odor
SB-5, 7'	> 1,000	80	> 1,000	Strong odor
SB-6, 7'	> 1,000	80	> 1,000	Strong odor
SB-7, 3'	0	0	0	No odor
SB-8, 3'	0	0	0	No odor
SB-9, 4'	380	160	220	Strong odor
SB-9, 6'	180	60	120	Slight odor
TP-14, 3'	7	4	3	No odor
TP-15, 3'	20	3	17	No odor
SB-10, 3'	380	160	220	No odor
TP-16, 2'	150	55	95	Slight odor

The total volume of excessively-contaminated soil in Areas 1 through 6 at the site is, therefore, estimated to be 3,035 cy, as shown on Figure 3-1. Assuming 110 pounds per cubic foot of soil the total weight of soil to be remediated is approximately 4510 tons.

3.4 NOVEMBER 16, 1991 INVESTIGATION RESULTS

Two soil samples were collected from Areas 1 and 2, composited into one sample and analyzed for total lead to confirm the concentration detected in the sample collected in August, 1991 (170 mg/kg). The result of the analyses indicates the soil sample contained total lead at a concentration of 15 mg/kg.

3.5 DECEMBER 18 - 20, 1991 INVESTIGATION RESULTS

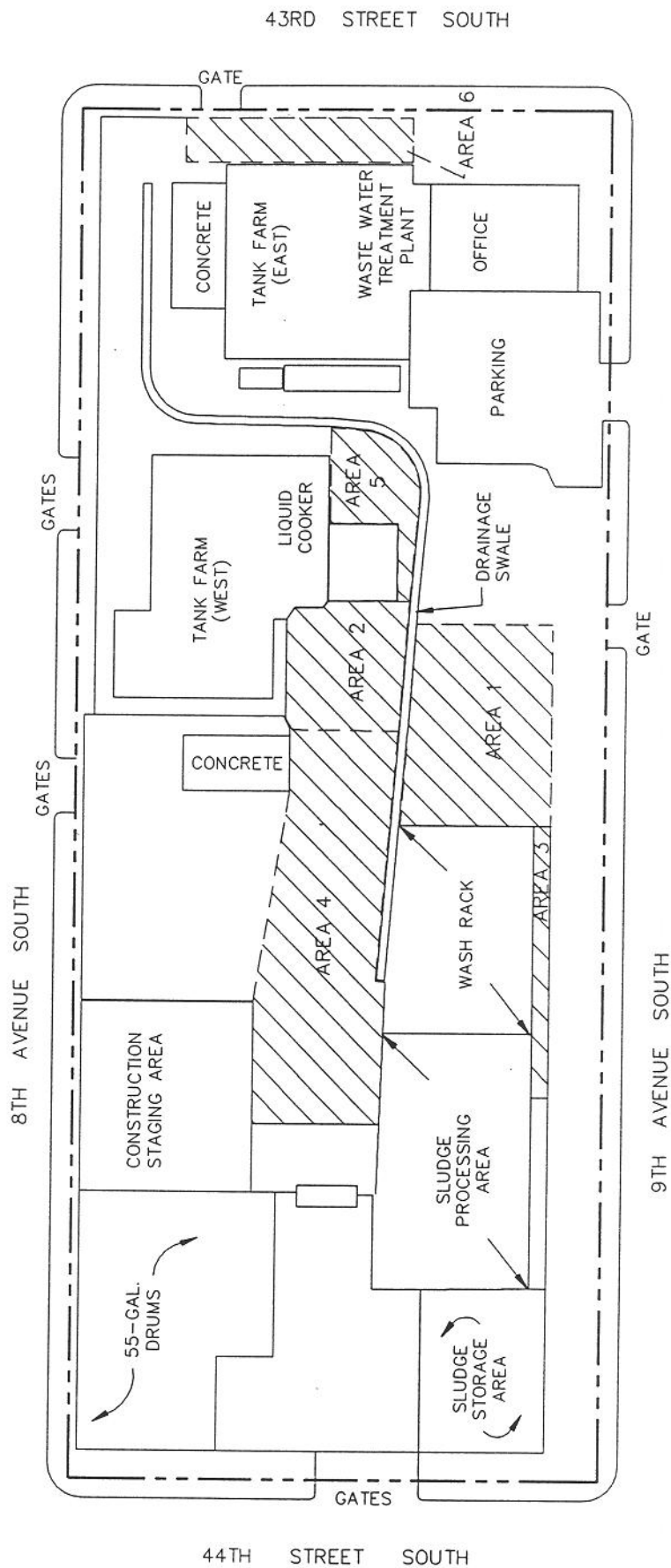
To sort out the conflicting lead data obtained during August and November, 1991, ten composite samples, COMP-1 through COMP-10, were collected from the site at the locations shown on Figure 2-2, for analysis of total lead. The total lead result for each sample is listed below.

■ COMP-1	15.2 mg/kg	■ COMP-6	456 mg/kg
■ COMP-2	3.22 mg/kg	■ COMP-7	367 mg/kg
■ COMP-3	10.8 mg/kg	■ COMP-8	549 mg/kg
■ COMP-4	14.6 mg/kg	■ COMP-9	489 mg/kg
■ COMP-5	405 mg/kg	■ COMP-10	549 mg/kg


Samples COMP-1, COMP-2, COMP-3, COMP-4, COMP-7, and COMP-10 were then analyzed for TRPH, purgeable aromatics, and purgeable halocarbons. The laboratory report for these analyses is included in Appendix D.

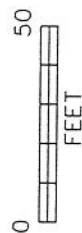
Rinker Materials thermal treatment unit is permitted to treat soil containing lead at concentrations less than 77 mg/kg. Only soil samples COMP-1 through COMP-4 met the lead criteria for Rinker's treatment unit. COMP-1 through COMP-4 were collected

Figure 3-1
Excessively Contaminated Soil
 Howco Facility
 St. Petersburg, Florida



LEGEND

 EXCESSIVELY CONTAMINATED SOIL



from Areas 1, 3, and 6, which are estimated as having a total of 1213 cubic yards of excessively-contaminated soil.

SECTION 4.0 CONCLUSIONS

4.1 OPERATION AUDIT

The results of the August 23, 1991 operational audit conducted by ERM indicate the facility was in compliance with waste oil regulations established in 40 CFR 266, Part E. With few exceptions, ERM found engineering controls, entry controls, and the general and emergency management practices at the facility to be adequate. In addition, HOWCO was in compliance with the training and most recordkeeping requirements of RCRA and the Occupational Safety and Health Administration (OSHA). ERM recommended revisions to the documentation procedures to bring HOWCO into compliance with these regulations. ERM also recommended operational changes to the facility to improve stormwater and wastewater handling procedures.

HOWCO is currently discussing the applicability of RCRA and waste oil requirements to waste oil recyclers such as HOWCO with the FDER and EPA. Resolution of these matters are likely to be delayed pending consideration of EPA's proposed used oil rule.

4.2 EPA SAMPLING AND ANALYSIS

Representatives from USEPA Region IV collected samples of filter press sludge from the site on March 13, 1991. The sludge is generated during the separation of sludge bearing oil. The recovered oil is recycled and the remaining material is placed in rolloff bins for disposal at an offsite landfill.

Samples of filter press material were reportedly collected by EPA personnel from five of the approximately 8 feet by 20 feet by 4 feet deep rolloff bins located in the storage area. The samples were collected at depths of approximately 18 inches, 24 inches, and also from the bottom of the bins, and analyzed for TCLP metals and volatile organic compounds by the EPA laboratory in Athens, Georgia.

