Manatee County Government
Public Works Department

1996/1997

GROUNDWATER MONITORING PLAN
BIANNUAL EVALUATION

Manatee County Solid Waste Management Facility
Lena Road Landfill

Permit No.: SO41 211176

Prepared For

Manatee County Government
Public Works Department
Solid Waste Division
3333 Lena Road
Bradenton, Florida 34202

Prepared By
Professional Service Industries, Inc.
4400 140th Avenue North Suite 100

PSI Environmental Geotechnical Construction
Consulting • Engineering • Testing

December 31, 1997

Manatee County Government
Public Works Department
Solid Waste Division
3333 Lena Road
Bradenton, Florida 34202

Attention: Mr. Benjamin L. Alex
Solid Waste Technical Coordinator

Re: 1996/1997 Groundwater Monitoring Plan Biannual Evaluation
Manatee County Solid Waste Management Facility
Lena Road Landfill
Permit No. SO41-211176
PSI Project No. 552-4L015-138

Dear Mr. Alex:

Enclosed is the Biannual Evaluation of the Groundwater Monitoring Plan for the Manatee County Solid Waste Management Facility, known as Lena Road Landfill, per F.A.C. Rule 62-701.510 (9) b. This Biannual Evaluation follows the revised Specific Conditions which were incorporated into the facility's operating permit No. S041 211176 on July 21, 1994 and noted herein. The latest amendments to the permit were completed on June 24, 1997. The latest modifications do not effect the Groundwater Monitoring Plan sampling or reporting requirements.

Please feel free to contact us if you have any further questions or comments regarding the status of the Annual Evaluation.

Sincerely,

PROFESSIONAL SERVICE INDUSTRIES, INC.

David A. Stedje, P.G.
Project Manager

John G. Barkey, P.G.
Senior Geologist

DAVID A. STEDJE LICENSE NO. 1944 STATE OF FLORIDA PROFESSIONAL GEOLOGIST

Copy to: Mr. Kim Ford, P.E., FDEP
Keith Butts, PSI Sarasota

Information To Build On

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1.0 EXECUTIVE SUMMARY

Professional Service Industries, Inc. (PSI) performed a Biannual Evaluation of the data gathered at the Manatee County Solid Waste Management Facility, known as Lena Road Landfill, for the site's Groundwater Monitoring Plan. This evaluation is designed to meet the report provisions of the Florida Department of Environmental Protection (FDEP) Permit No. SO41-211176 for the Lena Road Landfill. This evaluation provides an assessment of the existing landfill design and operation in relation to potential environmental impacts to groundwater within the facility. The evaluation/assessment was accomplished by analyzing data that has been compiled monthly and semi-annually over the time period of January 1, 1996 to June 23, 1997. The data consists of specific parameters requested by the FDEP permit for the site, as amended through June 24, 1997.

The subject site is located in east-central Manatee County within Section 1, Township 35 South, Range 18 East; Sections 6 and 7, Township 35 South, Range 19 East, and Section 31, Township 34 South, Range 19 East. The north boundary of the site runs along State Road 64. The site location is shown on a portion of the applicable U.S.G.S. map on Figure 1.

Based on the findings of our assessment, the following are the general trends and notable observations associated with the Lena Road Landfill:

- Based on a comparison of the average water table elevations in the monitor wells around the landfill stages, regional groundwater flow appears to be toward the northwest. The construction of the slurry wall system around the landfill stages (Stages I, II and III), and the leachate collection systems within the stages has created localized cells with opposing gradients, with the exception of the western side of Stage III, around each landfill stage. Due to the confining layer beneath the landfill the localized cells are restricted to the shallow or surficial aquifer.

- The monitor well hydrographs show a general decrease in the groundwater elevations through the second half of 1996, followed by a increase in the first half of 1997.

- For the shallow monitor wells, the analytical parameters that vary from FDEP Maximum Contaminant Levels include pH, total dissolved solids, and iron.

- For the deep monitor wells, the analytical parameters that vary from FDEP Maximum Contaminant Levels include total dissolved solids and iron.

- The upgradient/downgradient monitor well analysis revealed negligible changes in the levels of various parameters in monitor wells to the south and west of the landfill. These changes are not consistent with any impacts which could be representative of the landfill design or operation.

2.0 INTRODUCTION

2.1 Scope

The Biannual Groundwater Monitoring Plan Annual Evaluation herein referred to as the Biannual Evaluation or evaluation is designed to meet the annual report provision of the Florida Department of Environmental Protection (FDEP) Permit No. S041-211176 for the Manatee County Solid Waste Management Facility, known as Lena Road Landfill. The evaluation provides an assessment of the existing landfill design and operation in relation to potential environmental impacts to the facilities groundwater. The evaluation was accomplished by analyzing data that has been compiled monthly and semi-annually over the time period of January 1, 1996 to June 23, 1997. The data consists of specific parameters requested by the FDEP permit for the site. The data for the last semi-annual event for 1997 was not available at the time of this evaluation and is therefore not included in this report. However, the second half 1997 sampling event was completed during the second week of December, 1997, in accordance with the operating permit specific conditions.

The Biannual Evaluation focuses on significant trends and other pertinent features observed in the data compiled over the two (2) year period at the selected monitoring locations specified in the permit. The evaluation includes both tabular and graphical display's of pertinent data as well as an interpretation of the findings.

The data presented in this evaluation falls under the current operating permit, FDEP Permit No. SO41-211176, which was most recently amended on June 24, 1997. Since the issuance of the permit, the most significant changes which effect the Groundwater Monitoring Plan include:

- Collection of water levels from the monitor wells and piezometers on a monthly basis (formerly quarterly).
- Sampling and analysis of the monitor wells semi-annually for groundwater indicator parameters (formerly quarterly).
- Submission of the water quality analysis results semi-annually (formerly quarterly).
- Completion of the "annual report" every two (2) years (formerly annually).

2.2 Objective

The objective of the Biannual Evaluation is to present data and information as specified under the current permit (FDEP Permit No SO41-211176). The required data and information under the current permit includes all applicable information as required by F.A.C. Rule 62-701.510 (9) and

an assessment of the effectiveness of the existing landfill design and operation as related to the prevention of groundwater contamination.

2.3 Location

The Manatee County Solid Waste Management Facility, known as Lena Road Landfill, is located in east-central Manatee County within Section 1, Township 35 South, Range 18; East, Sections 6 and 7, Township 35 South, Range 19 East, and Section 31, Township 34 South, Range 19 East. The north boundary of the site approximately runs along State Road 64. The land use in the area surrounding the landfill is primarily rural light residential. The location of the subject landfill is superimposed on a portion of the Lorraine Quadrangle United States Geological Survey (USGS) topographic map in Figure 1, Appendix A.

2.4 Sources of Data

As noted in the previous Biannual Evaluation, the Revised Groundwater Monitoring Plan and subsequent addendum's were performed by Ardaman & Associates, Inc. These reports discuss the history, hydrogeological setting and groundwater conditions at the subject site and have been used as reference material in preparing this evaluation. The available previous reports are listed in the references section of this evaluation.

In addition, the Manatee County Government Public Works Department, Solid Waste Division, has provided PSI with copies of the 1996 and 1997 (first half) semi-annual water quality results for the monitoring well network as well as the monthly piezometer measurements obtained during the sampling periods. A copy of the current permit and the applicable amendments were also provided by the Public Works Department.

The 1994/1995 Biannual Evaluation, prepared by PSI, was also used for comparison to the 1996/1997 data.

3.0 SITE BACKGROUND

3.1 Site History and Previous Investigations

The Lena Road Landfill is constructed of three (3) stages. Stage I is the existing landfill area. Stage II is an inactive landfill area located to the north of Stage I. Refuse is not located in the Stage II area. Stage III (formerly the Gun Club landfill) is located to the west of the Stage I area. Refuse from a currently inactive landfill is located within the Stage III area.

As part of a seepage control system, a slurry wall system was installed around the three stages of the Lena Road Landfill between August 29, 1985 and September 22, 1989. Stage I construction was completed between August 29, 1985 and November 14, 1985. Stage II was completed between August 20, 1989 and September 22, 1989. Stages I, II and III also have FDEP approved and permitted leachate recovery systems. The leachate recovery systems were installed inside the perimeters of the landfill's slurry walls in each stage.

Previous evaluations were completed for the operating years 1992/1993 and 1994/1995.

A review of the 1994/1995 Biannual Evaluation indicates the landfill design and use has historically been effective in preventing significant impacts to the groundwater quality at the selected sampling locations. Water quality parameters that did vary from FDEP Groundwater Guidance Concentrations included pH, total dissolved solids, turbidity, color, and iron; however, comparisons between background shallow and deep monitor wells and the landfill monitor wells indicated these parameters were not outside the range of local "normal" background conditions. Additionally, these parameters have been outside of the "normal" range for the last two evaluations and appear to be indicative of natural site conditions.

The 1994/1995 evaluation indicated that one deep monitor well (SA-2) appeared to be screened within portions of the surficial and deep aquifer zones. The results of the FDEP recommended evaluation of this well are summarized in Sections 5.3 and 6.3.1.

3.2 Hydrogeological Setting

3.2.1 Subsurface Profile

The results from the standard penetration test (SPT) borings from previous reports (Ardaman & Associates, 1990) were reviewed by PSI. SPT borings were performed within the subject site and around the perimeter of the slurry wall system. Data from these borings indicated the following:

- a surficial fine sand to clayey fine sand, and
- a relatively impervious stratum of clayey sand to clay (the confining layer).

The surficial sandy soils generally consist of brown to gray fine sands to silty fine sand interbedded with gray clayey fine sands. The thickness of the surficial sandy soils is typically 10-15 feet, overlying the confining layer. The clayey stratum begins about 15 feet below land surface and extends to the top of the Tampa Limestone unit, approximately 335 feet below land surface.

3.2.2 Summary of Existing Landfill Design

The confining layer is a virtually impervious stratum of clayey sand to clay which contains interbedded seams of silt and sand most prevalent between 50 to 150 feet below land surface. The upper portion of the confining unit consists of clay, silt, or very clayey sand. However, the predominant layer at the top of the confining unit is a green to gray clayey sand to clay with phosphate. The major facies of the top of the confining unit are as follows:

- a gray and green to brown sandy clay to clay,
- a gray and green clayey sand, and
- a gray dolosilt.

The upper part of the confining unit beneath the Lena Road Landfill also contains approximately 50 feet of alternating layers of highly plastic clay, slightly sandy to sandy clay, clayey to slightly clayey sand, and occasional lenses of silty fine sand.

The coefficient of vertical permeability was found to be $5x10^{-8}$ centimeters per second (cm/s) for the top portion of the confining unit (Ardaman & Associates, Inc. January, 1990). The GWMP states that based on the hydraulic characteristics of the upper confining unit at the landfill the downward seepage rate is estimated to be on the order of 0.2 inches per year (Ardaman & Associates, Inc. January, 1990). The lower portion of the clayey unit beneath the upper confining unit consists of clayey sands to clay with rock lenses to 335 feet below land surface. The water table is approximately 13 feet above the potentiometric surface at the first artesian aquifer.

The classification of the soils listed above is based on the Unified Soil Classification System (USCS). This classification system is based on the grain size and plasticity of the soils and ranges from clayey sands to highly plastic, inorganic clay or sandy clay (Ardaman & Associates, Inc. January, 1990).

4.0 DATA COLLECTION

4.1 Methods

The water quality data used for this evaluation was obtained from the groundwater quality reports that have been submitted to the Florida Department of Environmental Protection over the past two years (1996 and 1997). Our review of the data supplied by Manatee County indicates that the

sampling, collection, and testing procedures were in accordance with the applicable procedures set forth by the Florida Department of Environmental Protection and the Department approved Groundwater Monitoring Plan.

The collected groundwater samples were analyzed by P. E. LaMoreaux & Associates, Inc. (PELA), a geochemistry laboratory located in Lakeland, Florida. The State of Florida certification numbers for PELA are E 84098 and 84183. The methods used by PELA are from "Standards Methods for the Methods of Water and Wastewater," latest edition APHA, AWWA, and WPCF, and/or other EPA approved methods which meet FDEP protocol. A copy of the approval letter for P.E. LaMoreaux and Associates, Inc. annual CompQAP review was submitted to the FDEP in accordance with permit Specific Condition #30.

The water levels obtained from the monthly monitoring, Specific Condition # 29, were evaluated for the periods corresponding with the semi-annual groundwater sampling events. The static water table elevation values obtained from each piezometer and shallow aquifer groundwater monitoring well were used to create the shallow aquifer groundwater elevation contour maps included in Appendix A. The use of the monthly inward gradient report data was necessary to evaluate the shallow groundwater flow at the site for this evaluation since the monthly events are the only time water levels are measured in both the piezometers and the shallow monitor wells at the same time. The groundwater elevations for the shallow monitor wells shown on the analytical summary tables in Appendix C are from the actual sampling events and do not correspond with those shown on Figures 3, 4 and 5, Appendix A.

4.2 Groundwater Sampling Periods

In accordance with the amended permit, groundwater data was obtained semi-annually. The first half 1996 samples were collected on August 26-29, 1996. The second half 1996 groundwater samples were collected on November 18-20, 1996. In 1997 the first half groundwater samples were collected on June 23-26, 1997.

The monthly inward gradient water level measurement dates used for the shallow aquifer groundwater contour maps were August 21, 1996, November 18, 1996 and June 16, 1997.

4.3 Omissions in Data Collection

Data from the second half 1997 semi-annual groundwater sampling event was not available at the time of this report for review under this evaluation since the sampling event was completed in mid-December 1997.

Within the three semi-annual events evaluated only one variance from the specified protocol was noted. The second half 1996 sampling event omitted the turbidity measurement and included bicarbonate alkalinity analysis results.

5.0 GROUNDWATER TREND ANALYSIS

5.1 Groundwater Background Information

The USDA Soil Survey of Manatee County (April 1983) gives general soil descriptions for the soils found in the vicinity of the landfill, including typical water table information. The majority of soils in the area are classified as "EauGallie Fine Sand." Other soils that are interspersed within this main area include, "Cassia fine sand, moderately well drained," "Canova, Anclote, and Okeelanta soils," Delray Complex," and "Floridana-Immokalee-Okeelanta Association."

In general, the water table exhibited by the predominant soil in the area, "EauGallie Fine Sand," is at a depth of less than 10 inches for two to four months during wet season and within a depth of 40 inches for more than six months out of the year. This soil exhibits a permeability that is rapid in the surface and subsurface layers and moderate to moderately rapid in the subsoil and substratum. The other soils found in the area exhibit roughly the same groundwater level and permeability as the "EauGallie Fine Sand" soils.

In its natural state, the water table configuration within the shallow zone usually follows the same shape as the ground surface. Locally, groundwater in the surficial aquifer would flow toward relief points along natural or artificial channels and depressions in the land surface. Previous reports indicate that the local relief points around this site are toward the intermittent stream north of Stage II and toward the intermittent tributary as part of Cypress Strand west of Stage I, south of Stage III, and the headwaters of Cypress Strand at the south end of Stage I.

The construction of the Lena Road Landfill alters the natural groundwater levels throughout the year. The slurry wall around the landfill creates an isolated environment within the landfill boundaries. Variables such as the landfill heights, fill areas, varying compaction, varying types of refuse, varying porosity's of refuse, and other factors continually influence the groundwater flow direction within the landfill boundaries. The slurry wall creates a "dam" in the natural groundwater flow pattern, so that the shallow groundwater would be expected to backup on the upgradient side of the landfill and flow around the edges. The following sections evaluate the groundwater level measurements reported over the past eight quarters through contour maps and individual well hydrographs. The monitor well and piezometer locations at the landfill site are provided in Figure 2, Appendix A. The following table lists the existing monitor wells located at the landfill. The well type and aquifer monitored are listed in the table to aid in data interpretation.

GROUNDWATER MONITORING WELLS AT LENA ROAD LANDFILL		
MONITORING WELL	AQUIFER	WELL TYPE
LRII-1	Surficial	Detection/Compliance
LRII-2	Surficial	Detection/Compliance
LRII-3	Surficial	Detection/Compliance
LRII-4	Surficial	Detection/Compliance
LRII-5	Surficial	Detection/Compliance
MW-1	Surficial	Compliance
MW-2	Surficial	Detection/Compliance
MW-3	Surficial	Detection/Compliance
MW-5	Surficial	Detection/Compliance
MW-6	Surficial	Detection/Compliance
CW-4	Surficial	Compliance
CW-5A	Surficial	Detection/Compliance
GC-1A	Surficial	Detection/Compliance
GC-2	Surficial	Detection/Compliance
GC-3	Surficial	Detection/Compliance
GC-4	Surficial	Detection/Compliance
GC-5	Surficial	Detection/Compliance
GC-6	Surficial	Background
SMR-1	Surficial	Background
SMR-2	Artesian (deep)	Background
SA-2	Artesian (deep)	Detection/Compliance
SA-3	Artesian (deep)	Detection/Compliance
SA-4	Artesian (deep)	Detection/Compliance
SA-5	Artesian (deep)	Detection/Compliance
SA-6	Artesian (deep)	Detection/Compliance
SA-7	Artesian (deep)	Detection/Compliance
SA-8	Artesian (deep)	Detection/Compliance
PZ-1	Surficial	Piezometer
PZ-2	Surficial	Piezometer
PZ-3	Surficial	Piezometer
PZ-4	Surficial	Piezometer
PZ-4A	Surficial	Piezometer
PZ-5	Surficial	Piezometer
PZ-6	Surficial	Piezometer
PZ-7	Surficial	Piezometer
PZ-8	Surficial	Piezometer
PZ-9	Surficial	Piezometer
PZ-10	Surficial	Piezometer
PZ-11	Surficial	Piezometer
PZ-12	Surficial	Piezometer
PZ-13	Surficial	Piezometer
PZ-14	Surficial	Piezometer
PZ-15	Surficial	Piezometer
PZ-15A	Surficial	Piezometer
PZ-16	Surficial	Piezometer
PZ-17	Surficial	Piezometer

5.2 Groundwater Elevation Map Analysis

5.2.1 Shallow Wells

The groundwater elevation contour maps presented as Figures 3, 4 and 5 in Appendix A, are estimates of the groundwater flow conditions during the periods around the semi-annual groundwater sampling events in 1996 and 1997. The groundwater elevations shown were obtained from the monthly water gradient measurements made during the same months as the groundwater sampling events. The elevations obtained during the actual sampling events are shown on the analytical summary tables in Appendix C. The monitoring wells are located along the perimeter of the Lena Road Landfill and the piezometers mirror the locations of the monitoring wells on the inside of the slurry wall system of the landfill.

Figures 3, 4 and 5, Appendix A, indicate that the regional groundwater flow of the shallow aquifer appears is toward the northwest across the landfill. As expected, the slurry wall and leachate collection systems that surround the three landfill stages have created localized cells of groundwater flow in and around each landfill stage.

Topographic features combined with the leachate collection system's effects have created localized groundwater mounds within each stage. Groundwater flow within each landfill stage is outward from the center toward the leachate collection system surrounding the cell. In general, comparisons of the water table elevations from opposing shallow monitor wells and piezometers indicates an inward gradient around each landfill stage. An apparent outward gradient is observed in the area of Stage III between GC-1A, PZ-15A and PZ-15. PZ-15A was installed in March 1996 to monitor groundwater elevations in this area of Stage III. This area of Stage III is adjacent to one of the main headwater channels for Cypress Strand Creek, and is therefore, topographically lower than the surrounding land surface. This natural topographic low tends to accentuate the hydraulic inbalance between the shallow groundwater levels within the landfill stage and the area immediately to the west of Stage III. As described in Section 6.2, groundwater flow across the slurry wall system is not indicated by "abnormal" analytical trends in the area to the west of Stage III. Nevertheless, the leachate collection system in this area is scheduled for repair to correct the outward gradient.

5.2.2 Deep Wells

The groundwater elevation maps presented as Figures 6, 7 and 8 in Appendix A, are estimates of the deep aquifer groundwater flow conditions during the periods of the semi-annual groundwater sampling events in 1996 and 1997. The groundwater elevations were measured at each of the available deep wells during the two year period. The groundwater elevation contour maps represent snapshots of the deep groundwater flow patterns at the

time of the sampling events. The deep monitor wells are generally located along the north and western sides of the landfill, particularly stages II and III.

Analysis of the deep groundwater flow patterns indicates the regional groundwater flow pattern is toward the north and west. This corresponds with the general trend indicated by the shallow wells and piezometers. A copy of the potentiometric surface map for the Floridan Aquifer is included as Figure 9, Appendix A. As shown on Figure 9 the general trend within the Floridan Aquifer in September 1996 was toward the north and west. The groundwater elevations shown on Figure 9 correspond closely with those observed during the semi-annual sampling events.