SECTION 5.0
RECOMMENDATIONS



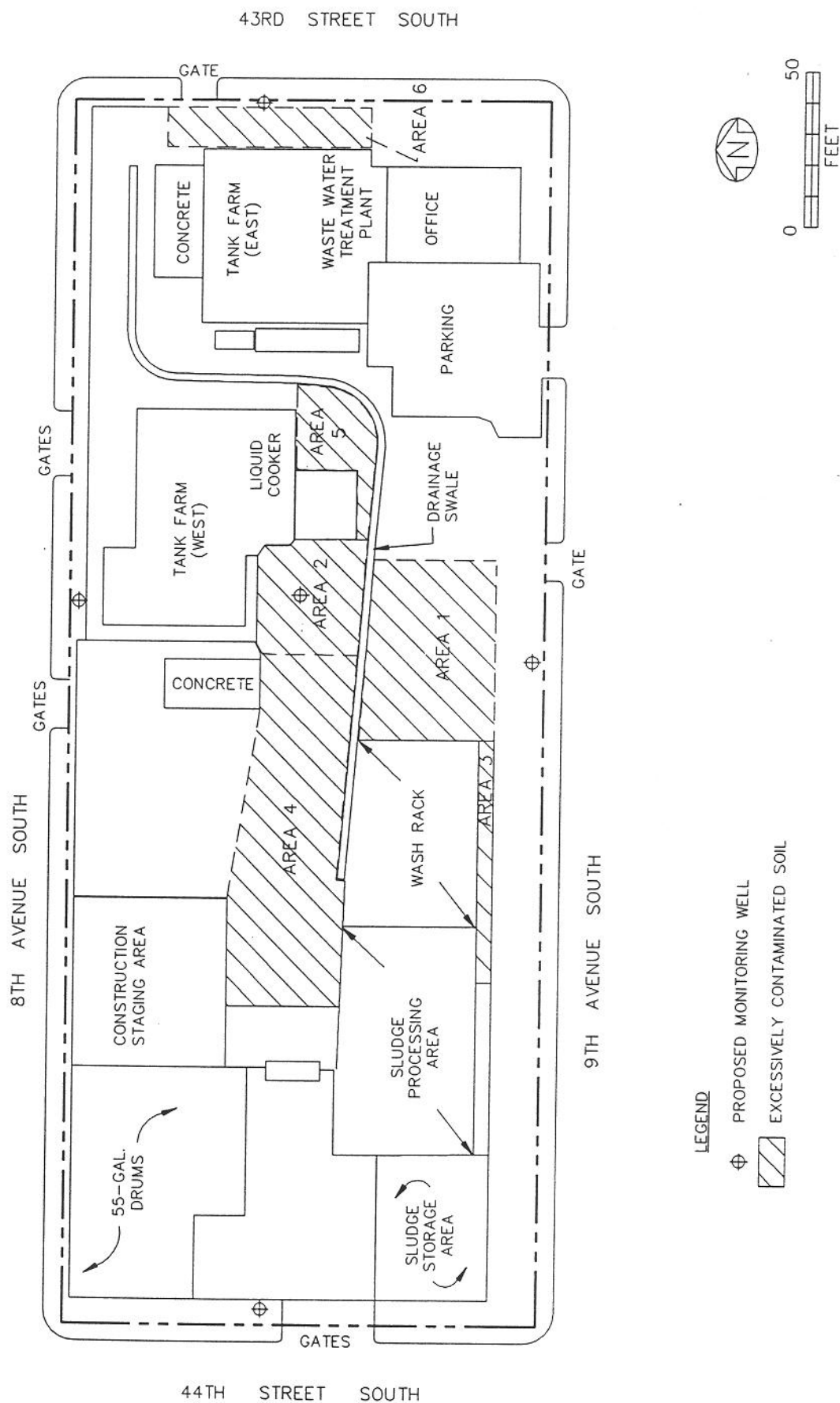
SECTION 5.0

RECOMMENDATIONS

Based on the results of the preliminary contamination assessment at HOWCO presented in this PCAR, ERM has prepared the following recommendations.

- Evaluate IRA alternatives for the approximately 3,035 cy of excessively-contaminated soil identified during the soil assessment. Options considered should include thermal treatment, both onsite and offsite; stabilization/solidification; bioremediation; and soil washing.
- Treat excessively-contaminated soil to reduce the concentration of petroleum constituents released to ground water.
- Complete an assessment of the ground water quality beneath the site. Figure 5-1 shows the locations of proposed monitoring wells for the assessment. In addition, a deeper monitoring well should be installed in an area identified with petroleum-impacted soil to assess the vertical extent of petroleum-impacted ground water, if any. Ground water samples should be analyzed for the Kerosene and Mixed Product Analytical Group parameters as listed in Chapter 17-770, FAC.
- Assess aquifer characteristics in order to prepare a remediation plan for ground water, if needed. The assessment should include an evaluation of the ground water flow direction, the hydraulic conductivity of the impacted aquifer, and the rate of contaminant transport.

Figure 5-1
Proposed Monitoring Well Locations
Howco Facility
St. Petersburg, Florida



APPENDIX A
TEST PIT LOCATION MAP
AREAS 1 AND 2



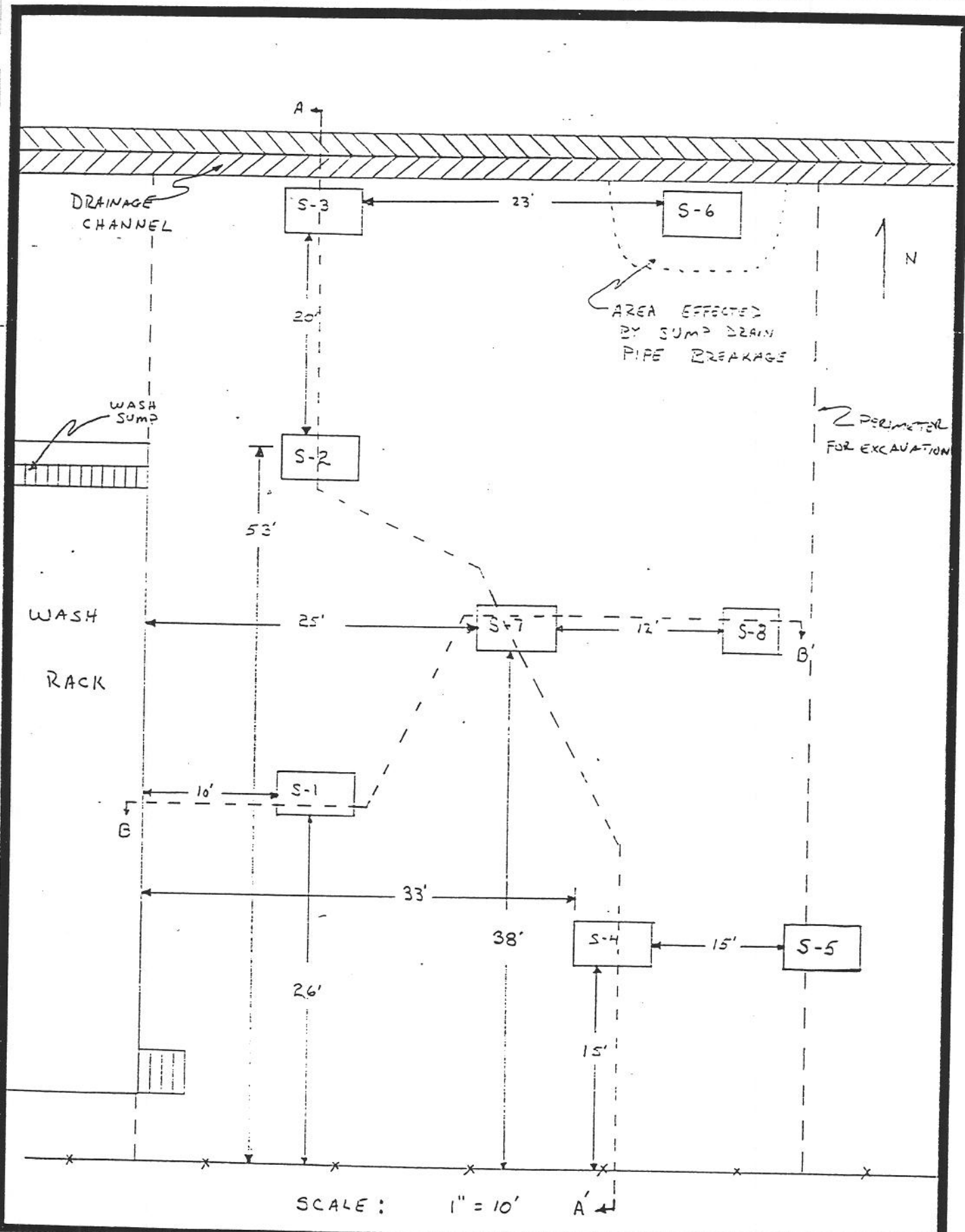


ERM-South, Inc.

Environmental Resources Management

Project Howco
Subject Site Map of AREA 1
(Former Asphalt Cooker Area)

W.O. No. 14412.03 Sheet 1 of 7
By MSH Date 8/16/91
Chkd by _____ Date _____



DETAILED DESCRIPTION OF TEST PITS IN AREA 1

Test Pit S-1

S-1 was constructed to a depth of 3.5 feet. The material from 6 inches to 1.5 feet was a dark brown stained shell material with a strong petroleum odor and from 1.5 feet to 3.0 feet a light brown stained grey sandy soil with a slight petroleum odor. Two soil samples were collected at 2.0 feet and 3.5 feet and analyzed with an OVA/FID. The OVA readings were 90 PPM and zero PPM, respectively.

Test Pit S-2

S-2 was constructed to a depth of 4.0 feet. The material from 6 inches to 2.0 feet was a dark brown stained shell material with a strong petroleum odor and from 2.0 feet to 3.5 feet a light brown stained grey sandy soil with a slight petroleum odor. A soil sample was collected at 4.0 feet and analyzed with an OVA/FID. The OVA reading was 28 PPM.

Test Pit S-3

S-3 was constructed to a depth of 4.0 feet. The material from 6 inches to 1.5 feet was a dark brown stained shell material with a slight petroleum odor and from 1.5 feet to 4.0 feet a grey sandy soil with a slight petroleum odor and no apparent staining. Two soil samples were collected at 1.0 and 2.0 feet and analyzed with an OVA/FID. The OVA readings were 190 PPM and 41 PPM, respectively.

Test Pit S-4

S-4 was constructed to a depth of 4.0 feet. The material from 6 inches to 2.0 feet was a dark brown stained shell material with a strong petroleum odor and from 1.5 feet to 4.0 feet a grey sandy soil with a slight petroleum odor and no apparent staining. A soil sample was collected at 2.0 feet and analyzed with an OVA/FID. The OVA reading was 41 PPM.

Test Pit S-5

S-5 was constructed to a depth of 2.0 feet. The material from 6 inches to 1.5 feet was a dark brown stained shell material with a strong petroleum odor and from 1.5 feet to 2.0 feet a grey sandy soil with a slight petroleum odor and no apparent staining. A soil sample was collected at 2.0 feet and analyzed with an OVA/FID. The OVA reading was 32 PPM.

Test Pit S-6

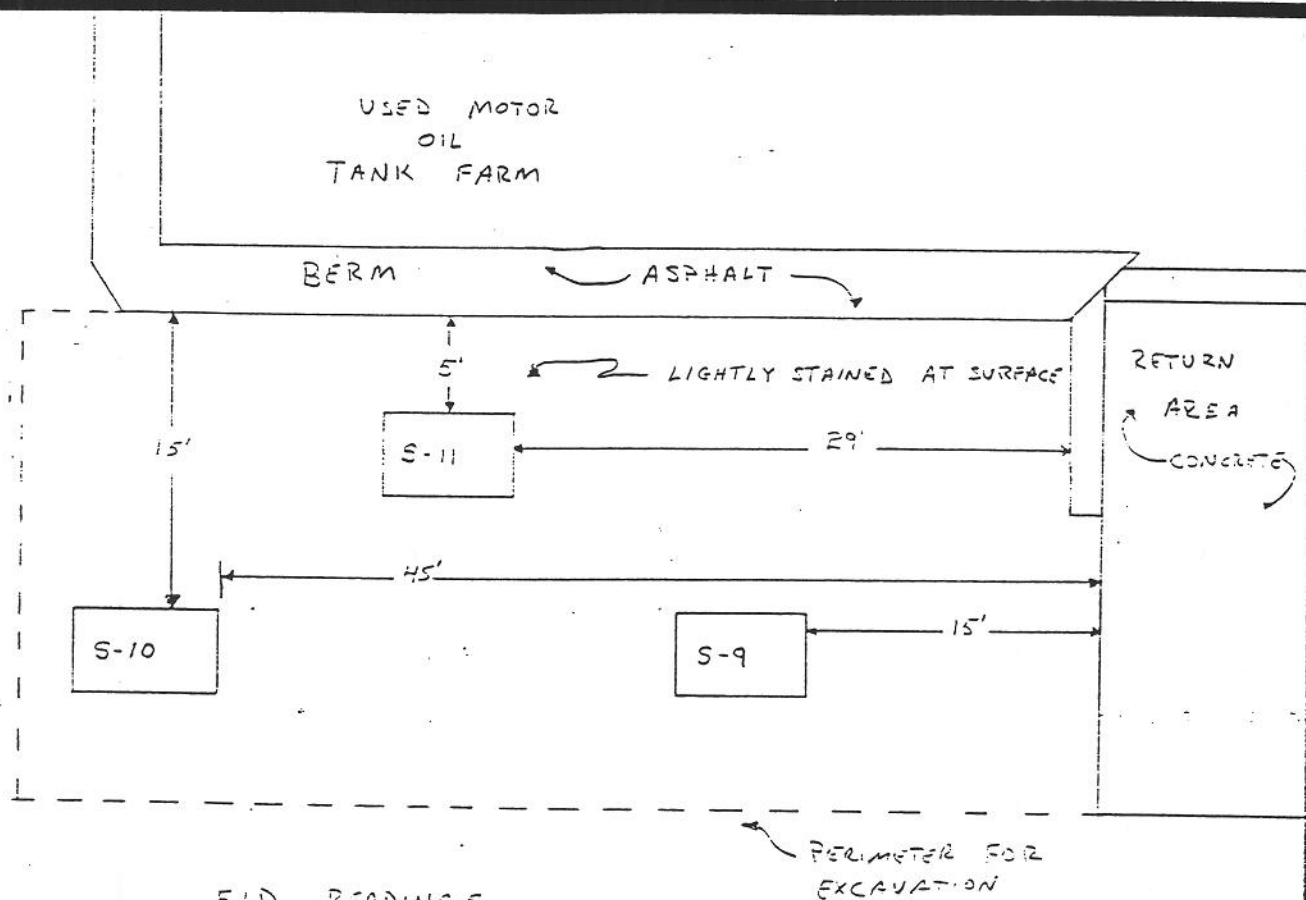
During the construction of S-6 a drain line from the wash rack sump was severed. Approximately 65 to 70 gallons of oily water was discharged into the test pit. A sample from this area was not collected. Within fifteen minutes a vacuum truck was present and removed the oily water from the test pit.

Test Pit S-7

S-7 was constructed to a depth of 5.5 feet. The material from 6 inches to 1.5 feet was a dark brown stained shell material with a strong petroleum odor, from 1.5 feet to 4.5 feet a grey sandy soil with a strong petroleum odor and heavy staining and from 4.5 feet to 5.5 feet a dark brown silty material. A soil sample was collected at 5.5 feet and was analyzed with an OVA/FID. The OVA reading was 250 PPM.