5.3 Monitoring Well Hydrograph Analysis

The monitoring well hydrographs presented in Appendix B are based on the groundwater elevation measurements obtained during the two year evaluation period beginning January 1, 1996. The evaluation is for all of the shallow and deep monitor wells at the facility. The piezometer data was not included in this analysis.

Based on an analysis of the hydrographs, the average fluctuation of the groundwater level over the two year period at the shallow well locations was approximately 1.6 feet. In comparison, the average fluctuation for the 1994/1995 evaluation period was 3.2 feet. Over the 1996/1997 evaluation period the average fluctuation of the deep wells was approximately 3.9 feet. Over the same period during the 1994/1995 evaluation period the average fluctuation in the deep wells was 7.0 feet.

The general trend for the shallow monitor wells is for a gradual decrease in groundwater elevations between the first half and second half, 1996, followed by a general increase in the first half of 1997. This general trend is evident in nearly all of the monitor wells. The largest fluctuations in the shallow aquifer were observed in the vicinity of Stage II. The general trend for the deep monitor wells was decreasing water levels throughout the evaluation period. The overall trends are as follows:

- Between Half 1, 1996 and Half 2, 1996 there is an average decrease in the groundwater level of approximately 1.4 feet for the shallow wells and 0.63 feet for the deep wells.

- Between Half 2, 1996 and Half 1, 1997 there is an average rise in the groundwater level of approximately 0.04 feet for the shallow wells and an average decrease in the groundwater levels in the deep wells of 3.31 feet.

There are a few cases where the fluctuation of groundwater levels at an individual well does not support the general behavior exhibited by the groundwater levels overall. These cases may be

attributed to local geologic or hydrologic influence, and/or perhaps errors in the measurement procedures or in the reporting of the data. These outliers were visually smoothed during the development of the groundwater contour maps included in Appendix A of this report.

Significantly, the groundwater elevation at deep well SA-2, which during the 1994/1995 evaluation period exhibited a water level characteristic of the shallow aquifer, correlated with the other deep wells during all three 1996/1997 sampling events. This data suggests that SA-2 is screened within the deep aquifer as originally designed. The groundwater elevation at SA-7 appeared to be higher than the adjacent deep monitor well SA-8 and did not fit with the overall groundwater contour pattern. Data from SA-7 was not used for the deep aquifer groundwater contour maps.

5.4 Shallow and Deep Well Comparison

The groundwater elevation data for the 1996/1997 evaluation period from three adjacent pairs of shallow and deep monitor wells; GC-1A and SA-4, LRII-2 and SA-5, and LRII-4 and SA-8, were evaluated to assess an average vertical hydraulic gradient at the site. A variation of the Darcy flow equation was utilized with the known screen lengths, well depths and estimated thickness of the confining layer (125 feet) to determine the average value of vertical hydraulic gradient. The calculations are shown on the following table.

Measurement Date	Shallow and Deep Well Pair Gradient		
	GC-1A/SA-4	LRII-2/SA-5	LRII-4/SA-8
Half 1, 1996	(26.62-17.32)/125 = 0.074 ft/ft	(31.28-19.96)/125 = 0.091 ft/ft	(27.92-16.46)/125 = 0.092 ft/ft
Half 2, 1997	(26.26-15.59)/125 = 0.085 ft/ft	(29.41-19.35)/125 = 0.080 ft/ft	(25.95-16.17)/125 = 0.078 ft/ft
Half 1, 1997	(26.59-12.94)/125 = 0.109 ft/ft	(28.57-16.15)/125 = 0.099 ft/ft	(25.53-12.31)/125 = 0.105 ft/ft
Averages	0.089 ft/ft	0.090 ft/ft	0.092 ft/ft

Based on the available data and known and estimated site conditions, the average vertical gradient is 0.09 feet/foot. The trend of the gradient is for flow from the surficial aquifer to the deep aquifer; however, as indicated in Section 3.2.2, the vertical permeability of the confining unit beneath the surficial aquifer was found to be 5×10^{-8} centimeters per second (cm/s) (Ardaman and Associates, Inc., 1990). Therefore, vertical flow should be highly retarded in areas where the confining unit is continuous.

6.0 GROUNDWATER ANALYTICAL TREND ANALYSIS

6.1 Groundwater Analytical Parameters

The current permit (FDEP Permit No. SO41-211176) at the Lena Road Landfill requires that each monitoring well at the subject landfill and the leachate produced at the subject landfill undergo semi-annual analysis for the parameters specified in the FDEP permit. These parameters are also listed in the state guidelines for Solid Waste Management Facilities, F.A.C. Rule 62-701.510 (8) - 62-701.510 (9). The maximum contaminant levels are acquired per F.A.C. Chapter 62-550 for Drinking Water Standards, Monitoring, and Reporting unless otherwise indicated. The parameters whose MCL is listed as "**" do not currently have an MCL per the Drinking Water Standards. The specified parameters and their respective maximum contaminant levels for monitoring wells are listed in the following table:

MONITORING WELL QUARTERLY ANALYSIS PARAMETERS	
FIELD PARAMETERS	MCL
Static Water Level - NGVD	Seasonal - Foot
Conductivity	**
pH	6.5 - 8.6 SU
Dissolved Oxygen	**
Turbidity	**
Temperature	Seasonal - °C
Color/Sheen	15 CPU
Total Ammonia (as N)	**
Antimony	0.006 mg/l
Arsenic	0.05 mg/l
Barium	2.0 mg/l
Beryllium	0.004 mg/l
Cadmium	0.005 mg/l
Chromium	0.1 mg/l
Chlorides	250 mg/l
Cobalt	**
Copper	1 mg/l
Iron	0.3 mg/l
Lead	0.015 mg/l
Mercury	0.002 mg/l
Nickel	0.1 mg/l
Nitrate (as N)	10.0 mg/l
Selenium	0.05 mg/l
Sodium	160 mg/l
Silver	0.1 mg/l
Thallium	0.002 mg/l
Vanadium	**
Zinc	5.0 mg/l
Total Dissolved Solids	500 mg/l
Total Organic Carbon	**
EPA 8260 Parameters	Varies by parameter

The field parameters on the previous table were evaluated at the well sampling point. If the laboratory value or field value were not available, it is indicated by a "-" in the appropriate column. Values below the laboratory detection limits are generally listed with a less than sign preceding the laboratory detection limit. The data was reviewed for general trend analysis and fluctuation from average or typical values concerning semi-annual changes in groundwater quality, comparison of shallow/deep zone wells, comparison of upgradient/downgradient wells, and correlation between related parameters. A compilation of the data for Half 1, 1996 through Half 2, 1997 for each monitor well is provided in Tables 1 - 27, Appendix C of this report.

6.2 Shallow Zone Monitoring Well Analysis

The monitoring wells at the Lena Road Landfill are grouped in two major categories in relation to their total depth. These categories are shallow and deep monitoring wells, or, wells that tap the surficial aquifer or the artesian aquifer, respectively. The data analysis from each of these well categories is used to evaluate the effectiveness of the landfill design and the relative extent of the potential for groundwater contamination. For the purposes of this annual evaluation the shallow wells are defined as ranging in depth from 10 - 25 feet below the surface. A listing of the shallow wells and their total depths are provided below:

TOTAL DEPTH OF SHALLOW ZONE MONITORING WELLS (FEET)			
Monitoring Well	Depth	Monitoring Well	Depth
MW-1	14.53	LRII-4	22.50
MW-2	13.97	LRII-5	22.78
MW-3	13.97	GC-1A	23.76
MW-5	21.42	GC-2	18.03
MW-6	20.72	GC-3	22.58
CW-4	17.91	GC-4	22.18
CW-5A	11.92	GC-5	22.02
LRII-1	21.12	GC-6	22.40
LRII-2	22.83	SMR-I	22.88
LRII-3	22.61		

6.2.1 Shallow Monitoring Well Analytical Trends

The measurements for antimony barium, beryllium, cadmium, chlorides, chromium, cobalt, copper, lead, mercury, nitrates, nickel, selenium, silver, sodium, thallium, vanadium and zinc were below maximum contamination levels (MCLs). The concentration of arsenic exceeded the MCL on the three measurement dates at GC-2

(0.058 mg/l, 0.066 mg/l and 0.081, respectively). The arsenic MCL was previously exceeded at GC-2 during the 1994/1995 evaluation period.

Fluctuations in the other reported values for the parameters were slight and were not affected largely by seasonal changes in the water levels. All organic constituents listed in EPA Method 8260 were below their respective MCLs during the 1996/1997 semi-annual sampling events.

6.2.2 Shallow Monitoring Wells: With MCL Exceedance

Parameters that were either exceptions to the general trends or exceeded the maximum contaminant level (MCL) are discussed below. A historical review of these parameters indicates that the measured levels are common to this region and while sometimes outside of state guidelines they do not appear to be indicative of changes induced by the landfill design or operation.

- *Total Dissolved Solids* - The maximum contaminant level (MCL) for total dissolved solids (TDS) is 500 mg/l, as indicated by F.A.C. Rule 62-550. The TDS values for the majority of the shallow wells ranged from 52 mg/l to 468 mg/l and fell within the MCL of 500 mg/l. A tabular and graphic representation of these semi-annual TDS values over all shallow wells is presented on Table 28, Appendix D, of this report.

  Monitor wells GC-1A, CW-4 and CW-5A experienced fluctuations in the levels of TDS that exceeded the MCL. Monitor wells GC-1A is located on the west side of Stage III. Monitor well GC-1A slightly exceeded the TDS MCL during all three sampling events. GC-1A also exceeded the TDS MCL during one 1994/1995 sampling event. Monitor wells CW-4 and CW-5A are located upgradient of the landfill to the south of Stage I. Monitor well CW-4 exceeded the MCL during the entire 1996/1997 evaluation period. CW-5A exceeded the MCL during the half 1, 1996 sampling period. Similar results for these monitor wells were noted during the 1994/1995 evaluation period.

- *pH* - The regulatory range for pH is between 6.5 SU and 8.5 SU, as indicated by the F.A.C. Rule 62-550. All of the shallow monitoring wells exhibited pH values outside of the normal range during the 1996/1997 evaluation period.

  Generally, the groundwater sample analysis yielded pH values consistently below the accepted value. According to the USDA Soil Survey of Manatee County, the pH values typical of soils in the vicinity of the landfill range from 4.5 SU to 8.4 SU. The soil survey indicates that some of the soils in the area of the landfill

possess a natural acidity. The general trend of the pH values measured during 1994-1995 evaluation period was similar. This suggests no causal link between the pH values observed in the shallow monitor wells and the current design and use of the landfill. SMR-1 is a background shallow well with consistent low pH values. Table 29, Appendix A, illustrates the pH trends over the evaluation period.

- *Iron* - The maximum contaminant level for iron in groundwater is 0.3 milligrams per liter (mg/l), as per the Florida Groundwater Guidance Concentrations. All of the shallow monitor wells located throughout the landfill site had iron levels that exceeded the recommended value of 0.3 mg/l. The iron levels of the monitoring wells ranged between 1.19 mg/l to 37.4 mg/l. The highest concentrations were noted in GC-2 and LRII-1. A tabular and graphical representation of these semi-annual iron concentration values over all shallow wells is presented in Table 30, Appendix D, of this report.

  Iron concentrations in the background monitor well SMR-1 were consistent with the values observed in the landfill monitor wells.

- *Color/Sheen* - The MCL for color/sheen is 15 CPU. Sampling records do not indicate any noticeable sheen on any of the samples. Sample color generally ranged from clear to reddish-brown. Color/sheen values ranged from <5 to 80 CPU. The highest values were noted in the samples from LRII-1 and MW-5. The color/sheen values noted at the background well SMR-1 were consistent with those observed in the monitoring wells.

6.3 Deep Zone Monitoring Well Analysis

There are eight (8) deep aquifer monitoring wells at the Lena Road Landfill. The deep wells total depths range from 140 feet to 165 feet. A listing of the deep zone wells and their total depths are as follows:

TOTAL DEPTH OF DEEP ZONE MONITORING WELLS (FEET)			
Monitoring Well	Depth	Monitoring Well	Depth
SMR-II	150.00	SA 5	153.02
SA-2	154.93	SA-6	153.04
SA-3	163.02	SA-7	152.97
SA-4	143.78	SA-8	153.38

6.3.1 Deep Monitoring Well Analytical Trends

The measurements for antimony, arsenic, barium, beryllium, cadmium, chlorides, chromium, cobalt, copper, lead, mercury, nitrate, nickel, selenium, silver, sodium, thallium, vanadium, and zinc were all below maximum contamination levels (MCL) according to F.A.C. Rule 62-550. The only major trend irregularities were found at monitoring wells SA-2, SA-3 and SA-8, which are discussed below. Fluctuations in the reported values for the other parameters was slight and were not affected largely by seasonal changes in the measured water levels.

Significantly, deep monitoring well SA-2, which was suspected to be screened within both the surficial and deep aquifers, exhibited analytical trends and values consistent with the other deep monitor wells. This trend was evident throughout the 1996/1997 sampling period for all the significant parameters. This data suggests that SA-2 is screened as designed within the deep aquifer zone.

6.3.2 Deep Monitoring Wells: With MCL Exceedance

The following are groundwater analytical results that are either exceptions to the general trends or fall outside the maximum contaminant level (MCL) for the specific parameter. A historical review of these parameters indicates that the measured levels are common to this region and while sometimes outside of state guidelines they do not appear to be indicative of changes induced by the landfill design or operation.

- *Total Dissolved Solids* - The maximum contaminant level (MCL) for total dissolved solids (TDS) is 500 mg/l, as indicated by F.A.C. Rule 62-550. The TDS values for the majority of the deep wells fell within this accepted range. A tabular and graphical representation of these semi-annual TDS values over all deep wells is presented in Table 31, Appendix E, of this report.

The TDS values from the deep monitor wells exhibited a narrow range from 244 mg/l to 556 mg/l. None of the deep wells exhibited TDS levels which could not be attributed to "natural" background conditions. Seasonal fluctuations of TDS were minor.

- *pH* - The regulatory range for pH values is 6.5 to 8.5, as indicated by F.A.C. Rule 62-550. The pH values for the deep monitoring wells at the Lena Road Landfill fluctuated from 7.07 to 8.26. A tabular and graphical representation of the semi-annual pH values over all deep wells is provided in Table 32, Appendix E, of this report.

- *Iron* - The maximum contaminant level for iron in groundwater is 0.3 milligrams per liter (mg/l), as per F.A.C. Rule 62-550. A majority of the monitor wells at the site fell within the MCL limits. The iron levels of the deep monitor wells ranged from <0.02 to 0.7 mg/l. A tabular and graphical representation of the semi-annual iron values for the deep wells is presented in Table 33, Appendix E, of this report.

6.4 Upgradient/Downgradient Monitoring Well Analysis

The shallow monitoring wells that consistently reported the highest groundwater elevations are CW-4, MW-6, and CW-5A. These wells are used in this report as representations of upgradient behavior. The shallow monitoring wells that consistently report the lowest groundwater elevations include LRII-3, GC-1A, and GC-4. These wells are used in this report as representations of downgradient behavior. The upgradient and downgradient groups of wells were compared to evaluate the effect, if any, that is imposed on areas downgradient of the landfill stages. Based on our analysis, there does not appear to be a direct relation between the landfill design and the analytical values obtained from the upgradient and downgradient monitoring wells. The following is a listing of the general trends observed in the parameters that exhibited the most fluctuation.

- *Total Dissolved Solids* - The TDS values and trends between the upgradient and downgradient wells mirrored those observed during the 1994/1995 evaluation period. Significantly, the highest TDS levels were observed in the upgradient monitor well CW-4.

- *Iron* - There appears to be minor increases in the reported iron values from upgradient to downgradient wells. Monitor wells GC-1A and GC-2 reported consistently high iron concentrations.

From these results, it appears that there is no causal link between the minor fluctuations in the upgradient and downgradient shallow monitor wells and the landfill operation and design. Furthermore, the relative changes noted between the upgradient and downgradient wells are minimal, and are most likely due to variations in natural background conditions. Downgradient monitor well LRII-3 is located off the north of the site near Stage II of the landfill. As noted, Stage II is currently inactive.

An examination of the deep and shallow monitor well analytical trends indicates a distinct differentiation between the two aquifers properties in regards to groundwater levels and geochemical facies. Vertical migration between the two aquifers is not evident based on the analytical trends observed.

7.0 CONCLUSIONS

Professional Service Industries, Inc. (PSI) has performed a Biannual Evaluation of the data gathered from the Groundwater Monitoring Plan for the Manatee County Solid Waste Management Facility, known as Lena Road Landfill. This report is designed to meet the annual report provision of the Florida Department of Environmental Protection (FDEP) Permit No. S041-211176 for Lena Road Landfill. Such evaluation provided an assessment of the existing landfill design and operation in relation to potential environmental impacts on groundwater. The evaluation/assessment was accomplished by analyzing data that has been compiled monthly, quarterly, and semi-annually over the time period of January 1, 1996 to June 26, 1997. The data consists of specific parameters requested by the FDEP permit for the site. The second half, 1997 sampling data is not included in this evaluation.

Based on the findings of our assessment, the following are the general trends and conclusions associated with the Biannual Groundwater Monitoring Plan Evaluation for the Lena Road Landfill:

- Analysis of the groundwater elevation maps (shallow and deep) indicates the regional groundwater flow is toward the northwest. The existing landfill design, including the slurry wall and the leachate recovery systems, appears to have created discrete cells, with the exception of the western side of Stage III, within the overall regional shallow groundwater gradient. Flow within the cells appears to be contained, as designed. The leachate collection system around Stage III is currently scheduled for repair to correct the outward gradient.

- The monitor well hydrographs show a general decrease in the groundwater elevations through the second half of 1996, followed by a increase in the first half of 1997.

- Analysis of the groundwater level data and analytical trends of SA-2 indicate the well is screened in the deep aquifer as originally designed.

- Analysis of the vertical groundwater gradients at the site indicates the general trend is from the shallow to the deep aquifer; however, due to the low permeability of the confining layer beneath the landfill, vertical flow is expected to be highly retarded. Groundwater analytical results indicate the shallow and deep aquifers are distinct hydrologic units.

- For the shallow monitor wells, the analytical parameters that vary above a regulatory level or outside a regulatory range include total dissolved solids, pH, and iron. The total value for arsenic exceeded their MCLs on three occasions at one well location. The same well exhibited elevated arsenic levels in 1995.

- For the deep monitor wells, the analytical parameters that vary above a regulatory value or outside a regulatory range include total dissolved solids and iron.

- The upgradient and downgradient monitor well analysis revealed minor differences in the background values of various parameters in monitor wells to the north and west of landfill Stage III. The differences in the values between the upgradient and downgradient wells was minimal, and appears to be due to natural background conditions.

A review of the historical records of the levels of the parameters mentioned above indicates the exceedances of the state guidelines do not appear to be indicative of impacts from current or past landfill activities. Rather, these levels appear to be consistent with previously measured levels and other background data for this region of Florida.

8.0 WARRANTY

8.1 Annual Evaluation

PSI warrants that the findings and conclusions contained herein have been prepared in accordance with generally accepted environmental and engineering methods, only for the site described in this report. However, these findings and conclusions contain all of the limitations inherent to the information available at the time of the work as received by PSI from the client, some of which are more specifically set forth below.

8.2 Unidentifiable Conditions

There is a possibility that even with proper application of these methodologies, there may exist on the subject site conditions that could not be identified within the scope of the assessment or which were not reasonably identifiable from subjective evaluation from the information provided. PSI believes that the information obtained from the quarterly water quality reports and the groundwater monitoring plan concerning the site is sufficient. However, PSI cannot and does not warrant or guarantee that the information provided by these other sources is accurate or complete. The methodologies of this evaluation are not intended to produce all inclusive or comprehensive results, but rather to provide the client with information regarding apparent suspicions of existing and potential adverse environmental conditions relating to the subject property.

8.3 Use by Third Parties

This report was prepared pursuant to the contract PSI has with the Manatee County. That contractual relationship included an exchange of information about the subject site that was unique and between PSI and the client and serves as the basis upon which this report was prepared. Because of the importance of the communication between PSI and its client, reliance or any use of this report by anyone other than the client, for whom it was prepared, is prohibited and therefore not foreseeable to PSI.

Reliance or use by any such third party without explicit authorization in the report does not make said third party beneficiary to PSI's contract with the client.