**ERM-South, Inc.**

Environmental Resources Management

Project Howco
Subject SITE MAP AREA 2W.O. No. 1441253 Sheet 2 of 7
By MSH Date 8/16/91
Chkd by _____ Date _____FID READINGS

<u>LOCATION</u>	<u>PPM</u>	<u>COMMENT</u>
S-9, @ 5'	24	TAKEN BELOW STAINED AREA
S-10 @ 7'	(1) UNK	STRONG PETROLEUM ODOR
S-11 @ 4'	14	TAKEN FROM SOIL DIRECTLY BELOW STAINED AREA
S-9 @ 3'	140	SLIGHT ODOR
S-10 @ 4.5'	150	STRONG ODOR
S-11 @ 2'	100	STRONG ODOR

NOTE: (1) GREATER THAN 1000 PPM ON FILTERED AND UNFILTERED READINGS WITH OVA/FID

APPENDIX B
COMPOSITE SOIL SAMPLING DESIGNATIONS FOR
DECEMBER 1991 SAMPLES



**ERM-South, Inc.**

Environmental Resources Management

Project HowcoW.O. No. 14412.0

Sheet _____ of _____

Subject _____

By _____

Date _____

Chkd by _____

Date _____

		# of COMPOSITE SAMPLES	# OF LOCATIONS	# OF SUBSAMPLES
AREA 1 :	574 (18.9%)	CY	7	21
AREA 2 :	255 (8.4%)	CY	3	9
AREA 3 :	46 (1.5%)	CY	1	3
AREA 4 :	1435 (47.3%)	CY	19	57
AREA 5 :	133 (4.4%)	CY	2	6
AREA 6 :	593 (19.5%)	CY	8	24
	3036	CY	10	40
				120

MUST COLLECT 6 samples for the FIRST
1500 CY and ONE sample FOR EACH
ADDITIONAL 500 CY

∴ NEED TO COLLECT $6 + 4 = 10$ COMPOSITE
SAMPLES FOR 3036 CY

EACH COMPOSITE SAMPLE IS COMPRISED OF
12 SUBSAMPLES OBTAINED FROM 3 DEPTHS
AT 4 LOCATIONS

**ERM-South, Inc.**

Environmental Resources Management

Project _____

W.O. No. _____

Sheet _____ of _____

Subject _____

By _____

Date _____

Chkd by _____

Date _____

AREA 1 SAMPLE COLLECTION:

7 TOTAL LOCATIONS IN AREA 1

SUB-SAMPLE NO.	DEPTH (ft)	COND #	DATE COLLECTED
1-1 a	1.0	COND-1	12/3/91
1-1 b	1.5		
1-1 c	2.0		
1-2 a	1.0		
1-2 b	2.0		
1-2 c	3.0		
1-3 a	1.0		
1-3 b	2.0		
1-3 c	3.0		
1-4 a	1.0	COND-2	2/8/92
1-4 b	3.0		
1-4 c	5.0		
1-5 a	1.0		
1-5 b	2.0		
1-5 c	3.0		
1-6 a	1.0		
1-6 b	2.0		
1-6 c	3.0		
1-7 a	1.0		
1-7 b	4.0		
1-7 c	7.0		

AREA 3 SAMPLE COLLECTION:

1 LOCATION IN AREA 3

SUB-SAMPLE NO.	DEPTH (ft)	COND #	DATE COLLECTED
3-1 a	1.0	COND-1	2/8/92
3-1 b	1.5		
3-1 c	2.0		

**ERM-South, Inc.**

Environmental Resources Management

Project _____

W.O. No. _____

Sheet _____ of _____

Subject _____

By _____

Date _____

Chkd by _____

Date _____

AREA 6 SAMPLE COLLECTION:

8 LOCATIONS IN AREA 6

SUB-SAMPLE NO.	DEPTH (ft)	COMP #	DATE COLLECTED
6-1 a	2.0	COMP-3	12/18/91
6-1 b	4.0		
6-1 c	6.0		
6-2 a	2.0		
6-2 b	4.0		
6-2 c	6.0		
6-3 a	2.0		
6-3 b	4.0		
6-3 c	6.0		
6-4 a	2.0		
6-4 b	4.0		
6-4 c	6.0		
6-5 a	2.0	COMP-4	2/19/91
6-5 b	4.0		
6-5 c	6.0		
6-6 a	2.0		
6-6 b	4.0		
6-6 c	6.0		
6-7 a	2.0		
6-7 b	4.0		
6-7 c	6.0		
6-8 a	2.0		
6-8 b	4.0		
6-8 c	6.0		

Project _____ W.O. No. _____ Sheet _____ of _____
Subject _____ By _____ Date _____
Chkd by _____ Date _____

AREA 2 SAMPLE COLLECTION:

3 LOCATIONS IN AREA 2

SUB-SAMPLE NO.	DEPTH (ft.)	COMP =	DATE COLLECTED
2-1 a	1.0	COMP-5	12/19/91
2-1 b	3.0		
2-1 c	5.0		
2-2 a	1.0		
2-2 b	3.0		
2-2 c	5.0	7	7
2-3 a	1.0	COMP-6	12/19/91
2-3 b	3.0		
2-3 c	5.0	7	7

AREA 5 SAMPLE COLLECTION:

2 LOCATIONS IN AREA 5

SUB-SAMPLE NO.	DEPTH (ft.)	COMP =	DATE COLLECTED
5-1 a	1.0	COMP-5	12/19/91
5-1 b	1.5		
5-1 c	2.0		
5-2 a	1.0		
5-2 b	1.5		
5-2 c	2.0	7	7

**ERM-South, Inc.**

Environmental Resources Management

Project _____

W.O. No. _____

Sheet _____

of _____

Subject _____

By _____

Date _____

Chkd by _____

Date _____

AREA 4 SAMPLE COLLECTION:

19 LOCATIONS IN AREA 4

SUB SAMPLE NO.	DEPTH (ft)	COMP #	DATE COLLECTED
4-1 a	1.0	COMP-6	12/19/91
4-1 b	1.5		
4-1 c	2.0		
4-2 a	1.0		
4-2 b	1.5		
4-2 c	2.0		
4-3 a	1.0		
4-3 b	1.5		
4-3 c	2.0		
4-4 a	1.0	COMP-7	12/19/91
4-4 b	1.5		
4-4 c	2.0		
4-5 a	1.0		
4-5 b	1.5		
4-5 c	2.0		
4-6 a	1.0		
4-6 b	2.0		
4-6 c	3.0		
4-7 a	1.0	COMP-8	12/20/91
4-7 b	2.0		
4-7 c	3.0		
4-8 a	1.0		
4-8 b	2.0		
4-8 c	3.0		
4-9 a	1.0		
4-9 b	3.0		
4-9 c	5.0		
4-10 a	1.0		
4-10 b	3.0		
4-10 c	5.0		

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Environmental Resources Management

Project _____

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Sheet _____ of _____

Subject _____

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Date _____

AREA 4 SAMPLE COLLECTION (CONT.):

SUB-SAMPLE NO.	DEPTH (ft.)	COMP #	DATE COLLECTED
4-11 a	1.0	COMP-8	12/20/91
4-11 b	3.0	↓	↓
4-11 c	5.0	↓	↓
4-12 a	2.0	COMP-9	12/20/91
4-12 b	4.0	↓	↓
4-12 c	6.0	↓	↓
4-13 a	2.0	↓	↓
4-13 b	4.0	↓	↓
4-13 c	6.0	↓	↓
4-14 a	2.0	↓	↓
4-14 b	4.0	↓	↓
4-14 c	6.0	↓	↓
4-15 a	1.0	↓	↓
4-15 b	3.0	↓	↓
4-15 c	5.0	↓	↓
4-16 a	1.0	COMP-10	12/20/91
4-16 b	3.0	↓	↓
4-16 c	5.0	↓	↓
4-17 a	1.0	↓	↓
4-17 b	2.0	↓	↓
4-17 c	3.0	↓	↓
4-18 a	1.0	↓	↓
4-18 b	2.0	↓	↓
4-18 c	3.0	↓	↓
4-19 a	1.0	↓	↓
4-19 b	2.0	↓	↓
4-19 c	3.0	↓	↓

APPENDIX C
CROSS SECTION OF AREA 1





ERM-South, Inc.

Environmental Resources Management

Project Hawco

W.O. No. 144-2.93

Sheet 3 of 7

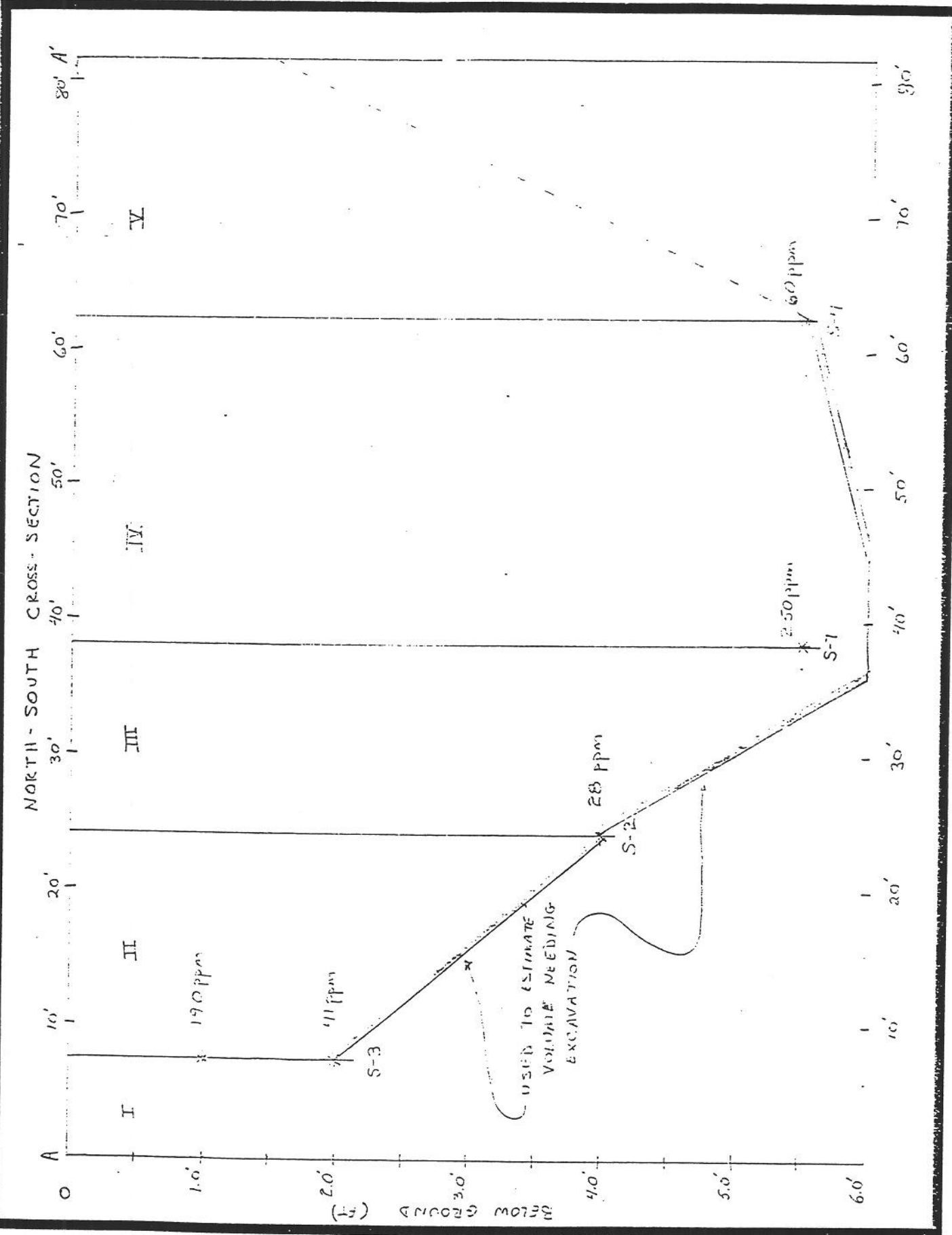
Subject North-South Cross-Section
A-A'

By MSF

Date 8/16/01

Chkd by _____

Date _____





ERM-South, Inc.

Environmental Resources Management

Project Howco

W.O. No. 14412.03

Sheet 4 of 7

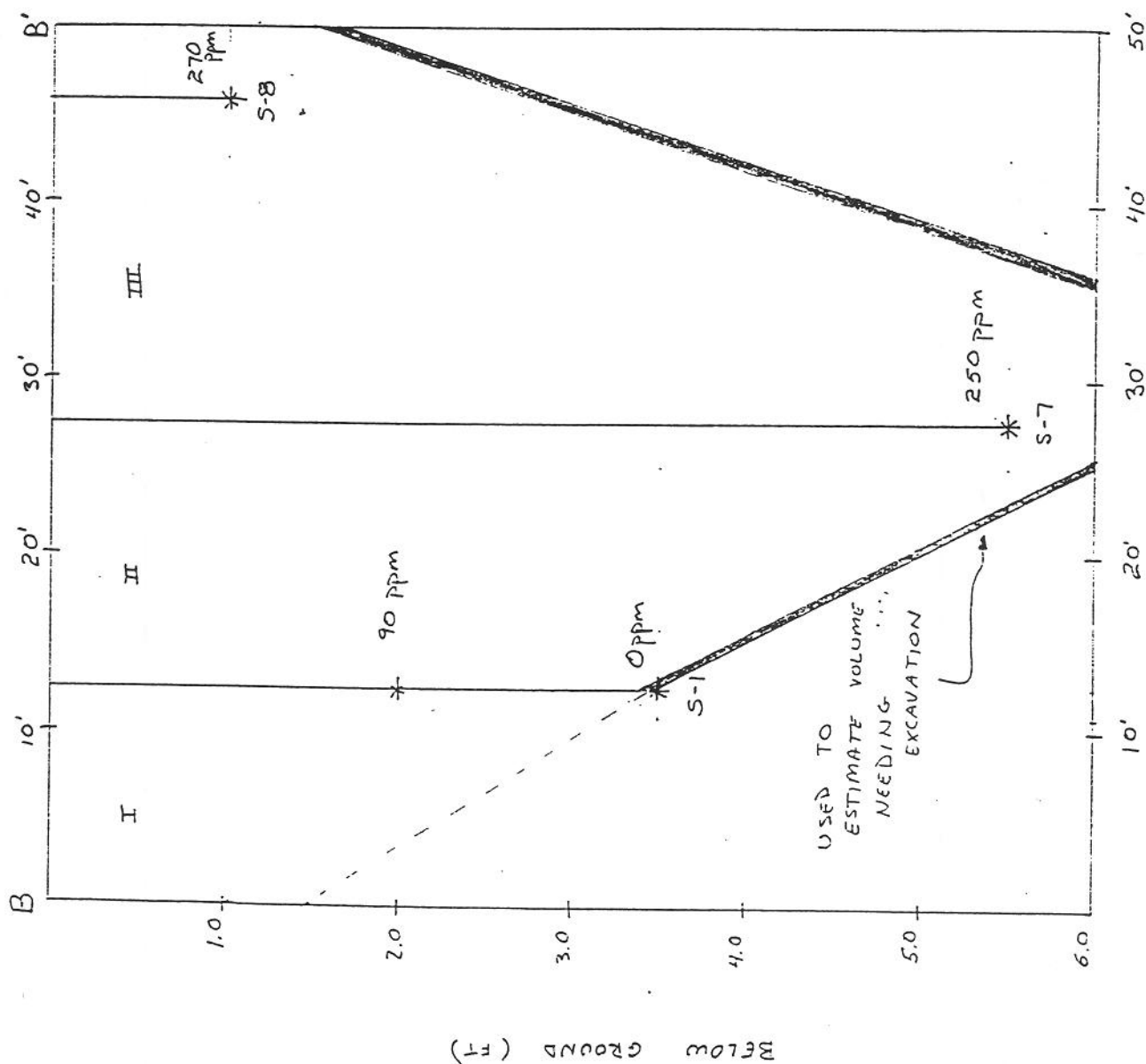
Subject EAST-WEST CROSS-SECTION B-B'