Any such unauthorized reliance on or use of this report, including any of its information or conclusions, will be at the third party's risk. For the same reasons, no warranties or representations, expressed or implied in this report, are made to any such third party.

9.0 REFERENCES

Ardaman & Associates, Inc., Revised Groundwater Monitoring Plan for Lena Road Landfill, January 11, 1990.

Ardaman & Associates, Inc., Lena Road Landfill Responses to FDEP Letter on Revised Groundwater Monitoring Plan - Permit Nos. SO41-118353, SC41-095658, and SC41-095667, March 28, 1990.

Ardaman & Associates, Inc., Second Set of Responses on Revised Groundwater Monitoring Plan for Lena Road Landfill, Manatee County, Florida, FDEP Permit Numbers: SO41-118353, SC41-095658, and SC41-095667, June 26, 1990.

Freeze, R. Allan and Cherry, John A., Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, Copyright 1979.

Manatee County Government - Public Works Department, Lena Landfill Piezometer Water Tables, Quarter 3, 1992 and Quarters 1 - 4, 1993.

P. E. LaMoreaux & Associates, Inc. Manatee County Government - Public Works Department Quarterly Groundwater Reports, Quarters 1 - 4, 1992 and Quarters 1 - 4, 1993.

Professional Service Industries, Inc., Groundwater Monitoring Plan Biannual Evaluation, Manatee County Solid Waste Management Facility (Lena Road Landfill), Bradenton, Florida, Permit No. S041-211176, April 17, 1996.

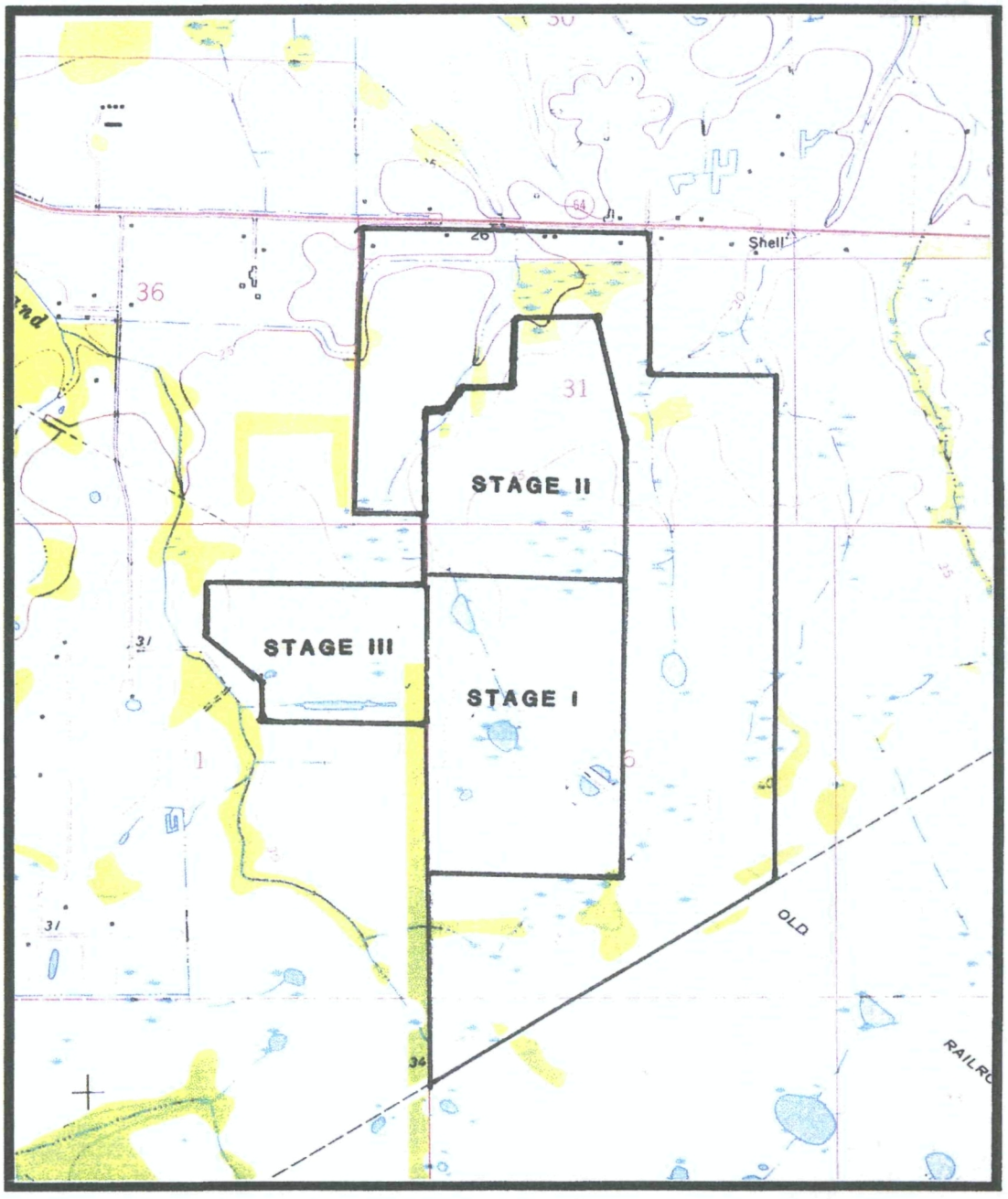
Professional Service Industries, Inc., Response to FDEP Comments - Groundwater Monitoring Plan Biannual Evaluation Lena Road Landfill, Permit No. S041-211176, Bradenton, Manatee County, Florida, October 10, 1996.

United States Department of Agriculture Soil Conservation Service, Soil Survey of Manatee County Florida, Issued April 1983.

APPENDIX A

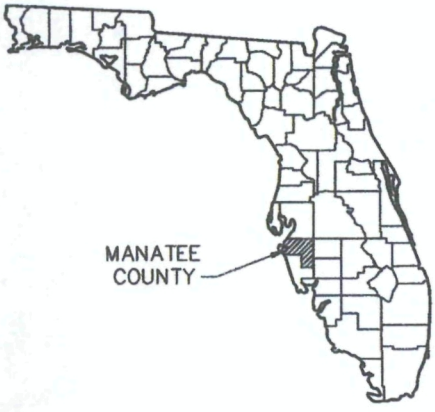
FIGURES

APPROXIMATE SITE LOCATION



NOTE: THIS MAP TAKEN FROM USGS QUADRANGLE MAP

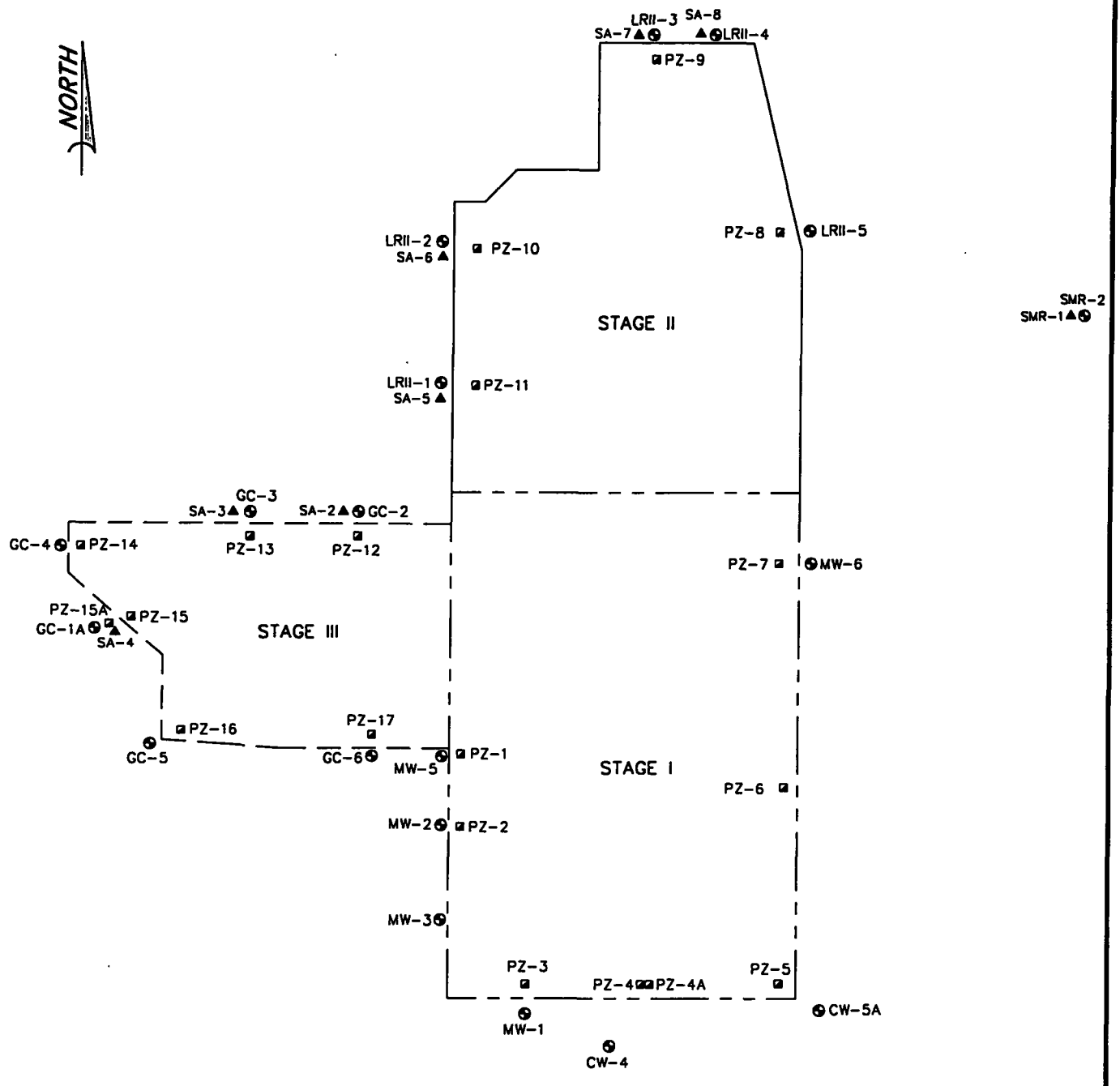
MAP NAME: LORRAINE
DATE: 1973
SECTION 1, TOWNSHIP 35 SOUTH, RANGE 18 EAST
SECTION 6 AND 7, TOWNSHIP 35 SOUTH, RANGE 19 EAST
SECTION 31, TOWNSHIP 34 SOUTH, RANGE 19 EAST



SITE VICINITY MAP
GROUNDWATER MONITORING PLAN ANNUAL EVALUATION
LENA ROAD LANDFILL
11401–11435 N. DALE MABRY HWY.
MANATEE COUNTY, FLORIDA

PROFESSIONAL SERVICE INDUSTRIES, INC.
13700 58th STREET NORTH
SUITE 207
CLEARWATER, FLORIDA 34620

DRAWN BY:	KT	SCALE:	1" = 2000'	PROJ. NO.:	378–4L015
CHKD. BY:	DAS	DATE:	9/01/94	DWG.:	FIGURE 1



GRAPHIC SCALE

0 250 500 1000

SCALE: 1" = 1000'

LEGEND

- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE DEEP AQUIFER WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION

WELL LOCATION MAP

LENA ROAD LANDFILL

3333 LENA ROAD

BRADENTON, FLORIDA

psi ENVIRONMENTAL SERVICES
4400 - 140th. AVENUE NORTH
SUITE 100
CLEARWATER, FLORIDA 34622

DRAWN BY: KT	SCALE: 1" = 1000'	PROJ. NO.: 552-4L015
CHKD. BY: DAS	DATE: 4/15/96	DWG.: FIGURE 2

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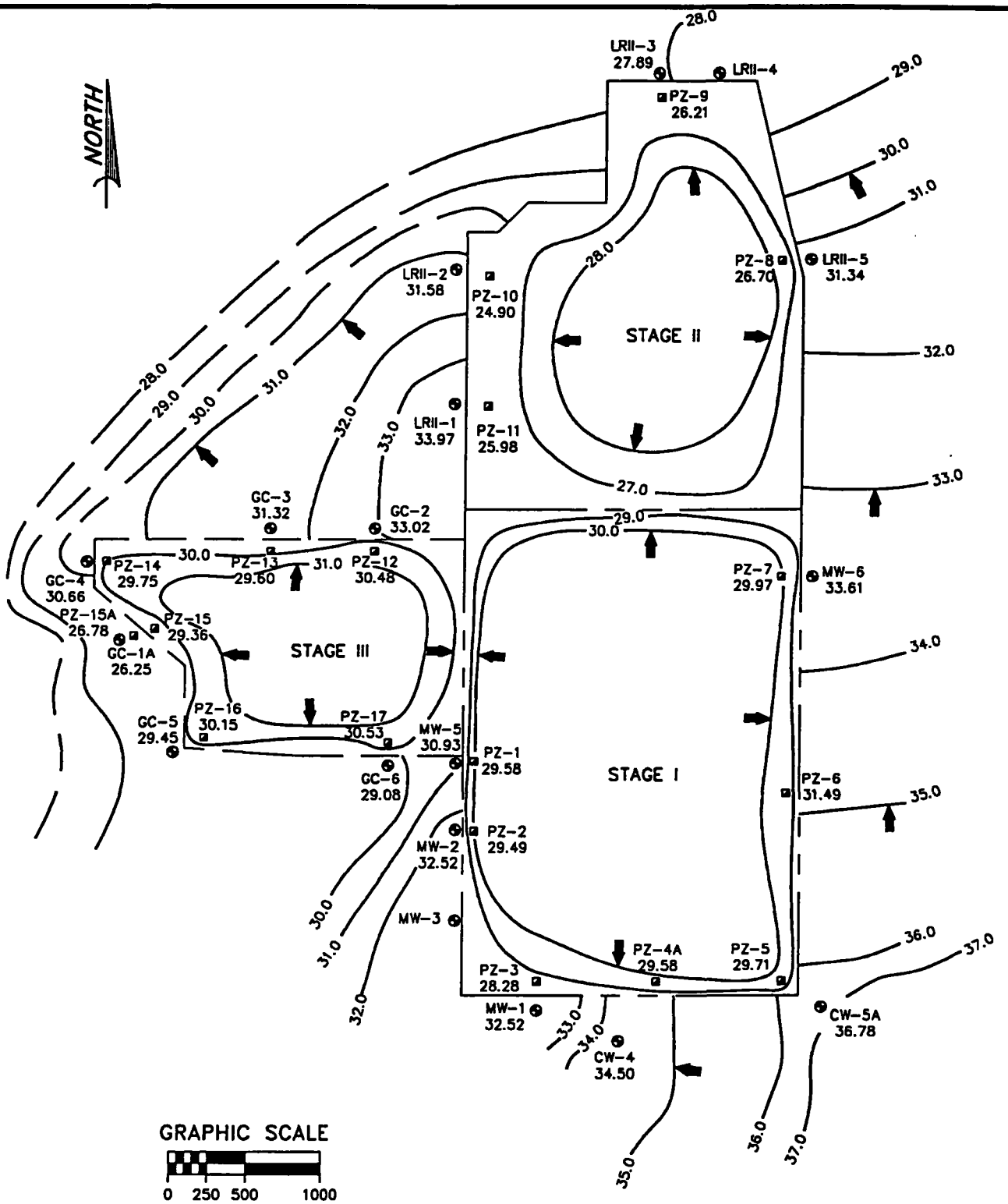

GRAPHIC SCALE

0 250 500 1000

SCALE: 1" = 1000'

AUGUST 21, 1996

LEGEND

- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP

LENA ROAD LANDFILL

3333 LENA ROAD

BRADENTON, FLORIDA

psi *Information To Build On*

Engineering • Consulting • Testing

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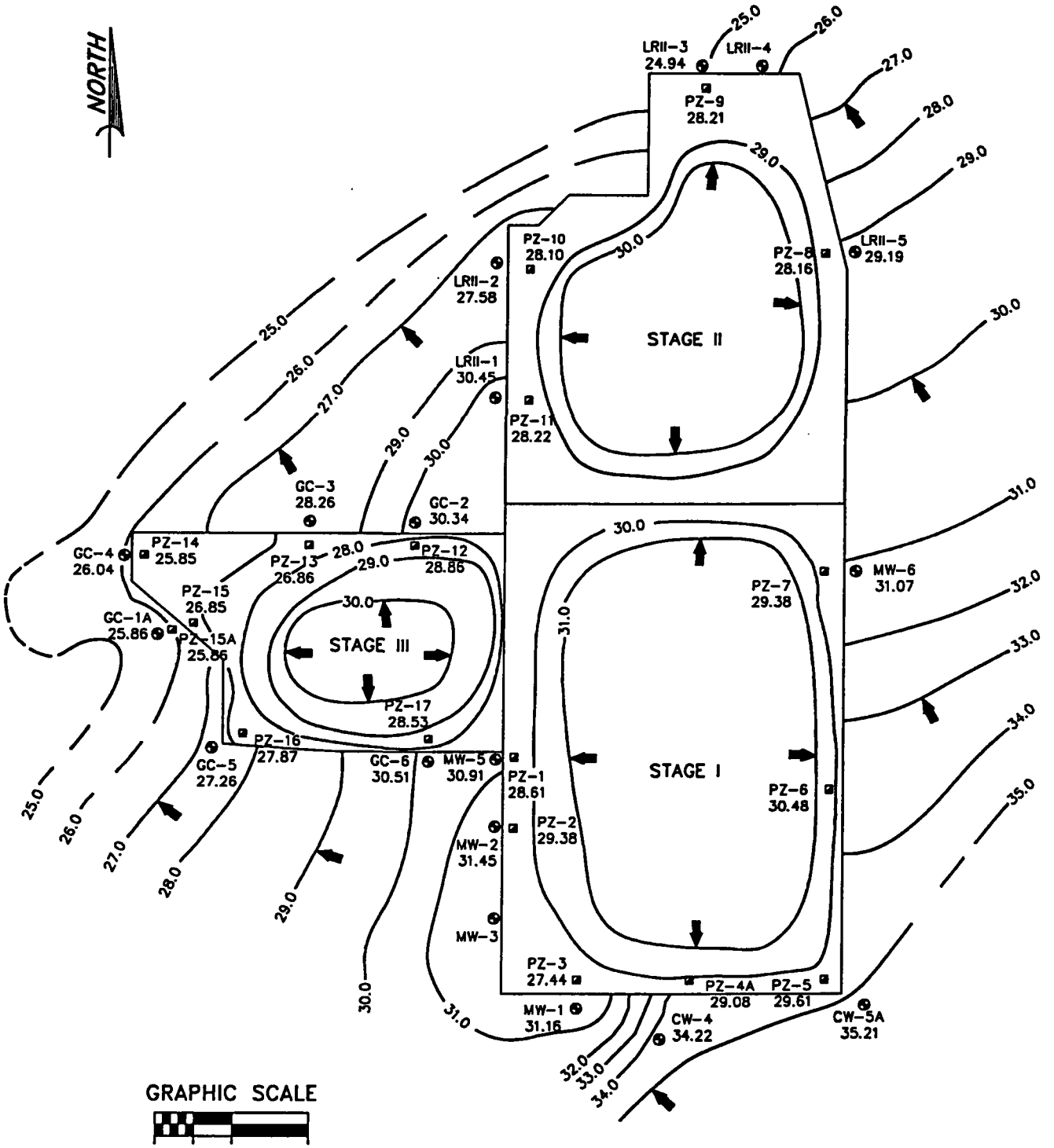

GRAPHIC SCALE

0 250 500 1000

SCALE: 1" = 1000'

NOVEMBER 18, 1996

LEGEND

- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP

LENA ROAD LANDFILL

3333 LENA ROAD

BRADENTON, FLORIDA

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CHKD. BY: DAS	DATE: 12/29/97	DWG.: 4	