By MSH

Date 8/16/91

Chkd by

Date

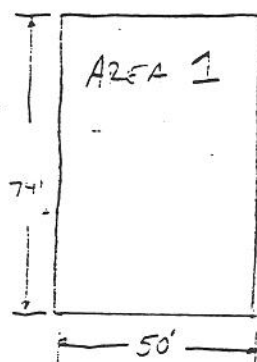


Project Howco W.O. No. 14412.03 Sheet 5 of 7
Subject AREA 1 VOLUME CALCULATION By MSH Date 8/17/91
Chkd by _____ Date _____

OBJECTIVE: DETERMINE THE VOLUME OF SOIL NEEDED
TO BE EXCAVATED FROM AREA 1.

- ASSUMPTIONS:
- 1) CROSS-SECTION (N-S and E-W) WILL BE AVERAGED TO DETERMINE VOLUME FOR EXCAVATION
 - 2) ONLY AREAS OBSERVED ARE CALCULATED IN TOTAL VOLUME (74' x 50')

TOTAL AREA FOR EXCAVATION (AREA 1)



FROM FIGURE 3 CROSS-SECTIONAL AREA

ASSUMPTION: CROSS-SECTION IS THE AVERAGE AREA OF
CONTAMINATED SOIL OVER AREA 1

N-S CROSS-SECTION AREA:

$$\text{AREA I} = (7.5 \text{ ft}) \left(\frac{2 + 1.5 \text{ ft}}{2} \right) = 13.13 \text{ ft}^2$$

$$\text{AREA II} = (17 \text{ ft}) \left(\frac{2 + 4 \text{ ft}}{2} \right) = 51 \text{ ft}^2$$

$$\text{AREA III} = (14 \text{ ft}) \left(\frac{4 + 6 \text{ ft}}{2} \right) = 70 \text{ ft}^2$$

$$\text{AREA IV} = (24 \text{ ft}) \left(\frac{6 + 5.5 \text{ ft}}{2} \right) = 138 \text{ ft}^2$$

$$\text{AREA V} = (19 \text{ ft}) \left(\frac{5.5 + 1.5 \text{ ft}}{2} \right) = 66.5 \text{ ft}^2$$

ROMAN NUMERALS CORRESPOND
TO AREAS IN FIGURE 3

$$\text{TOTAL X-SECT} = 338.63 \text{ ft}^2$$



Project HowCO W.O. No. 14412.03 Sheet 6 of 7
 Subject AREA 1 Volume Calc. (cont.) By MSH Date 8/17/91
 Chkd by _____ Date _____

THE N-S CROSS-SECTION IS THE AREA EFFECTED
 ACROSS A LENGTH OF 50 ft.

VOLUME OF SOIL : (using N-S X-SECTION)

$$(338.62 \text{ ft}^2)(50 \text{ ft}) = 16,931.5 \text{ ft}^3$$

$$\text{VOL.} = \frac{16,931.5 \text{ ft}^3}{27 \text{ ft}^3} \text{ C.Y.} = 627 \text{ C.Y.}$$

E-W CROSS-SECTION AREA: (Figure 4)

$$\text{Area I} = (13 \text{ ft}) \left(\frac{1.5 + 3.5}{2} \text{ ft} \right) = 32.5 \text{ ft}^2$$

$$\text{Area II} = (15 \text{ ft}) \left(\frac{3.5 + 6}{2} \text{ ft} \right) = 71.25 \text{ ft}^2$$

$$\text{Area III} = (23 \text{ ft}) \left(\frac{6.0 + 1.5}{2} \text{ ft} \right) = 86.25 \text{ ft}^2$$

ROMAN NUMERALS correspond
 TO AREAS IN Figure 4

$$\text{TOTAL X-SECT} = 190 \text{ ft}^2$$

THE E-W CROSS-SECTION IS THE AREA EFFECTED
 ACROSS A LENGTH OF 74 feet

VOLUME OF SOIL : (using E-W X-SECTION)

$$(190 \text{ ft}^2)(74 \text{ ft}) = 14060 \text{ ft}^3$$

$$\text{VOL.} = \frac{14060 \text{ ft}^3}{27 \text{ ft}^3} \text{ C.Y.} = 521 \text{ C.Y.}$$

CONCLUSION:

$$\text{AVE} = \frac{521 + 627}{2} = 574 \text{ C.Y.}$$

Approximately 574 CY OF SOIL NEEDS
 TO BE REMOVED



ERM-South, Inc.

Environmental Resources Management

Project Howco

W.O. No. 1412.03

Sheet 7 of 7

Subject Area 2 Volume Calculation

By MSL

Date 2/17/01

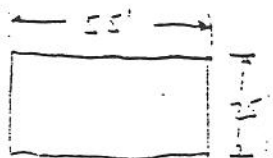
Chkd by

Date

OBJECTIVE: DETERMINE VOLUME OF SOIL NEEDED
TO BE EXCAVATED FROM AREA 2.

ASSUMPTION: 1) DEPTH \rightarrow 5.0 feet OVER ALL OF
AREA 2 (AVERAGE OF 5.0 feet, ISOLATED AREA, MAJOR
DRAINAGE)
2) ONLY AREAS OBSERVED ARE CALCULATED
IN TOTAL VOLUME (55' X 25')

TOTAL AREA FOR EXCAVATION (AREA 2)



$$\begin{aligned} \text{Volume} &= L \times W \times D \\ &= (55') (25') (5') = 6875 \text{ ft}^3 \\ &= \frac{6875 \text{ ft}^3}{27 \text{ ft}^3} \times \text{C.Y.} = 255 \text{ C.Y.} \end{aligned}$$

CONCLUSION: APPROXIMATELY 255 C.Y. OF SOIL
NEED EXCAVATION. ONLY AREAS
OBSERVED ARE IN TOTAL CALCULATION.

APPENDIX D
LABORATORY REPORTS



September 16, 1991

file
14412.03

Project No. 14412.03

MEMORANDUM

To: Project File, 14112.03

Copy: Paul Gruber
Robin Fornino
Sri Rao

From: Michael S. Helfrich *MSH*

RE: Laboratory Results from Composite Soil Samples Collected at HOWCO Oil Recovery Plant, St. Petersburg, Florida

On August 26, 1991, I travelled to HOWCO in St. Petersburg to collect a composite soil sample of two areas previously identified as petroleum contaminated (Field Memorandum dated August 16, 1991). The samples were collected and sent to Savannah Laboratories for analysis of PCB, TRPH, TCLP-RCRA metals, EPA Methods 8010 and 8020, and total halogens. The laboratory results were received September 11, 1991. The follow were detected:

Petroleum Hydrocarbons	15,000	mg/kg, dw
*Barium (TCLP)	0.097/0.085	mg/l
*Lead (TCLP)	0.45/0.41	mg/l
Ethylbenzene	110	ug/l, dw
Toluene	19	ug/l, dw
Trichloroethene	9.8	ug/l, dw
Xylene	160	ug/l, dw
Total halogens	820	mg/l, dw

Note:

* = First result is corrected, second is analytical for matrix spike.