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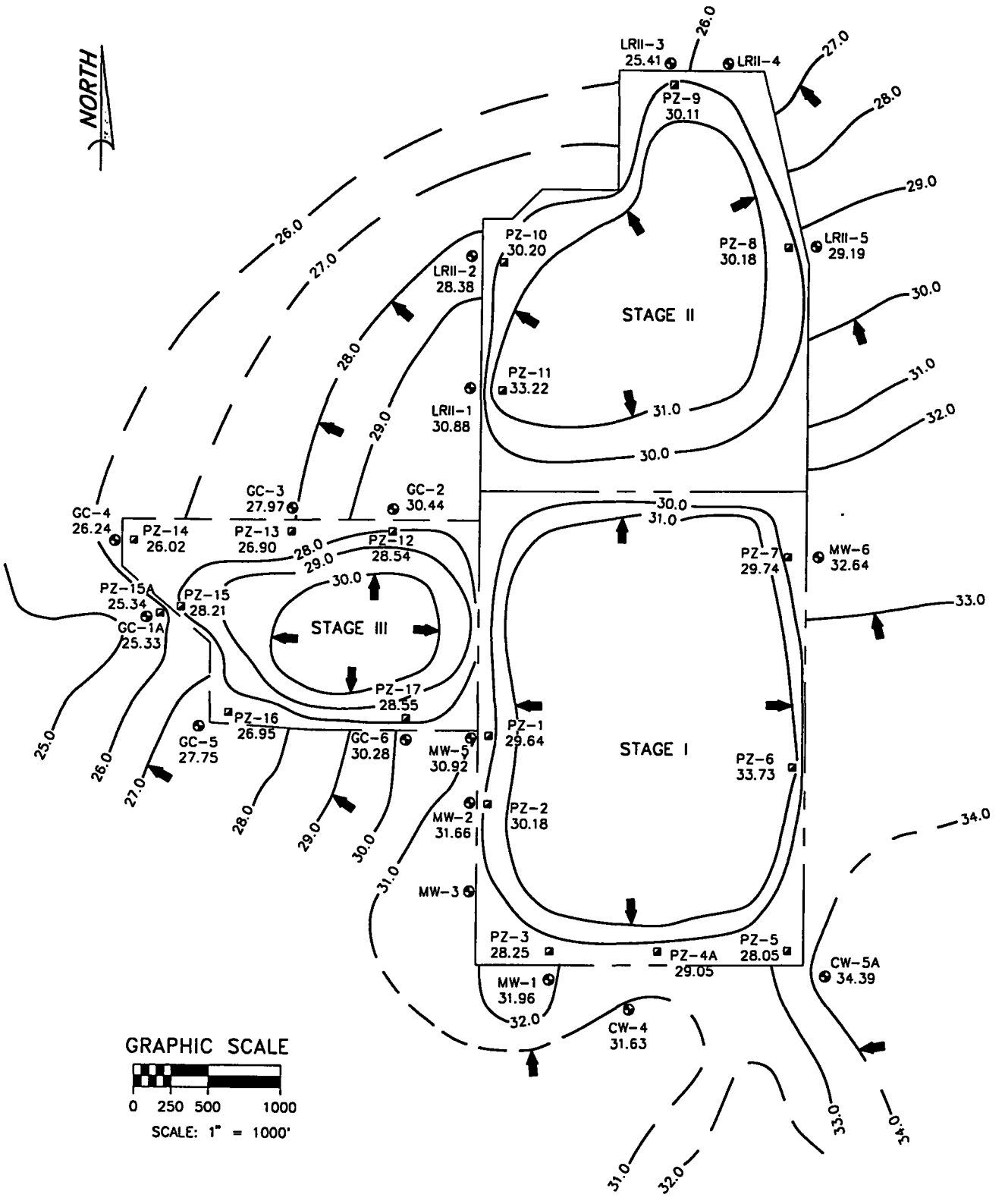

JUNE 16, 1997

LEGEND

- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP

LENA ROAD LANDFILL

3333 LENA ROAD

BRADENTON, FLORIDA

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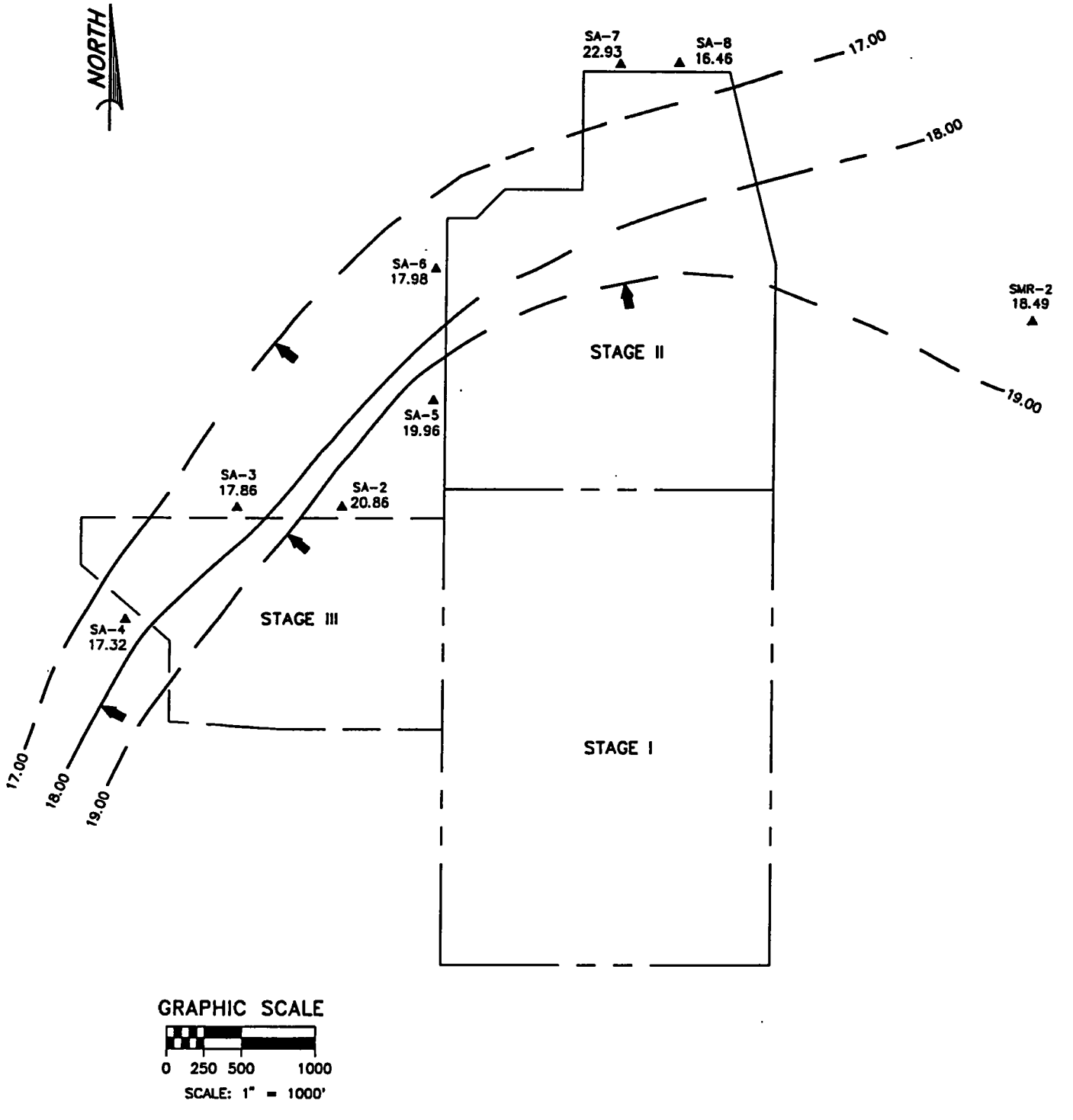

GRAPHIC SCALE

0 250 500 1000

SCALE: 1" = 1000'

LEGEND

- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- ▲ APPROXIMATE DEEP AQUIFER WELL LOCATION
- ➡ INFERRED DIRECTION OF GROUNDWATER FLOW

NOTE: DATA FROM SA-7 OMITTED FROM CONTOUR MAP

AUGUST 26–29, 1996

DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP

LENA ROAD LANDFILL

3333 LENA ROAD

BRADENTON, FLORIDA

psi *Information To Build On*

Engineering • Consulting • Testing

DRAWN BY: NMR	SCALE: 1" = 1000'	PROJ. NO.: 552-4L015-138
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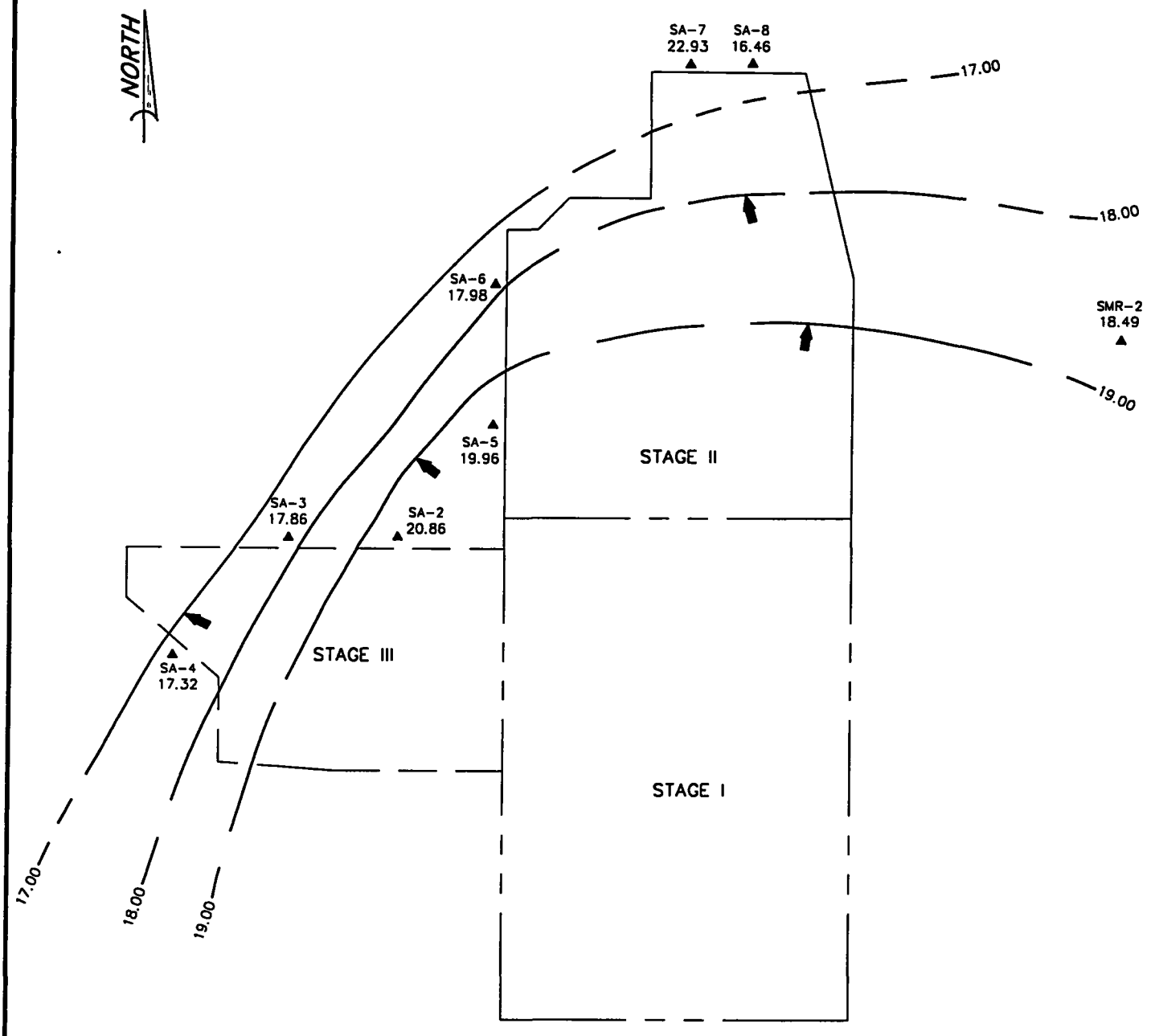

GRAPHIC SCALE

0 250 500 1000

SCALE: 1" = 1000'

LEGEND

- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- ▲ APPROXIMATE DEEP AQUIFER WELL LOCATION
- ➡ INFERRED DIRECTION OF GROUNDWATER FLOW

NOTE: DATA FROM SA-7 OMITTED FROM CONTOUR MAP

NOVEMBER 18-20, 1996

DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP

LENA ROAD LANDFILL

3333 LENA ROAD

BRADENTON, FLORIDA

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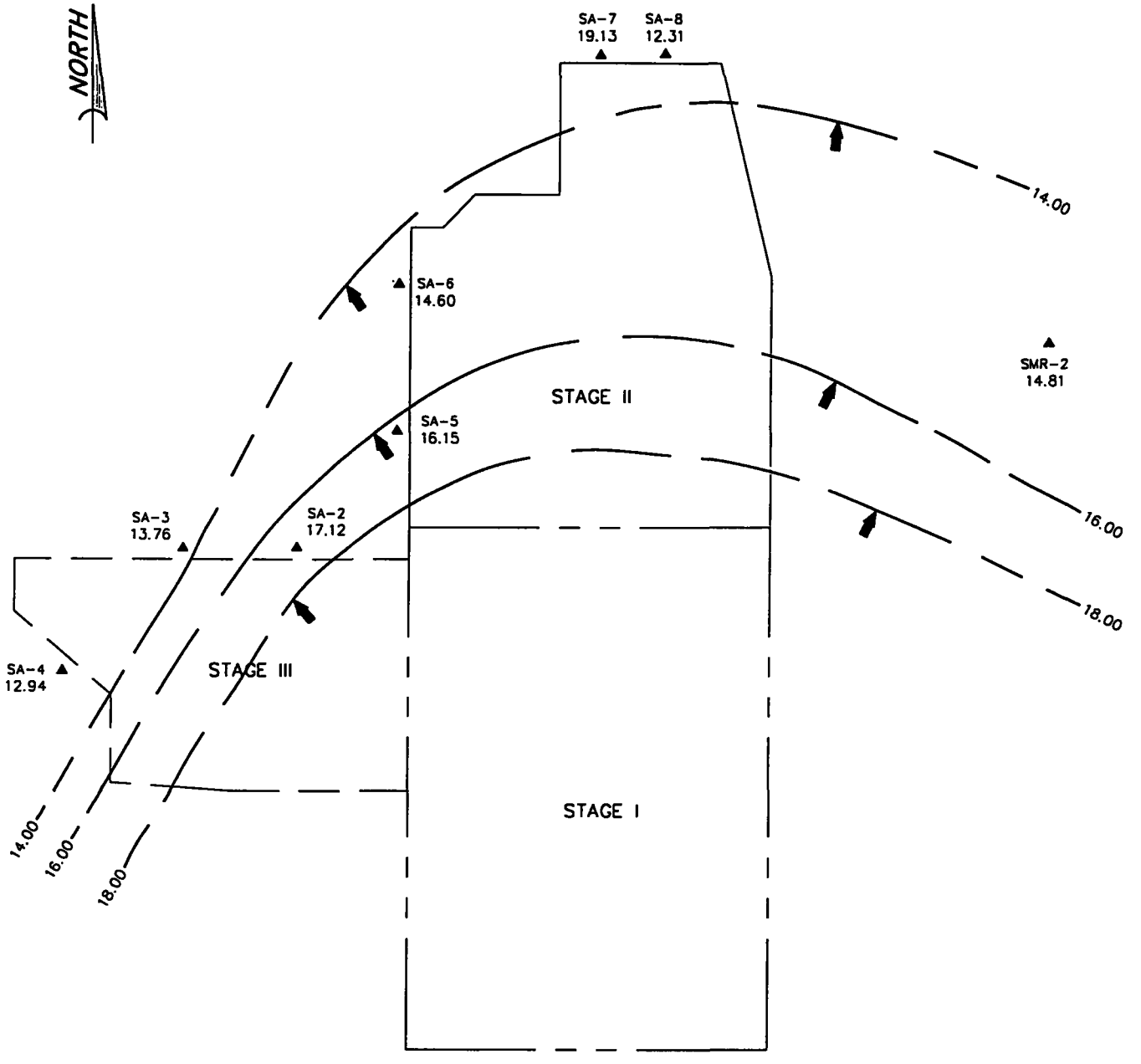


GRAPHIC SCALE

0 250 500 1000

SCALE: 1" = 1000'

LEGEND

- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- ▲ APPROXIMATE DEEP AQUIFER WELL LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

NOTE: DATA FROM SA-7 OMITTED FROM CONTOUR MAP

JUNE 23-26, 1997

DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP

LENA ROAD LANDFILL

3333 LENA ROAD

BRADENTON, FLORIDA

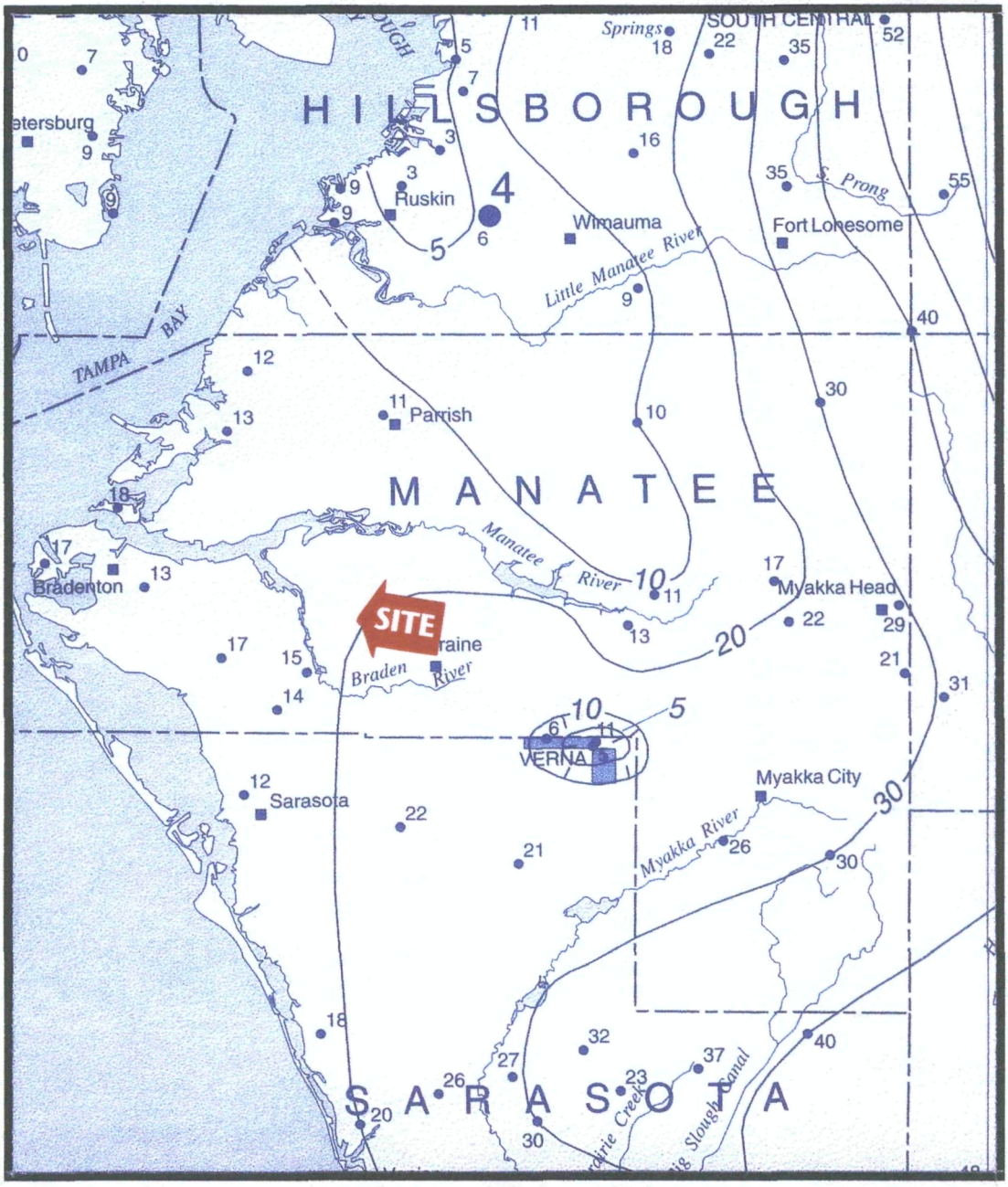
PSI *Information To Build On*

Engineering • Consulting • Testing

DRAWN BY: NMR	SCALE: 1" = 1000'	PROJ. NO.: 552-4L015-138
CHKD. BY: DAS	DATE: 12/17/97	DWG.: 8

12179708.DWG

APPROXIMATE SITE LOCATION



AFTER: P.A. METZ ET AL, 1997
USGS OPEN-FILE REPORT 97-179

GRAPHIC SCALE

0 2,120' 42,240'

SCALE: 1" = 42,240'