dw = dry weight

Enclosed

Chain of Custody
Laboratory Results
Field Notes

REC'D SEP 11 1991

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

6712 Benjamin Road • Suite 100 • Tampa, FL 33634 • (813) 885-7427 • Fax (813) 885-7049

LOG NO: B1-34070

Received: 27 AUG 91

Mr. Mike Helfrich
ERM-South Inc.
9501 Princess Palm Avenue
Tampa, FL 33619

Project: 14412.03

REPORT OF RESULTS

Page 1

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	SAMPLED BY
34070-1	Composite Soil (corrected/analytical)	Client
PARAMETER	34070-1	
PCB in soil		
PCB-1016, mg/kg dw	<80	
PCB-1221, mg/kg dw	<80	
PCB-1232, mg/kg dw	<80	
PCB-1242, mg/kg dw	<80	
PCB-1248, mg/kg dw	<80	
PCB-1254, mg/kg dw	<80	
PCB-1260, mg/kg dw	<80	
Petroleum Hydrocarbons , mg/kg dw	15000	
Metals in TCLP		
Arsenic (TCLP), mg/l	<0.20	
Barium (TCLP), mg/l	0.097/.085	
Cadmium (TCLP), mg/l	<0.010	
Chromium (TCLP), mg/l	<0.050	
Lead (TCLP), mg/l	0.45/0.41	
Selenium (TCLP), mg/l	<0.20	
Silver (TCLP), mg/l	<0.010	
Mercury (TCLP), mg/l	<0.020	

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REPORT OF RESULTS

Page 2

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	SAMPLED BY
34070-1	Composite Soil (corrected/analytical)	Client
PARAMETER	34070-1	
Volatile Organics		
Benzyl chloride, ug/kg dw	<5.6	
Bromobenzene, ug/kg dw	<5.6	
Bromodichloromethane, ug/kg dw	<5.6	
Benzene, ug/kg dw	<5.6	
Bromoform, ug/kg dw	<28	
Bromomethane, ug/kg dw	<5.6	
Carbon tetrachloride, ug/kg dw	<5.6	
Chlorobenzene, ug/kg dw	<5.6	
Chloroethane, ug/kg dw	<5.6	
Chloroform, ug/kg dw	<5.6	
1-Chlorohexane, ug/kg dw	<5.6	
2-Chloroethylvinyl ether, ug/kg dw	<5.6	
Chloromethane, ug/kg dw	<5.6	
Chlorotoluene, ug/kg dw	<5.6	
Dibromochloromethane, ug/kg dw	<5.6	
Dibromomethane, ug/kg dw	<5.6	
1,2-Dichlorobenzene, ug/kg dw	<5.6	
1,3-Dichlorobenzene, ug/kg dw	<5.6	
1,4-Dichlorobenzene, ug/kg dw	<5.6	
Dichlorodifluoromethane, ug/kg dw	<5.6	
1,1-Dichloroethane, ug/kg dw	<5.6	
1,2-Dichloroethane, ug/kg dw	<5.6	
1,1-Dichloroethene, ug/kg dw	<5.6	

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REPORT OF RESULTS

Page 3

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	SAMPLED BY
34070-1	Composite Soil (corrected/analytical)	Client

PARAMETER	34070-1
1,2-Dichloropropane, ug/kg dw	<5.6
1,3-Dichloropropylene, ug/kg dw	<5.6
Ethylbenzene, ug/kg dw	110
Methylene chloride, ug/kg dw	<5.6
1,1,2,2-Tetrachloroethane, ug/kg dw	<5.6
1,1,1,2-Tetrachloroethane, ug/kg dw	<5.6
Tetrachloroethene, ug/kg dw	<5.6
Toluene, ug/kg dw	19
1,1,1-Trichloroethane, ug/kg dw	<5.6
1,1,2-Trichloroethane, ug/kg dw	<5.6
Trichloroethene, ug/kg dw	9.8
Trichlorofluoromethane, ug/kg dw	<5.6
1,2,3-Trichloropropane, ug/kg dw	<5.6
Vinyl Chloride, ug/kg dw	<5.6
Xylenes, ug/kg dw	160
Total halogens, mg/kg dw	820
Percent Solids, %	93 %

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REPORT OF RESULTS

Page 4

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	SAMPLED BY
34070-2	Composite Soil Matrix Spike	Client
PARAMETER	34070-2	
Metals in TCLP		
Arsenic (TCLP), %	102 %	
Barium (TCLP), %	88 %	
Cadmium (TCLP), %	103 %	
Chromium (TCLP), %	98 %	
Lead (TCLP), %	92 %	
Selenium (TCLP), %	104 %	
Silver (TCLP), %	110 %	
Mercury (TCLP), %	87 %	

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REPORT OF RESULTS

Page 5

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SAMPLED BY
34070-3	Method Blank	Client
34070-4	Accuracy (% Recovery)	
34070-5	Precision (% RPD)	

PARAMETER	34070-3	34070-4	34070-5
PCB in soil			
PCB-1016, mg/kg dw	<80	---	---
PCB-1221, mg/kg dw	<80	---	---
PCB-1232, mg/kg dw	<80	---	---
PCB-1242, mg/kg dw	<80	---	---
PCB-1248, mg/kg dw	<80	86 %	0 %
PCB-1254, mg/kg dw	<80	---	---
PCB-1260, mg/kg dw	<80	---	---
Petroleum Hydrocarbons , mg/kg dw	<10	90 %	1.2 %

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Project: 14412.03

REPORT OF RESULTS

Page 6

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SAMPLED BY
34070-3	Method Blank	Client
34070-4	Accuracy (% Recovery)	
34070-5	Precision (% RPD)	

PARAMETER	34070-3	34070-4	34070-5
Volatile Organics			
Benzyl chloride, ug/kg dw	<5.0	---	---
Bromobenzene, ug/kg dw	<5.0	---	---
Bromodichloromethane, ug/kg dw	<5.0	---	---
Benzene, ug/kg dw	<5.0	105 %	1.9 %
Bromoform, ug/kg dw	<25	---	---
Bromomethane, ug/kg dw	<5.0	---	---
Carbon tetrachloride, ug/kg dw	<5.0	---	---
Chlorobenzene, ug/kg dw	<5.0	97 %	6.2 %
Chloroethane, ug/kg dw	<5.0	---	---
Chloroform, ug/kg dw	<5.0	---	---
1-Chlorohexane, ug/kg dw	<5.0	---	---
2-Chloroethylvinyl ether, ug/kg dw	<50	---	---
Chloromethane, ug/kg dw	<5.0	---	---
Chlorotoluene, ug/kg dw	<5.0	---	---
Dibromochloromethane, ug/kg dw	<5.0	---	---
Dibromomethane, ug/kg dw	<5.0	---	---
1,2-Dichlorobenzene, ug/kg dw	<5.0	---	---
1,3-Dichlorobenzene, ug/kg dw	<5.0	---	---
1,4-Dichlorobenzene, ug/kg dw	<5.0	---	---
Dichlorodifluoromethane, ug/kg dw	<5.0	---	---
1,1-Dichloroethane, ug/kg dw	<5.0	---	---

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Tampa, FL 33619

Project: 14412.03

REPORT OF RESULTS

Page 7

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID	SAMPLED BY
34070-3	Method Blank	Client
34070-4	Accuracy (% Recovery)	
34070-5	Precision (% RPD)	

PARAMETER	34070-3	34070-4	34070-5
1,2-Dichloroethane, ug/kg dw	<5.0	---	---
1,1-Dichloroethene, ug/kg dw	<5.0	115 %	21 %
1,2-Dichloropropane, ug/kg dw	<5.0	---	---
1,3-Dichloropropylene, ug/kg dw	<5.0	---	---
Ethylbenzene, ug/kg dw	<5.0	---	---
Methylene chloride, ug/kg dw	<5.0	---	---
1,1,2,2-Tetrachloroethane, ug/kg dw	<5.0	---	---
1,1,1,2-Tetrachloroethane, ug/kg dw	<5.0	---	---
Tetrachloroethene, ug/kg dw	<5.0	---	---
Toluene, ug/kg dw	<5.0	105 %	3.8 %
1,1,1-Trichloroethane, ug/kg dw	<5.0	---	---
1,1,2-Trichloroethane, ug/kg dw	<5.0	---	---
Trichloroethene, ug/kg dw	<5.0	115 %	17 %
Trichlorofluoromethane, ug/kg dw	<5.0	---	---
1,2,3-Trichloropropane, ug/kg dw	<5.0	---	---
Vinyl Chloride, ug/kg dw	<5.0	---	---
Xylenes, ug/kg dw	<5.0	---	---
Total halogens, mg/kg	<100	114 %	2.6 %