POTENTIOMETRIC SURFACE MAP OF THE FLORIDAN AQUIFER - SEPT. 1996

LENA ROAD LANDFILL

3333 LENA ROAD

BRADENTON, MANATEE COUNTY, FLORIDA

psi ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION

Consulting • Engineering • Testing

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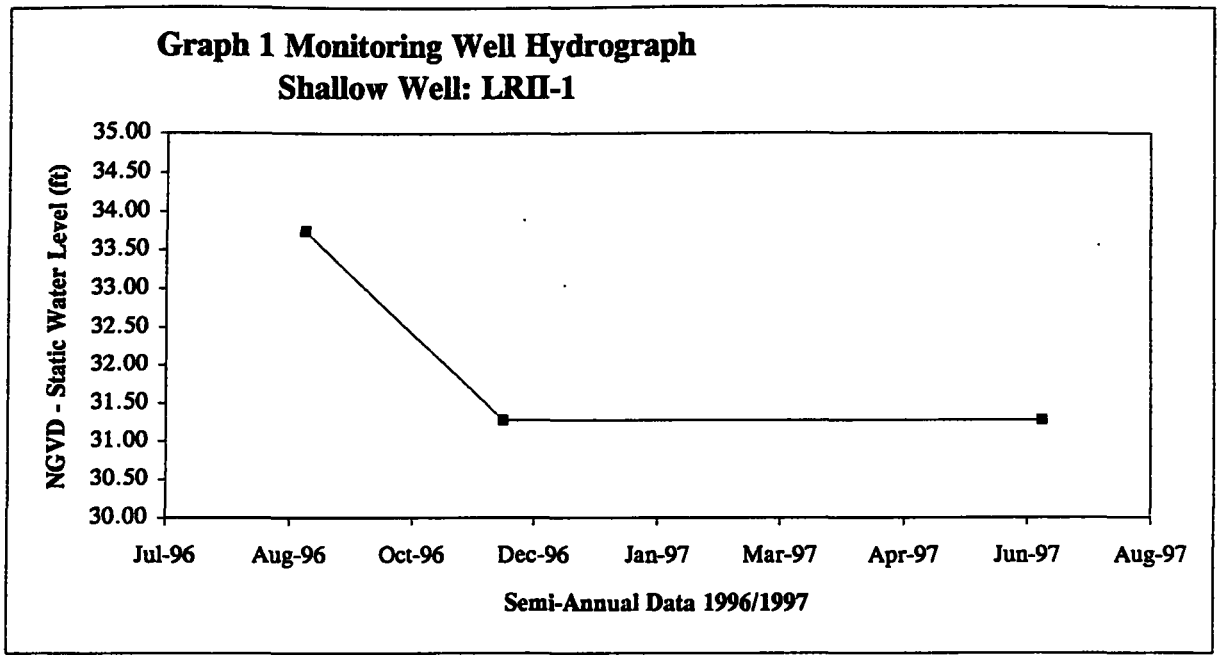
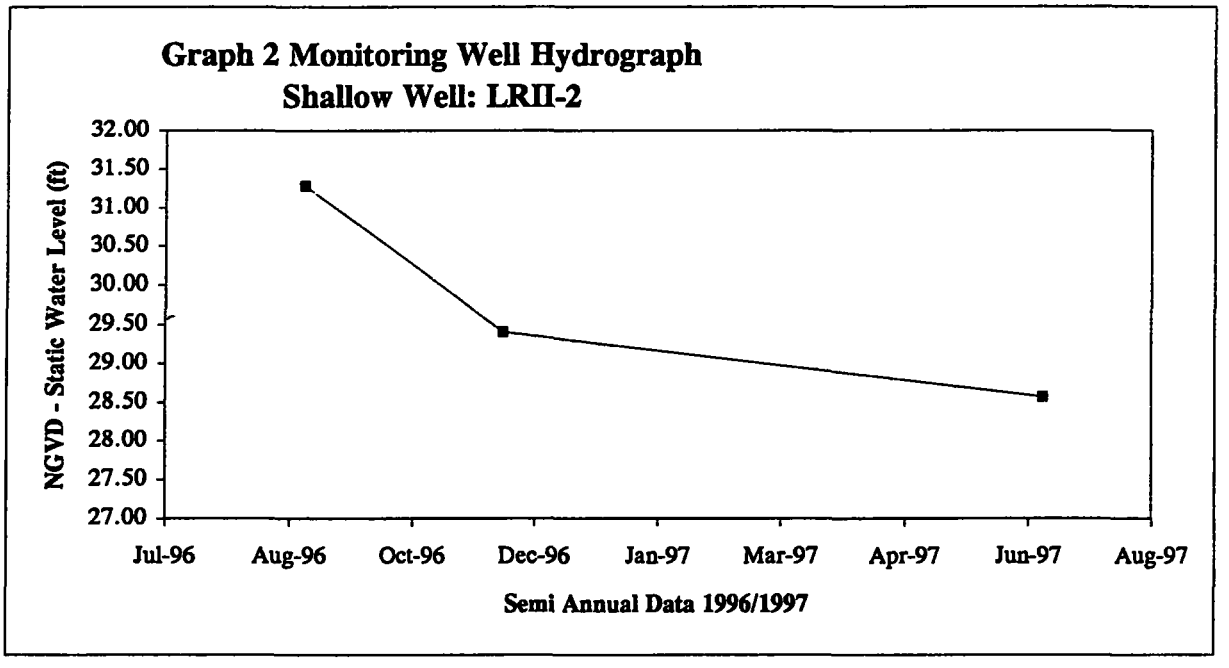
VICIN09.DWG

APPENDIX B

MONITORING WELL HYDROGRAPHS


Graph 1 Monitoring Well Hydrograph
Shallow Well: LRII-1
NGVD - Static Water Level (ft)
35.00
34.50
34.00
33.50
33.00
32.50
32.00
31.50
31.00
30.50
30.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997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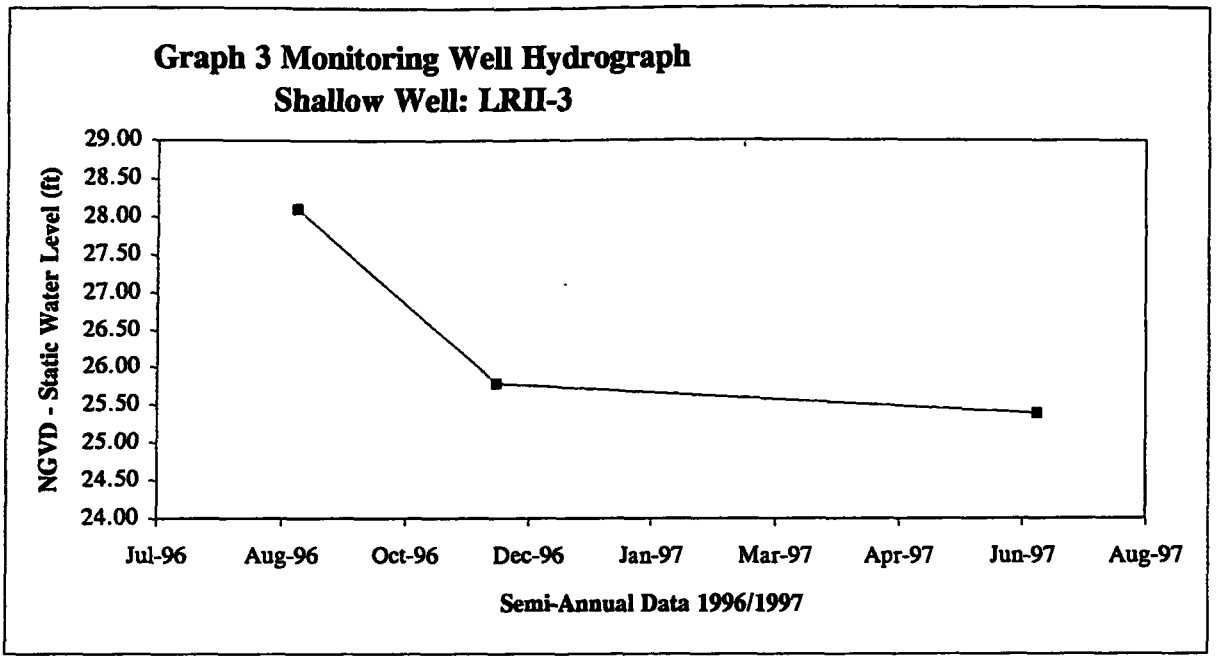
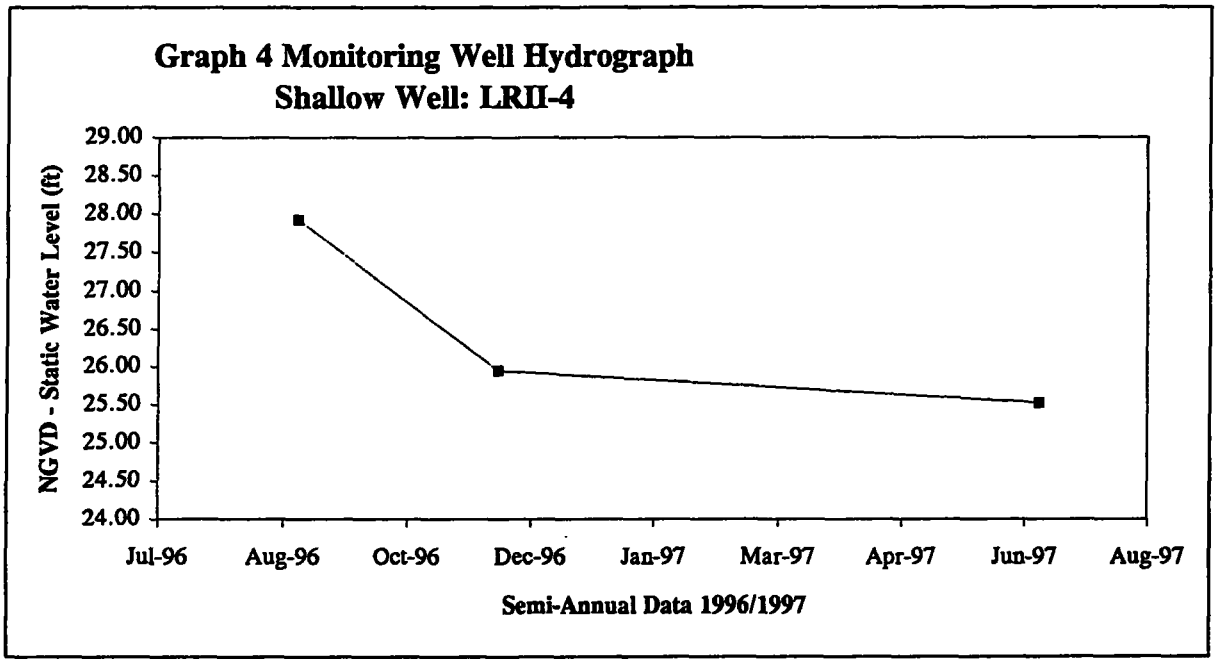
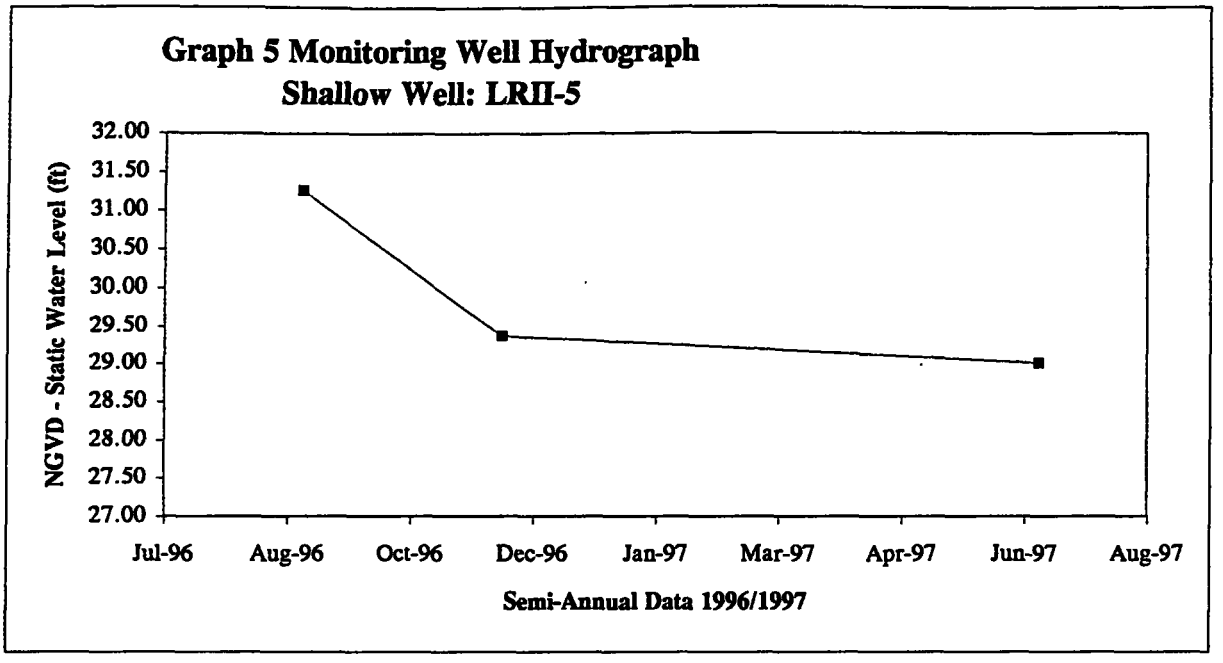
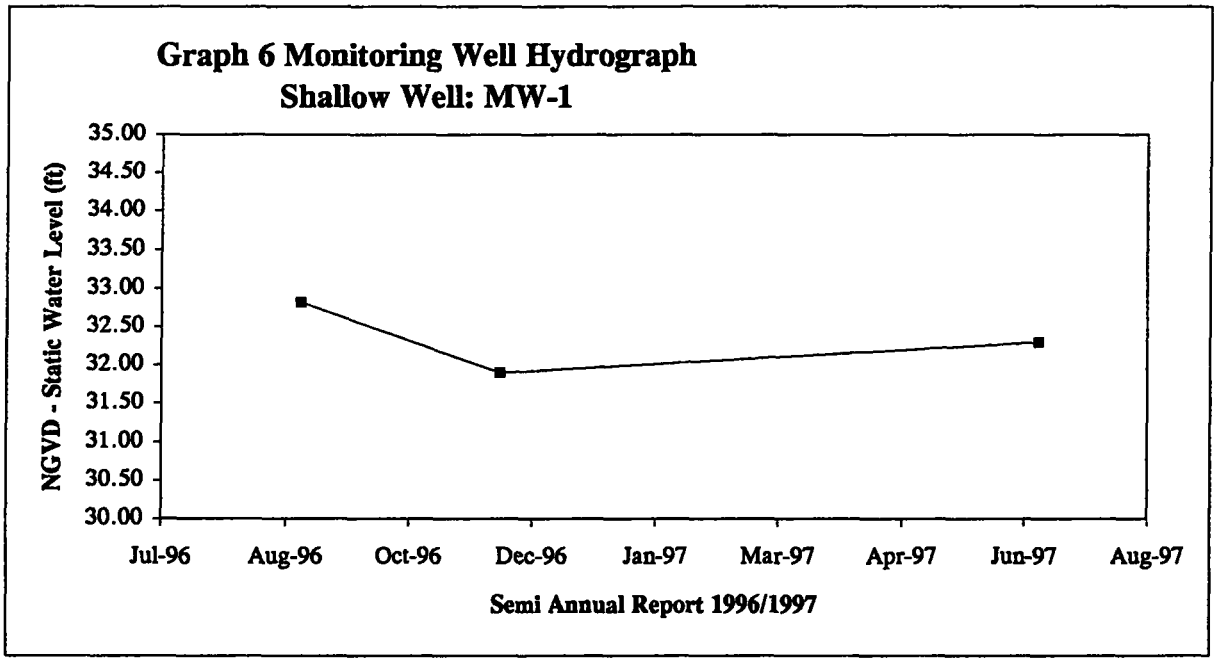
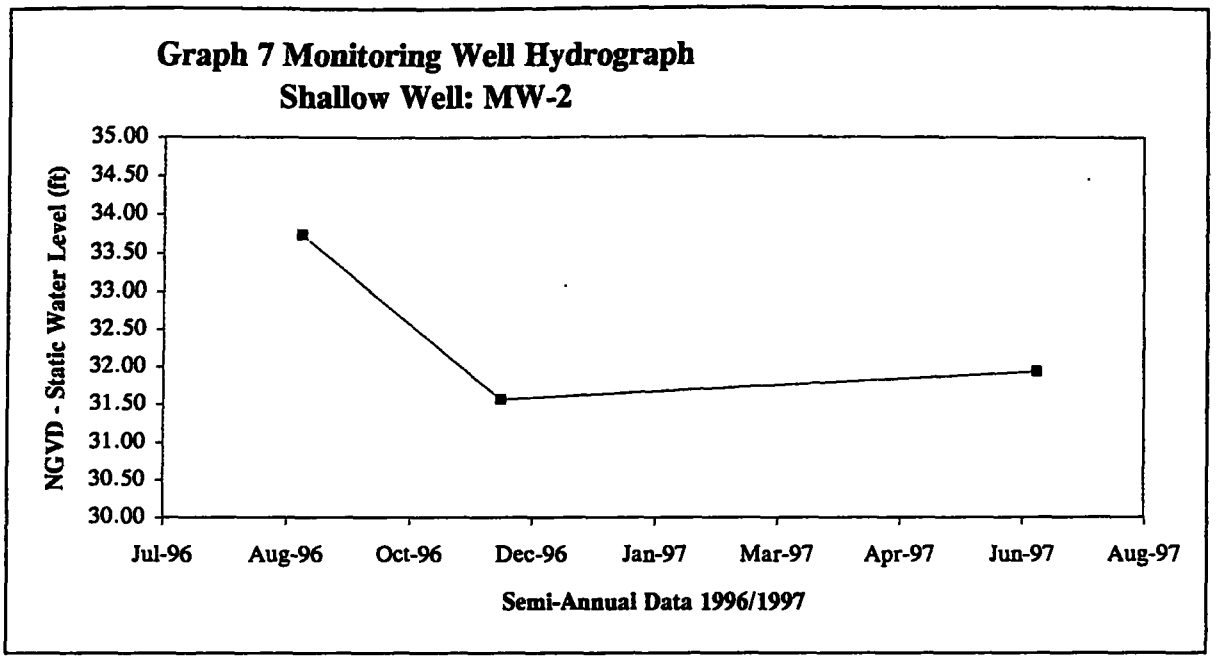
Shallow Well: LRII-2
NGVD - Static Water Level (ft)
32.00
31.50
31.00
30.50
30.00
29.50
29.00
28.50
28.00
27.50
27.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997

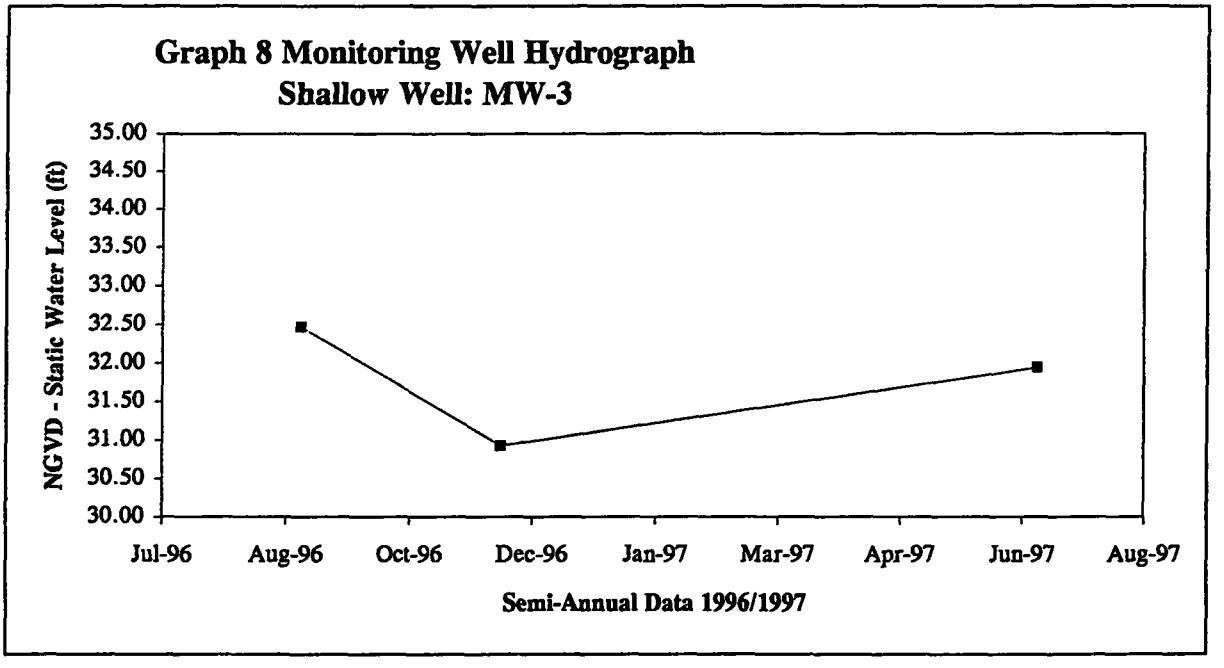

Graph 3 Monitoring Well Hydrograph
Shallow Well: LRII-3
NGVD - Static Water Level (ft)
29.00
28.50
28.00
27.50
27.00
26.50
26.00
25.50
25.00
24.50
24.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

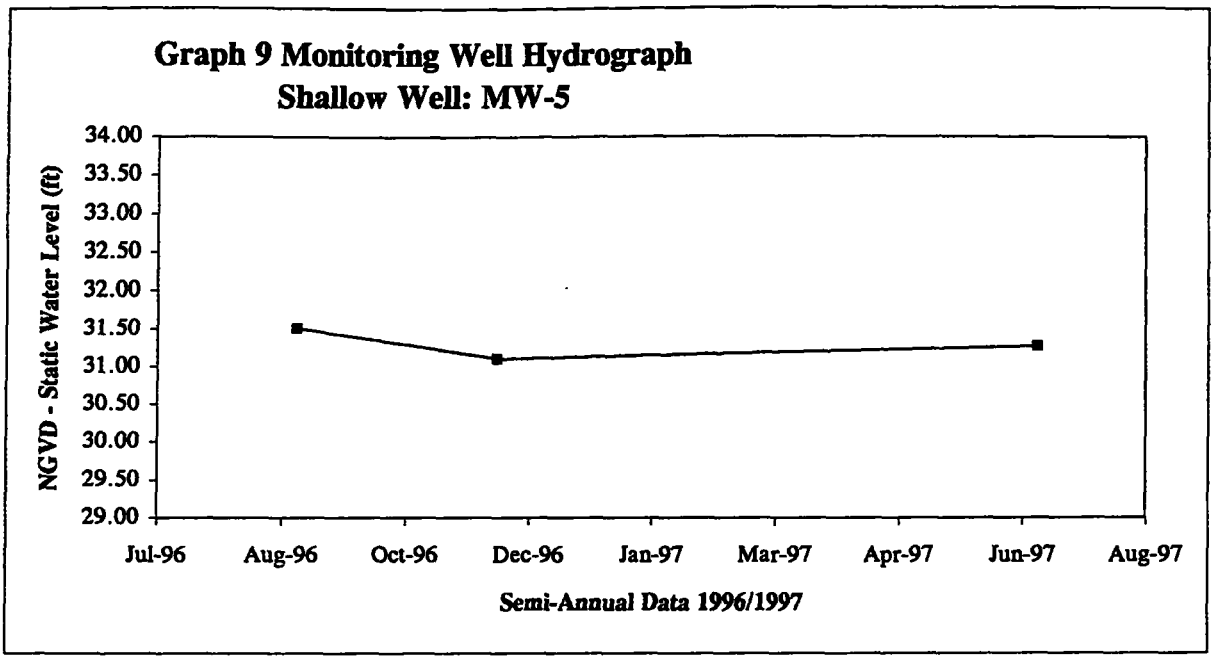

Graph 4 Monitoring Well Hydrograph
Shallow Well: LRII-4
NGVD - Static Water Level (ft)
29.00
28.50
28.00
27.50
27.00
26.50
26.00
25.50
25.00
24.50
24.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

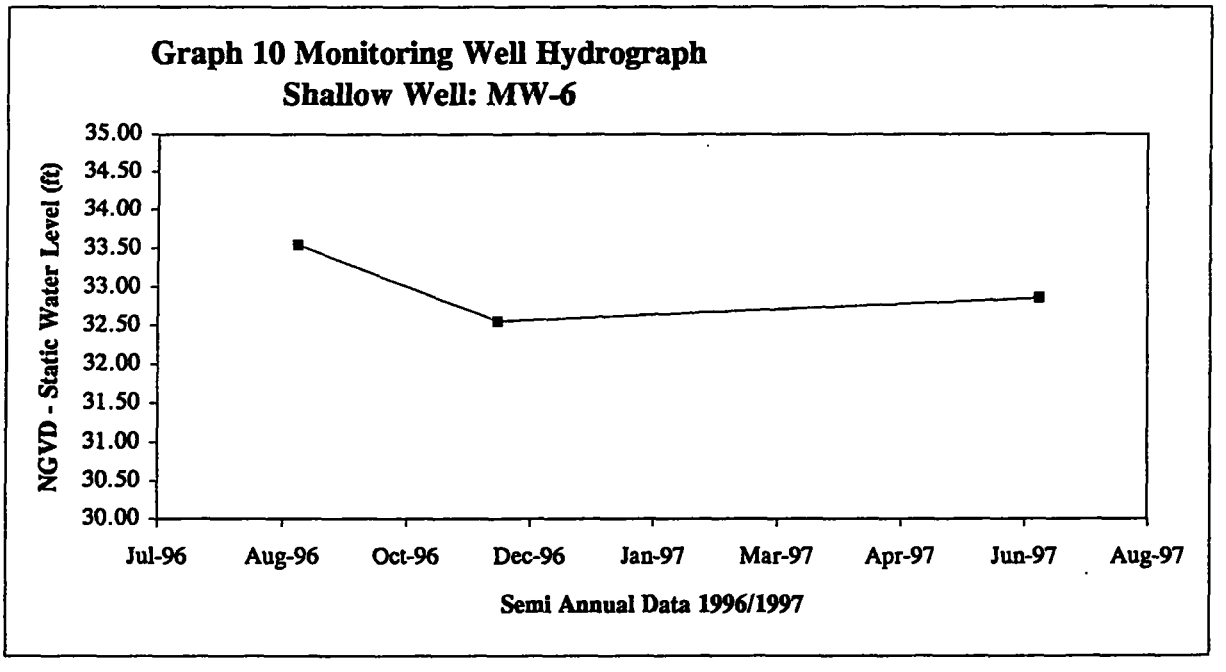

Graph 5 Monitoring Well Hydrograph
Shallow Well: LRII-5
NGVD - Static Water Level (ft)
32.00
31.50
31.00
30.50
30.00
29.50
29.00
28.50
28.00
27.50
27.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

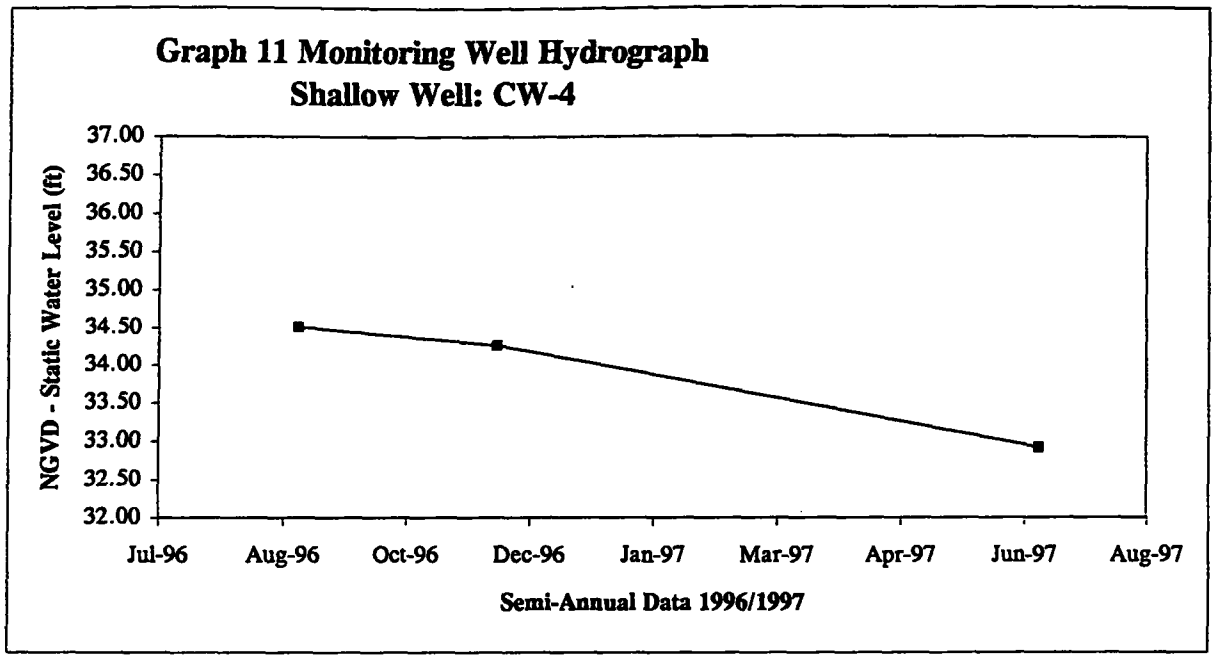

Graph 6 Monitoring Well Hydrograph
Shallow Well: MW-1
NGVD - Static Water Level (ft)
35.00
34.50
34.00
33.50
33.00
32.50
32.00
31.50
31.00
30.50
30.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Report 1996/1997

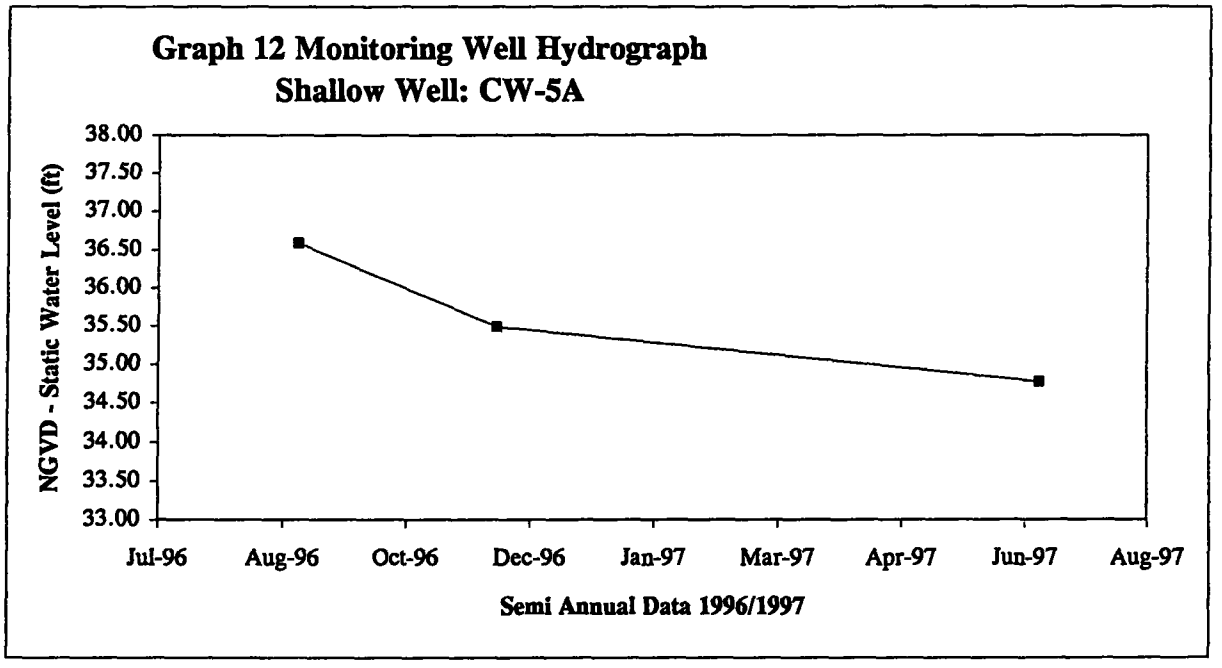

Graph 7 Monitoring Well Hydrograph
Shallow Well: MW-2
NGVD - Static Water Level (ft)
35.00
34.50
34.00
33.50
33.00
32.50
32.00
31.50
31.00
30.50
30.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

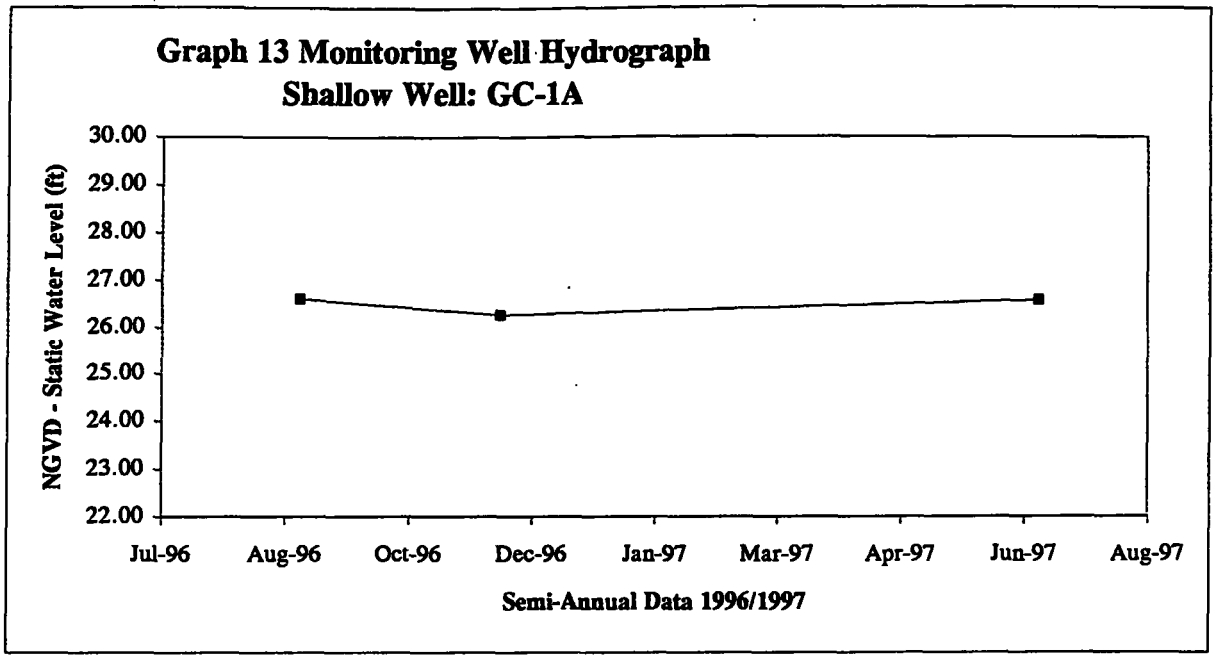

Graph 8 Monitoring Well Hydrograph
Shallow Well: MW-3
NGVD - Static Water Level (ft)
35.00
34.50
34.00
33.50
33.00
32.50
32.00
31.50
31.00
30.50
30.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

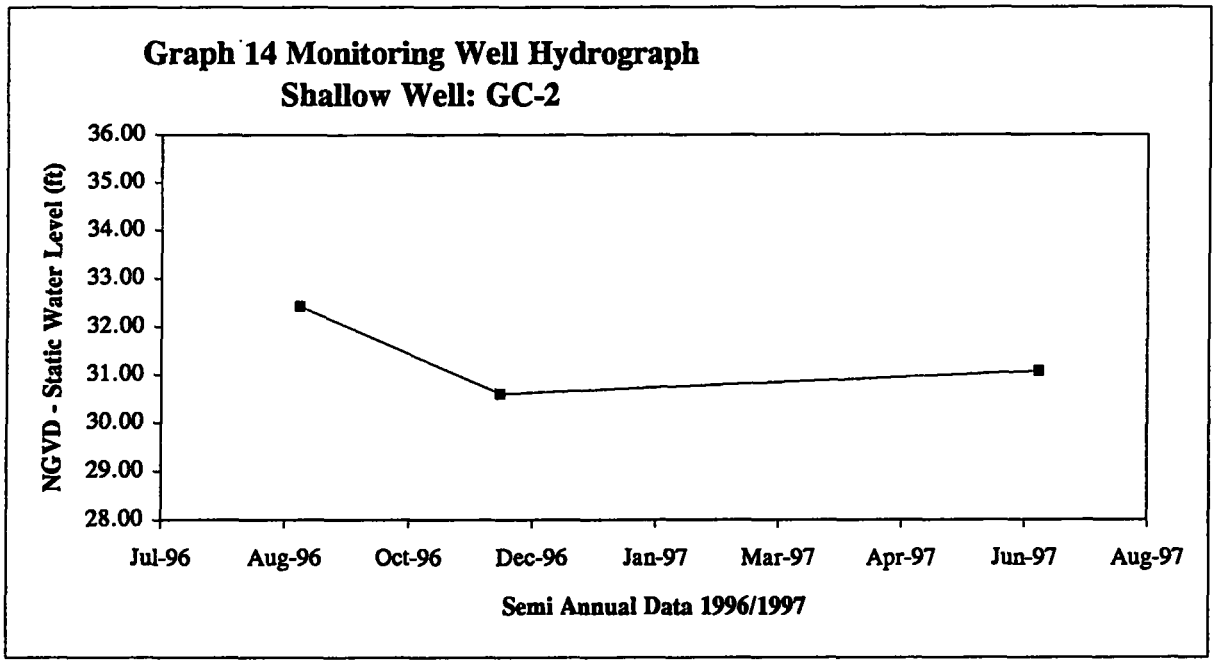

Graph 9 Monitoring Well Hydrograph
Shallow Well: MW-5
NGVD - Static Water Level (ft)
34.00
33.50
33.00
32.50
32.00
31.50
31.00
30.50
30.00
29.50
29.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

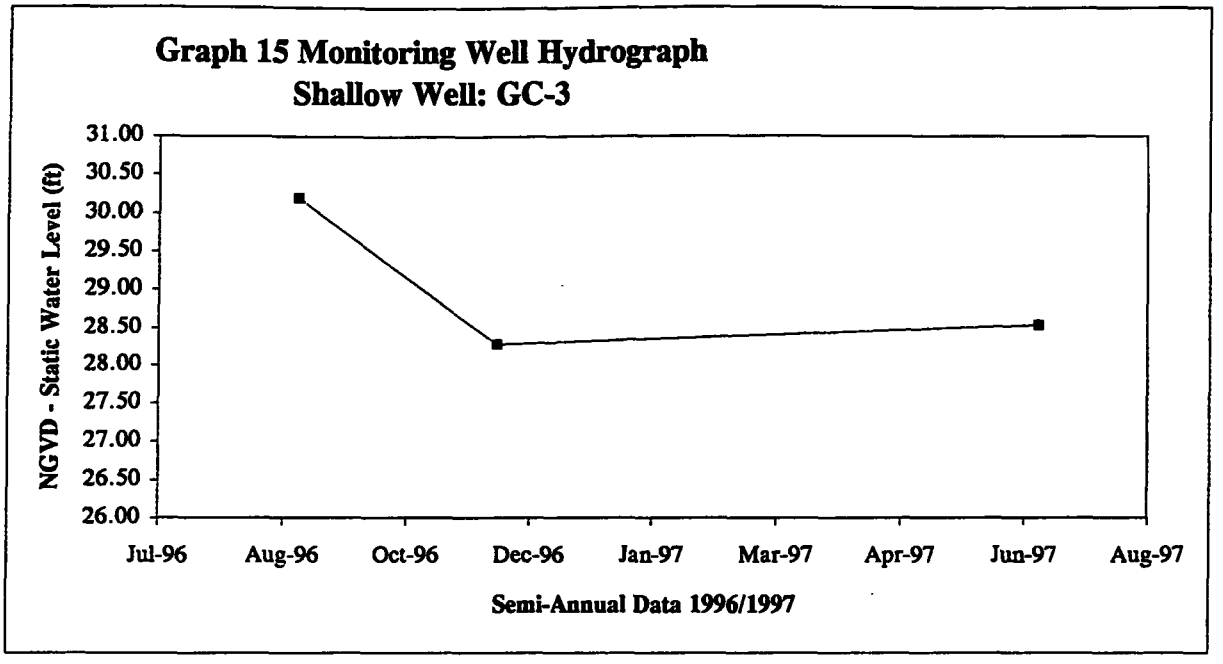

Graph 10 Monitoring Well Hydrograph
Shallow Well: MW-6
NGVD - Static Water Level (ft)
35.00
34.50
34.00
33.50
33.00
32.50
32.00
31.50
31.00
30.50
30.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997