Method: EPA SW-846

HRS Certification #'s: 81291, 87279, E81005, E87052


Kathy Sheffield

REC'D OCT 29 1991

712 Benjamin Road • Suite 100 • Tampa, FL 33634 • (813) 885-7427 • Fax (813) 885-7049

LOG NO: B1-35621

Received: 15 OCT 91

Mr. Mike Helfrich
ERM-South Inc.
9501 Princess Palm Avenue
Tampa, FL 33619

Project: 14412.03

REPORT OF RESULTS

Page 1

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	SAMPLED BY
35621-1	Composite Soil	Client
PARAMETER	35621-1	
Arsenic, mg/kg dw	<1.0	
Barium, mg/kg dw	4.9	
Cadmium, mg/kg dw	<0.50	
Chromium, mg/kg dw	2.4	
Copper, mg/kg dw	170	
Mercury, mg/kg dw	0.026	
Manganese, mg/kg dw	<1.0	
Nickel, mg/kg dw	<1.0	
Percent Solids, %	93 %	



SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

512 Benjamin Road • Suite 100 • Tampa FL 33634 • (813) 885-7427 • Fax (813) 885-7049

LOG NO: B1-35740

Received: 18 NOV 91

Mr. Michael Helfrich
ERM-South Inc.
9501 Princess Palm Avenue
Tampa, FL 33619

Project: 14412.03
Sampled By: Client

REPORT OF RESULTS

Page 1

NO	SAMPLE DESCRIPTION	SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
40-1	Comp		11-16-91
PARAMETER		35740-1	
Lead, mg/kg dw		15	
Percent Solids, %		87 %	

ENVIROPACT, INC.

11300 43rd Street North
Clearwater, Florida 34622-4900
(813) 573-9663 Fax No. (813) 572-4915

REC'D DEC 31 1991

441.05

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Attn: MICHAEL HELFRICH

ERM

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TAMPA, FLORIDA 33619

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24 Dec 1991

Report T1-12-138-01

LAB ID. 84271,E84060

Sample Description:

CLEARWATER, FLORIDA

PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 1

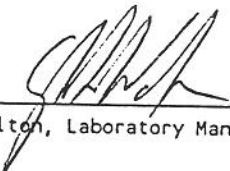
COLLECTED: 12/18/91

RECEIVED: 12/20/91

COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	15.2	mg/kg	3050/7420	2.0		12/23/91	KB

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ALL ANALYSIS PERFORMED BY EPA, ASTM, OR STANDARD METHODS


Steven L. Walton, Laboratory Manager



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Attn: MICHAEL HELFRICH

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24 Dec 1991

Report T1-12-138-02

LAB ID. 84271,E84060

Sample Description:

CLEARWATER, FLORIDA

PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 2

COLLECTED: 12/18/91

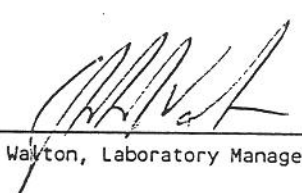
RECEIVED: 12/20/91

COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	3.22	mg/kg	3050/7420	2.0		12/23/91	KB

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Steven L. Walton, Laboratory Manager

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Attn: MICHAEL HELFRICH

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24 Dec 1991

Report T1-12-138-03

LAB ID. 84271,E84060

Sample Description:

CLEARWATER, FLORIDA

PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 3

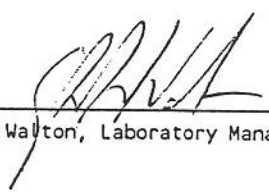
COLLECTED: 12/18/91

RECEIVED: 12/20/91

COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	10.8	mg/kg	3050/7420	2.0		12/23/91	KB

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24 Dec 1991
Report T1-12-138-04
LAB ID. 84271,E84060

Sample Description:
CLEARWATER, FLORIDA
PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 4
COLLECTED: 12/19/91
RECEIVED: 12/20/91
COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	14.6	mg/kg	3050/7420	2.0		12/23/91	KB

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Attn: MICHAEL HELFRICH

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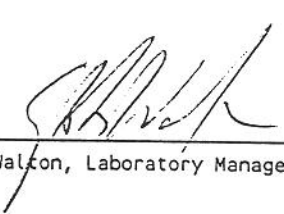
Page 5
24 Dec 1991
Report T1-12-138-05
LAB ID. 84271,E84060

Sample Description:
CLEARWATER, FLORIDA
PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 5
COLLECTED: 12/19/91
RECEIVED: 12/20/91
COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	405	mg/kg	3050/7420	2.0		12/23/91	KB

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Report T1-12-138-06
LAB ID. 84271,E84060


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TAMPA, FLORIDA 33619

Sample Description:
CLEARWATER, FLORIDA
PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 6
COLLECTED: 12/19/91
RECEIVED: 12/20/91
COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	456	mg/kg	3050/7420	2.0		12/23/91	KS

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Steven L. Walton, Laboratory Manager

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24 Dec 1991

Report T1-12-138-07

LAB ID. 84271,E84060

Sample Description:

CLEARWATER, FLORIDA

PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 7

COLLECTED: 12/19/91

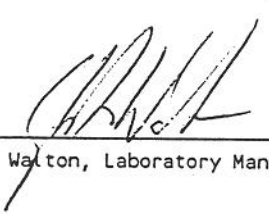
RECEIVED: 12/20/91

COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	367	mg/kg	3050/7420	2.0		12/23/91	KB

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TAMPA, FLORIDA 33619

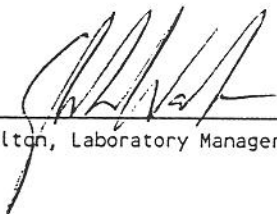
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24 Dec 1991
Report T1-12-138-08
LAB ID. 84271,E84060

Sample Description:
CLEARWATER, FLORIDA
PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 8
COLLECTED: 12/20/91
RECEIVED: 12/20/91
COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	549	mg/kg	3050/7420	2.0		12/23/91	KB

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Steven L. Walton, Laboratory Manager

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Attn: MICHAEL HELFRICH

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TAMPA, FLORIDA 33619

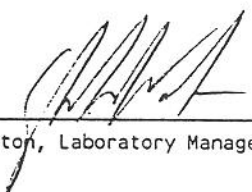
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24 Dec 1991
Report T1-12-138-09
LAB ID. 84271,E84060

Sample Description:
CLEARWATER, FLORIDA
PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 9
COLLECTED: 12/20/91
RECEIVED: 12/20/91
COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	489	mg/kg	3050/7420	2.0		12/23/91	KB

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24 Dec 1991
Report T1-12-138-10
LAB ID. 84271,E84060

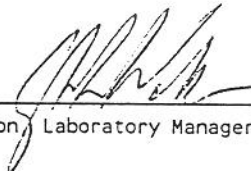
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TAMPA, FLORIDA 33619

Sample Description:
CLEARWATER, FLORIDA
PROJECT NUMBER: 14412.05

SAMPLE ID.: COMP - 10
COLLECTED: 12/20/91
RECEIVED: 12/20/91
COLLECTED BY: YOUR REP

Parameter	Result	Units	Method	Det. Limit	Extracted	Analyzed	Analyst
Lead, Total	549	mg/kg	3050/7420	2.0		12/23/91	KB

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