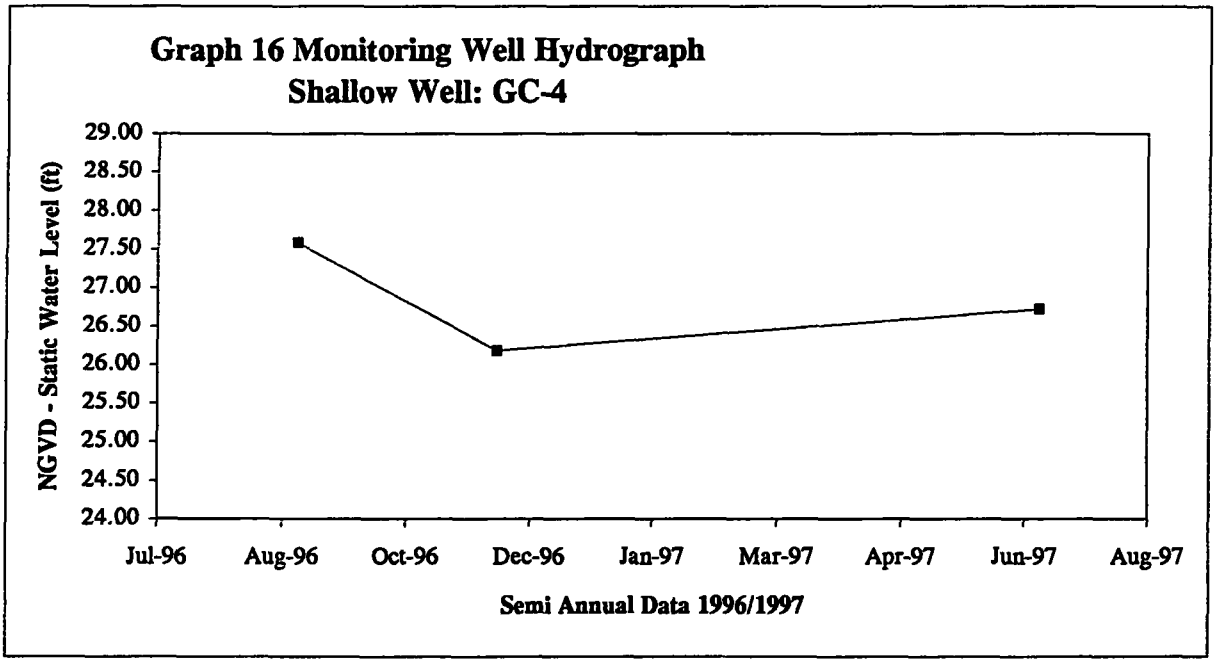

Graph 11 Monitoring Well Hydrograph
Shallow Well: CW-4
NGVD - Static Water Level (ft)
37.00
36.50
36.00
35.50
35.00
34.50
34.00
33.50
33.00
32.50
32.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

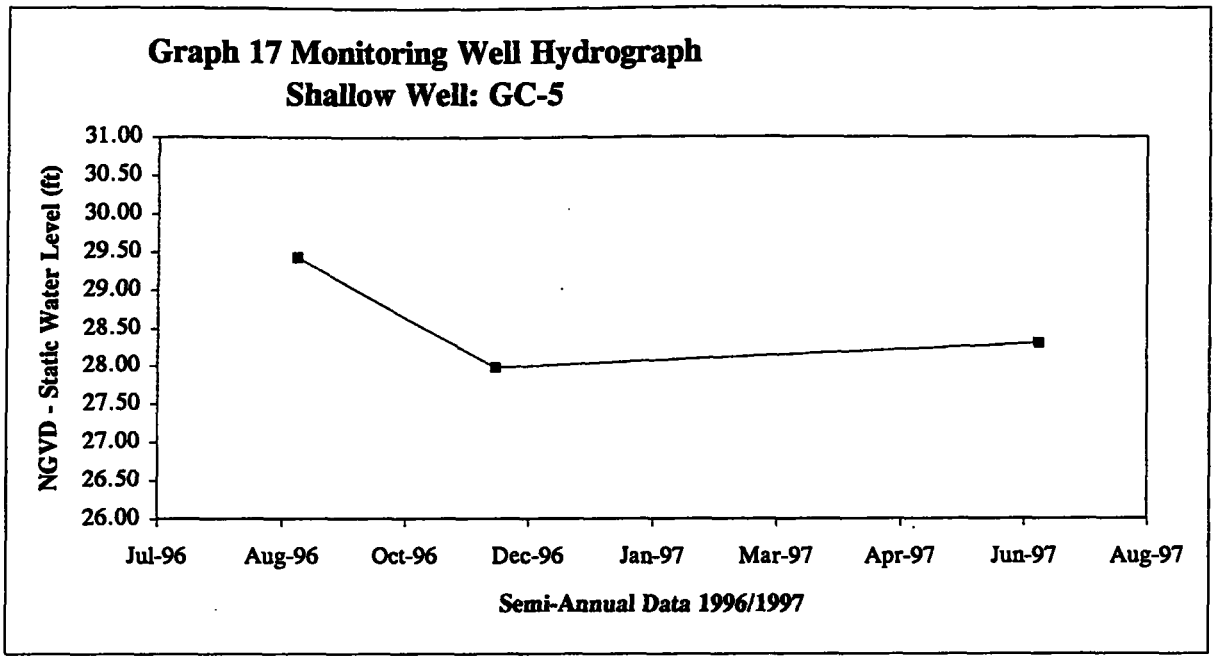

Graph 12 Monitoring Well Hydrograph
Shallow Well: CW-5A
NGVD - Static Water Level (ft)
38.00
37.50
37.00
36.50
36.00
35.50
35.00
34.50
34.00
33.50
33.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997

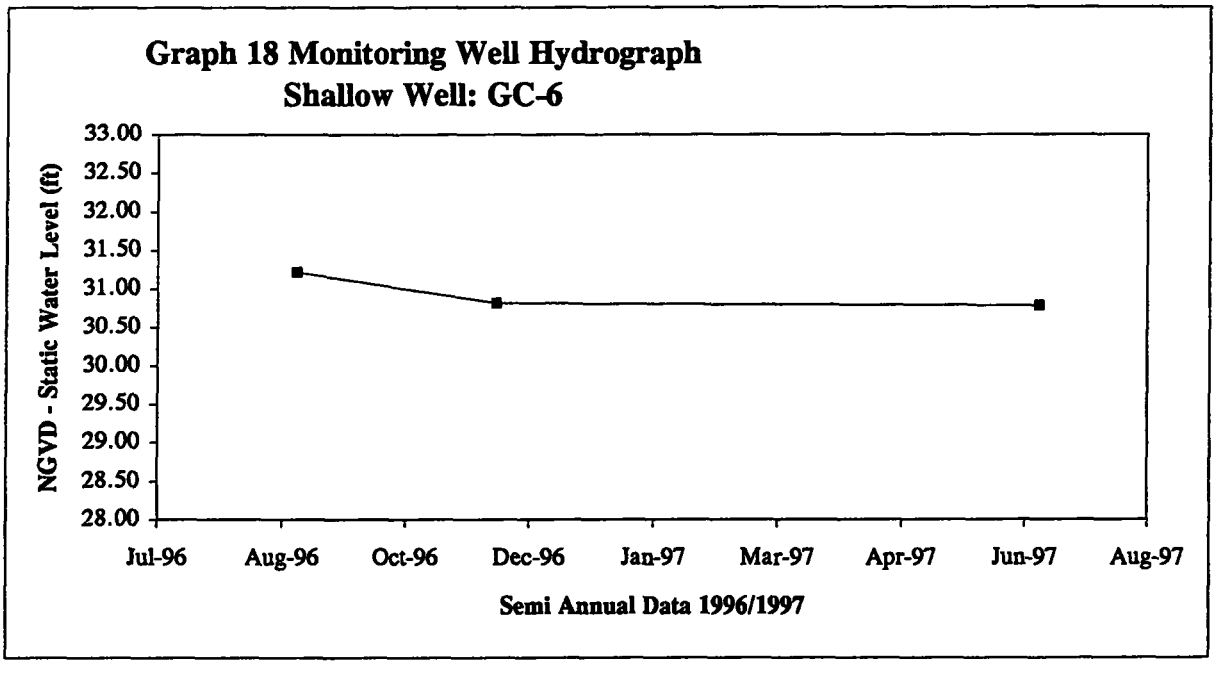

Graph 13 Monitoring Well Hydrograph
Shallow Well: GC-1A
NGVD - Static Water Level (ft)
30.00
29.00
28.00
27.00
26.00
25.00
24.00
23.00
22.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

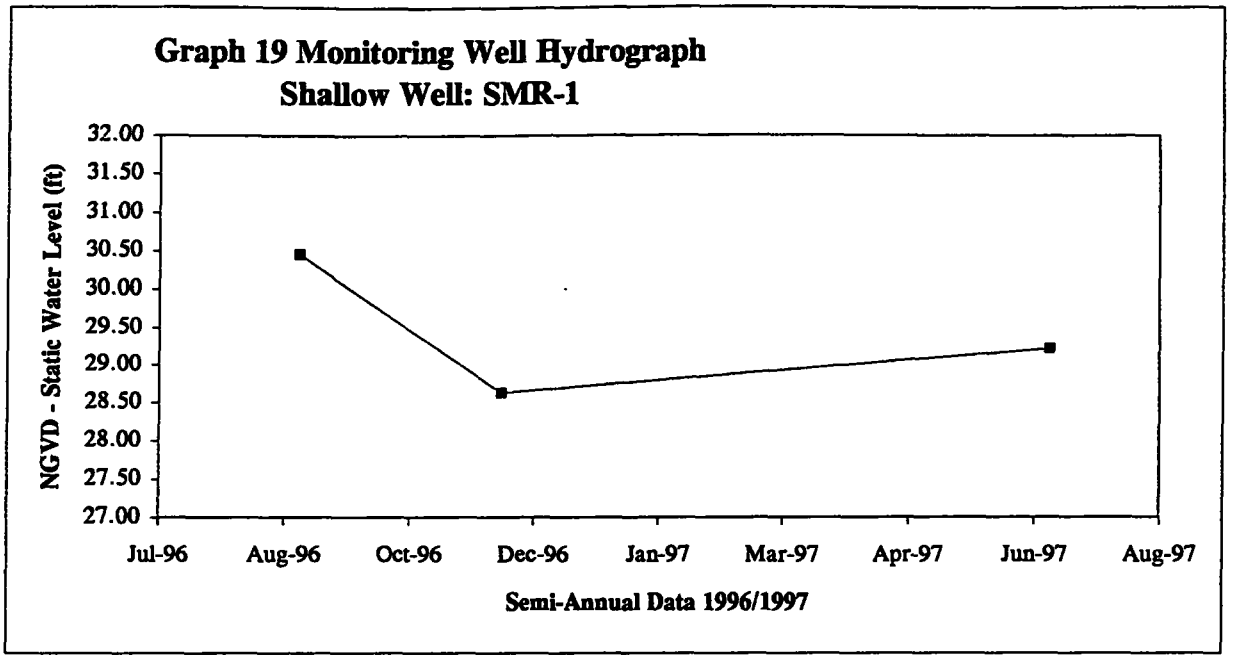

Graph 14 Monitoring Well Hydrograph
Shallow Well: GC-2
NGVD - Static Water Level (ft)
36.00
35.00
34.00
33.00
32.00
31.00
30.00
29.00
28.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997

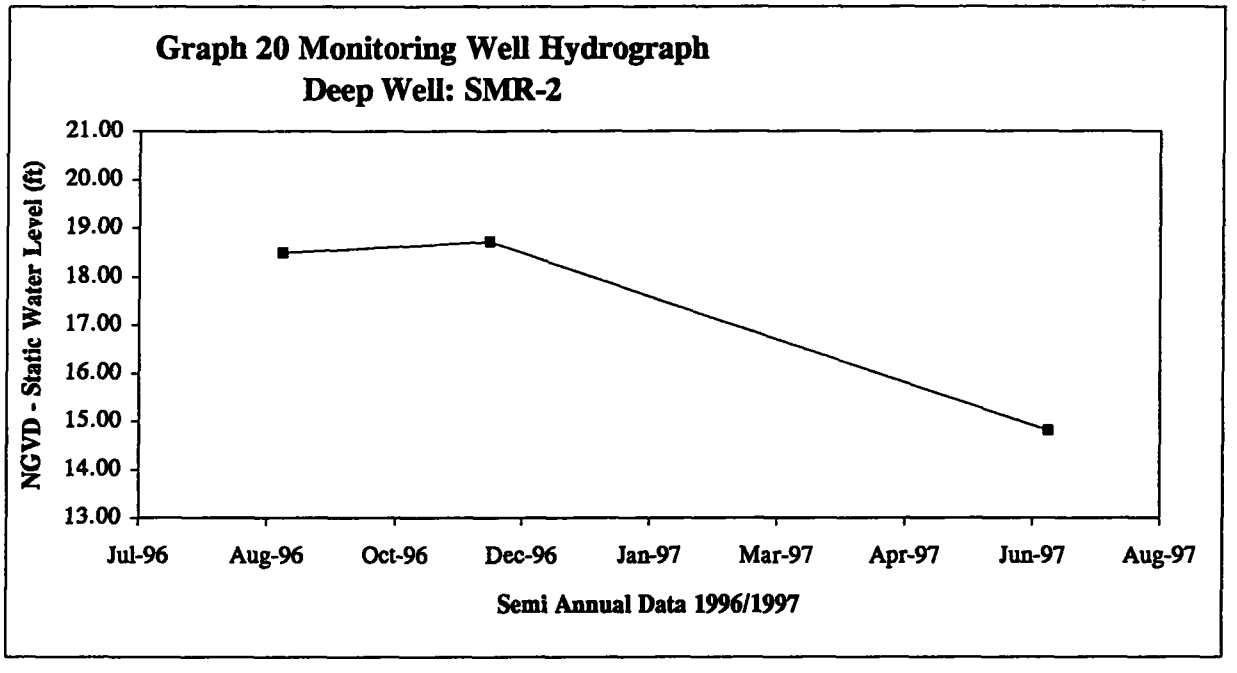

Graph 15 Monitoring Well Hydrograph
Shallow Well: GC-3
NGVD - Static Water Level (ft)
31.00
30.50
30.00
29.50
29.00
28.50
28.00
27.50
27.00
26.50
26.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

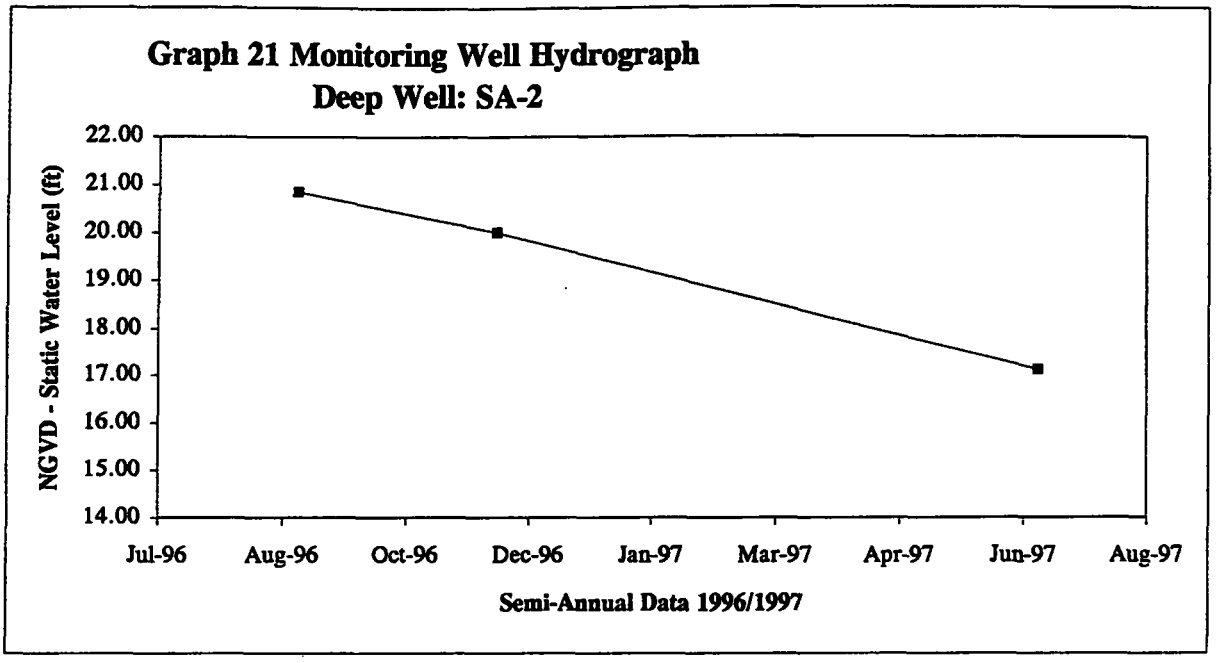

Graph 16 Monitoring Well Hydrograph
Shallow Well: GC-4
NGVD - Static Water Level (ft)
29.00
28.50
28.00
27.50
27.00
26.50
26.00
25.50
25.00
24.50
24.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997

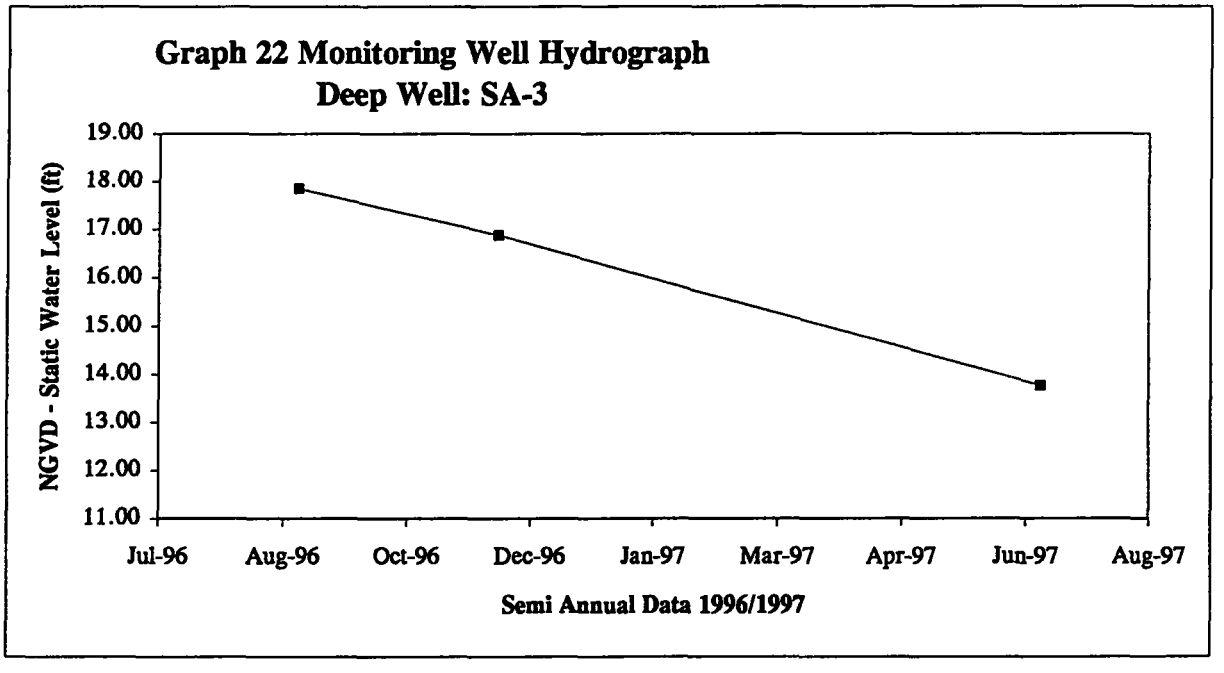

Graph 17 Monitoring Well Hydrograph
Shallow Well: GC-5
NGVD - Static Water Level (ft)
31.00
30.50
30.00
29.50
29.00
28.50
28.00
27.50
27.00
26.50
26.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

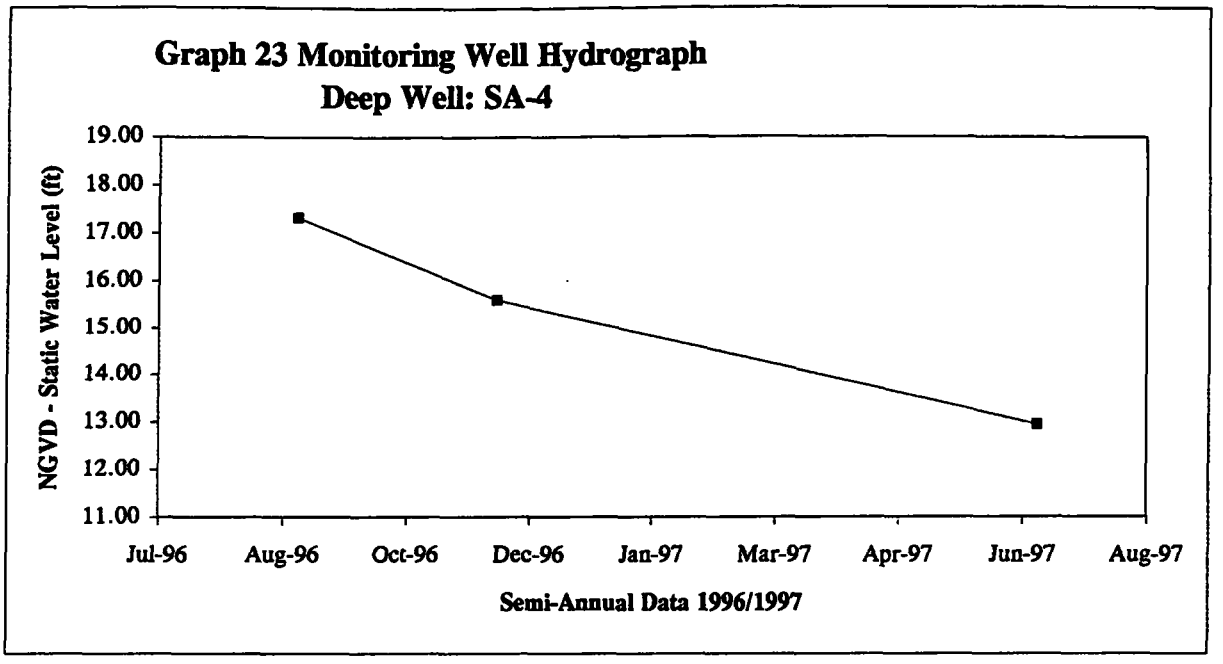

Graph 18 Monitoring Well Hydrograph
Shallow Well: GC-6
NGVD - Static Water Level (ft)
33.00
32.50
32.00
31.50
31.00
30.50
30.00
29.50
29.00
28.50
28.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997

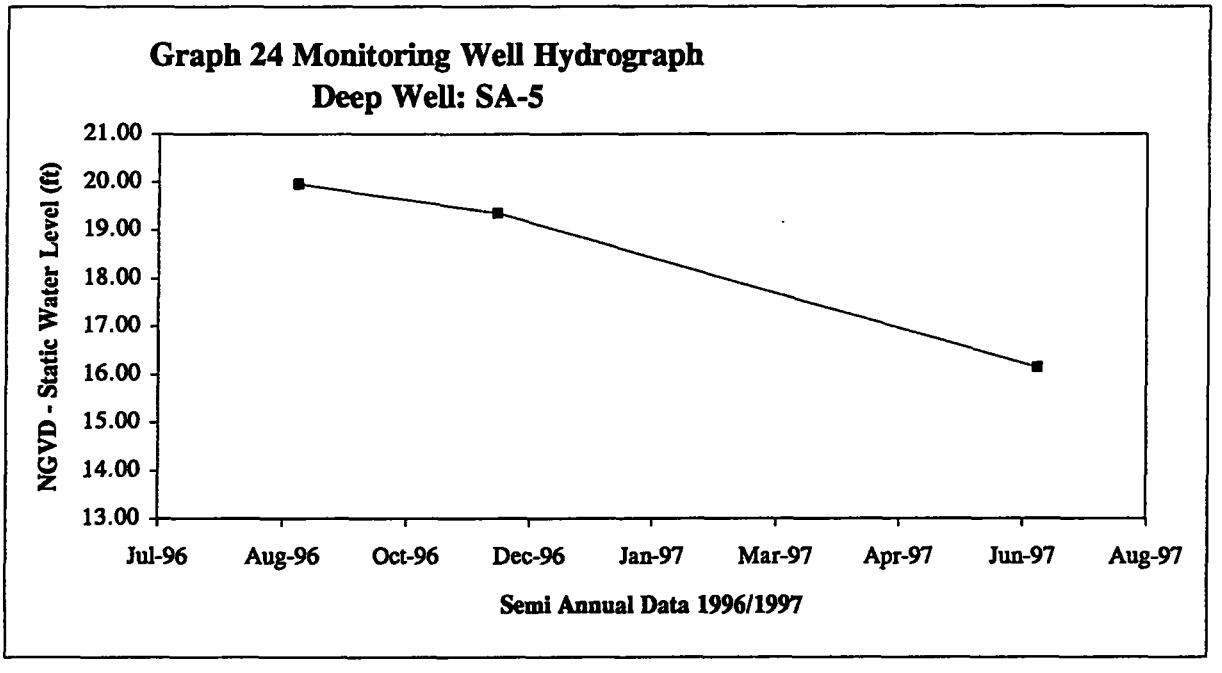

Graph 19 Monitoring Well Hydrograph
Shallow Well: SMR-1
NGVD - Static Water Level (ft)
32.00
31.50
31.00
30.50
30.00
29.50
29.00
28.50
28.00
27.50
27.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

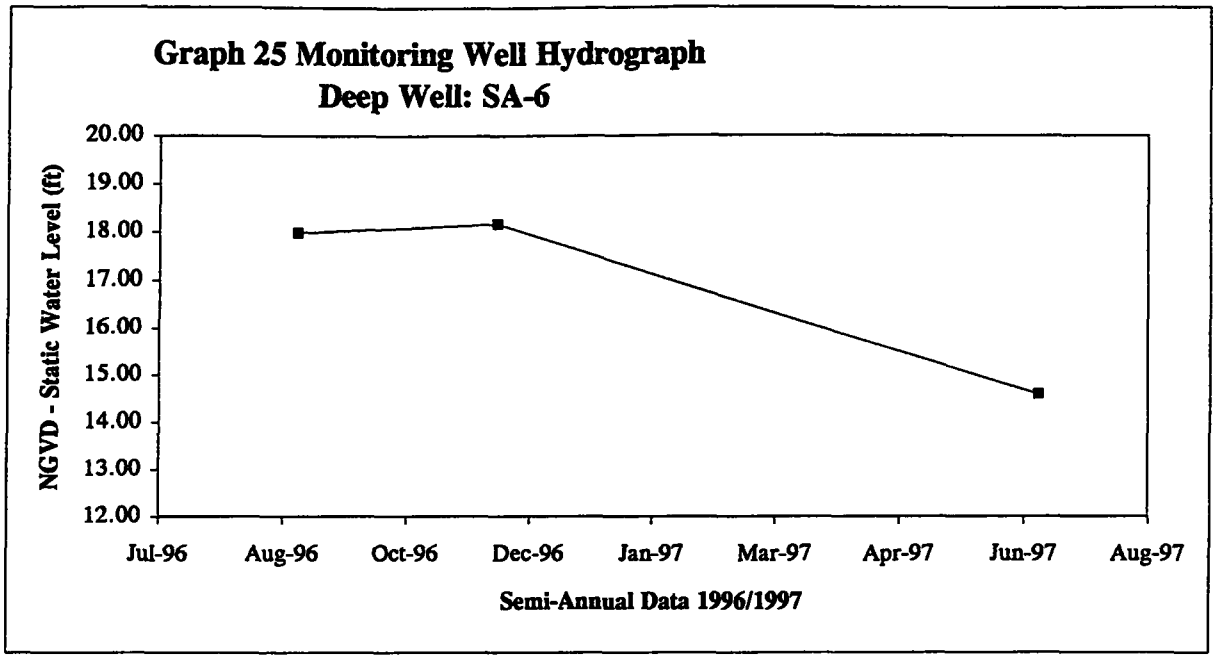

Graph 20 Monitoring Well Hydrograph
Deep Well: SMR-2
NGVD - Static Water Level (ft)
21.00
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997

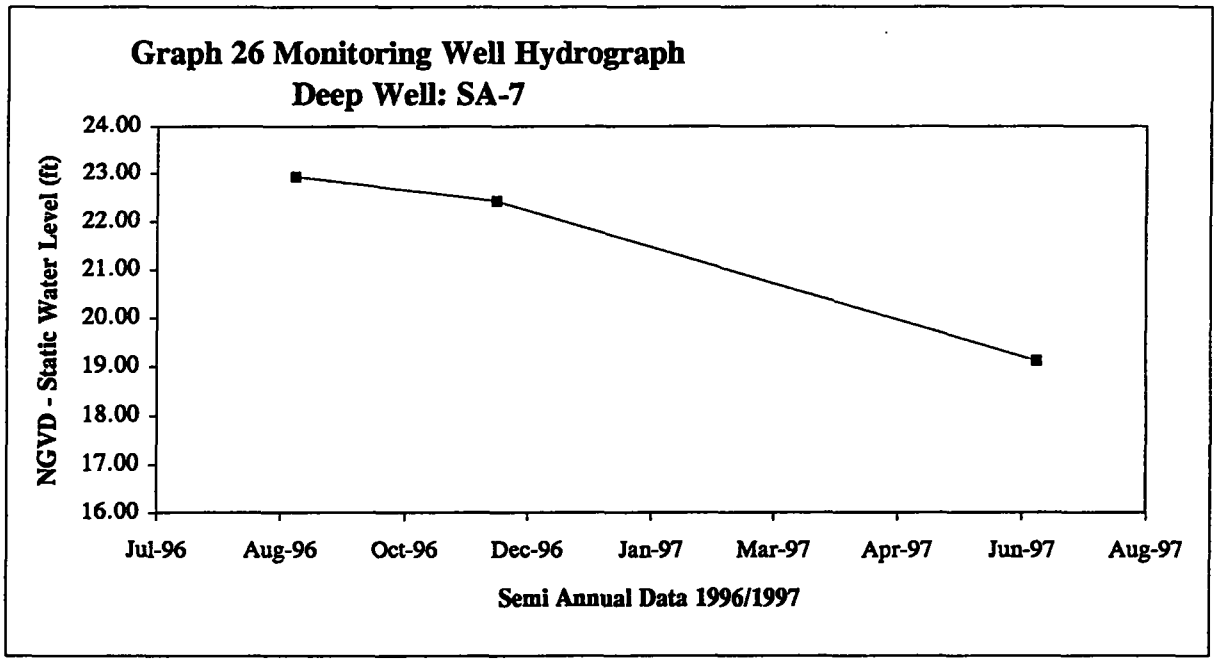

Graph 21 Monitoring Well Hydrograph
Deep Well: SA-2
NGVD - Static Water Level (ft)
22.00
21.00
20.00
19.00
18.00
17.00
16.00
15.00
14.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

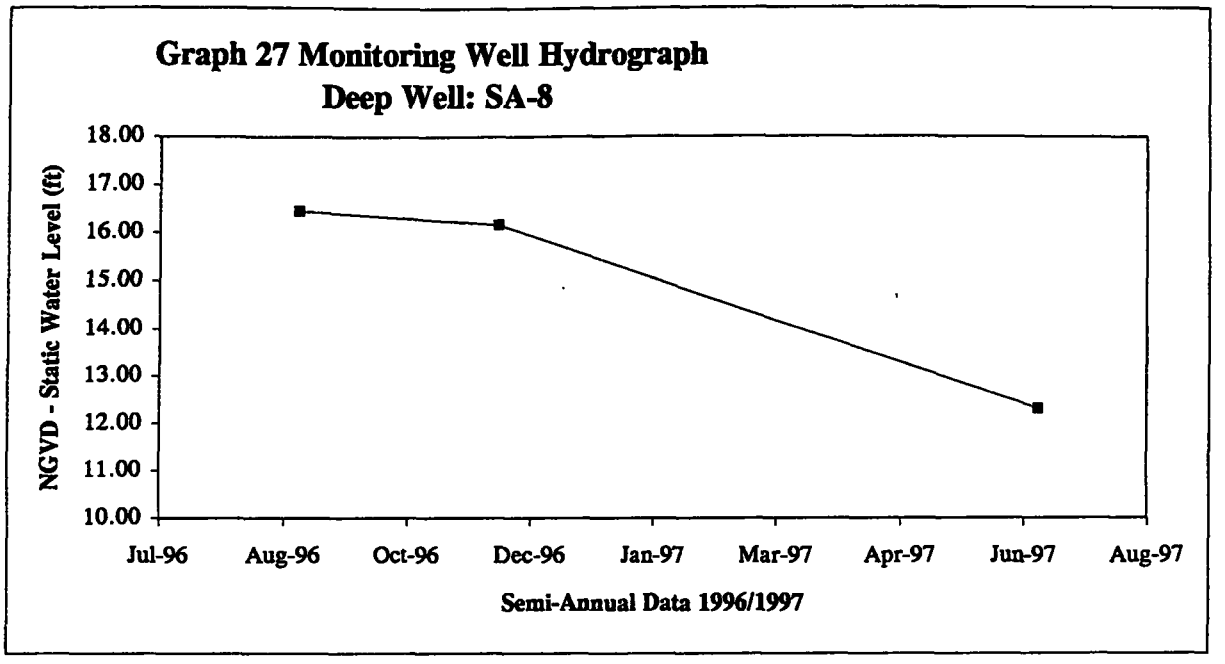

Graph 22 Monitoring Well Hydrograph
Deep Well: SA-3
NGVD - Static Water Level (ft)
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997


Graph 23 Monitoring Well Hydrograph
Deep Well: SA-4
NGVD - Static Water Level (ft)
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997


Graph 24 Monitoring Well Hydrograph
Deep Well: SA-5
NGVD - Static Water Level (ft)
21.00
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997


Graph 25 Monitoring Well Hydrograph
Deep Well: SA-6
NGVD - Static Water Level (ft)
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997


Graph 26 Monitoring Well Hydrograph
Deep Well: SA-7
NGVD - Static Water Level (ft)
24.00
23.00
22.00
21.00
20.00
19.00
18.00
17.00
16.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi Annual Data 1996/1997


Graph 27 Monitoring Well Hydrograph
Deep Well: SA-8
NGVD - Static Water Level (ft)
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
Jul-96
Aug-96
Oct-96
Dec-96
Jan-97
Mar-97
Apr-97
Jun-97
Aug-97
Semi-Annual Data 1996/1997

APPENDIX C

GROUNDWATER DATA FOR EACH MONITORING WELL

TABLE 1 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: LRII-1 Total Well Depth: 21.12 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	33.75	31.28	31.28
Conductivity (umho/cm)	500	500	500
pH (S.U.)	6.09	6.04	6.15
DO (mg/l)	5.34	2.21	2.21
Turbidity (NTU)	5.7	-	2.7
Bicarbonate Alkalinity (mg/l)	-	229	-
Temperature (C)	26.5	24.0	24.0
Color/Sheen (C.U.)	15	80	40
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.65	0.80	0.69
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.005	0.006	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	35.6	29.6	22.1
Chromium (mg/l)	<0.04	<0.04	0.00
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	32.7	30.4	37.4
Lead (mg/l)	0.001	0.009	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	0.11	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	23.1	24.1	22.5
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.016	0.031	<0.005
TDS (mg/l)	314	468	330
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 2 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: LRII-2 Total Well Depth: 22.83 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	31.28	29.41	28.57
Conductivity (umho/cm)	130	135	125
pH (S.U.)	5.83	5.85	5.90
DO (mg/l)	5.62	1.94	2.34
Turbidity (NTU)	1.00	-	2.57
Bicarbonate Alkalinity (mg/l)	-	49	-
Temperature (C)	27.0	24.0	25.0
Color/Sheen (C.U.)	5	15	10
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.05	0.07	0.08
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.002	0.002	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	11.3	11.6	10.1
Chromium (mg/l)	<0.04	<0.04	0.002
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	5.61	5.23	6.06
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	3.64	4.57	3.22
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	136	218	72
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 3 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: LRII-3 Total Well Depth: 22.61 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	28.11	25.78	25.39
Conductivity (umho/cm)	120	135	160
pH (S.U.)	5.19	4.90	4.91
DO (mg/l)	5.14	2.07	2.38
Turbidity (NTU)	1.30	-	0.43
Bicarbonate Alkalinity (mg/l)	-	12	-
Temperature (C)	25.5	24.5	25.0
Color/Sheen (C.U.)	5	5	<5
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	<0.01	0.05	0.27
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	1.54	18.0	25.5
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	1.19	1.26	1.65
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	16.7	18.3	20.4
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	52	198	90
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 4 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: LRII-4 Total Well Depth: 22.50 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	27.92	25.95	25.53
Conductivity (umho/cm)	445	440	450
pH (S.U.)	6.05	6.01	6.17
DO (mg/l)	1.57	2.21	1.62
Turbidity (NTU)	0.70	-	0.47
Bicarbonate Alkalinity (mg/l)	-	246	-
Temperature (C)	25.5	24.5	24.5
Color/Sheen (C.U.)	5	15	<5
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.1	0.10	0.08
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	11.6	9.24	11.3
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	4.90	5.17	5.48
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	11.0	11.9	12.1
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	256	250	244
EPA 8260 (ug/l)	(1)	BDL	BDL

1 - All EPA 8260 parameters below detection limits except for concentration listed
Benzene 0.38 ug/l, Toluene 0.74 ug/l, M,P-Xylenes 0.34 ug/l, O-Xylene 0.32ug/l.
"-" - Not analyzed or sampled for this parameter.

TABLE 5 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: LRII-5 Total Well Depth: 22.78 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	31.26	29.37	29.01
Conductivity (umho/cm)	340	320	325
pH (S.U.)	5.83	5.90	5.99
DO (mg/l)	4.9	1.61	2.65
Turbidity (NTU)	2.1	-	1.47
Bicarbonate Alkalinity (mg/l)	-	161	-
Temperature (C)	26.5	24.5	26.0
Color/Sheen (C.U.)	5	25	20
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.20	0.24	0.22
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	24.1	17.5	26.0
Chromium (mg/l)	<0.04	<0.04	0.002
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	5.26	4.47	5.12
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	9.81	9.55	10.2
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	0.009
TDS (mg/l)	202	336	200
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 6 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: MW-1 Total Well Depth: 14.53 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	32.82	31.90	32.30
Conductivity (umho/cm)	305	275	185
pH (S.U.)	4.81	4.80	5.14
DO (mg/l)	2.09	0.25	1.78
Turbidity (NTU)	1.00	-	0.55
Bicarbonate Alkalinity (mg/l)	-	20	-
Temperature (C)	26.5	25.0	25.5
Color/Sheen (C.U.)	5	15	15
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.40	0.40	0.28
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.005	0.004	0.002
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	73.8	67.0	42.1
Chromium (mg/l)	<0.04	<0.04	0.003
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	7.74	6.56	4.15
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	0.0013	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	15.6	18.0	14.0
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	218	210	134
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 7 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: MW-2 Total Well Depth: 13.97 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	33.74	31.57	31.94
Conductivity (umho/cm)	335	295	250
pH (S.U.)	4.85	4.66	5.02
DO (mg/l)	1.7	0.9	1.8
Turbidity (NTU)	1.20	-	0.95
Bicarbonate Alkalinity (mg/l)	-	7	-
Temperature (C)	26.5	25.0	25.5
Color/Sheen (C.U.)	10.00	40.00	15.00
LABROATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.35	0.24	0.35
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	41.6	36.8	38.5
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	2.22	2.61	2.81
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	0.32	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	23.9	25.3	20.2
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	224	195	178
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 8 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: MW-3 Total Well Depth: 13.97 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	32.47	30.93	31.95
Conductivity (umho/cm)	600	650	600
pH (S.U.)	5.73	5.73	6.06
DO (mg/l)	2.07	0.82	1.55
Turbidity (NTU)	1.7	-	2.42
Bicarbonate Alkalinity (mg/l)	-	73	-
Temperature (C)	25.0	24.0	24.0
Color/Sheen (C.U.)	10	10	10
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.11	0.11	0.16
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.002	0.002	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	128	123	114
Chromium (mg/l)	<0.04	<0.04	0.004
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	10.2	9.81	10.1
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	71	68.2	68.7
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.01
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	360	398	382
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 9 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: MW-5 Total Well Depth: 21.42 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	31.51	31.10	31.27
Conductivity (umho/cm)	250	310	315
pH (S.U.)	6.11	6.12	6.40
DO (mg/l)	1.48	1.21	1.49
Turbidity (NTU)	29.0	-	12.20
Bicarbonate Alkalinity (mg/l)	-	154	-
Temperature (C)	26	25	26
Color/Sheen (C.U.)	15	60	25
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	3.27	3.38	3.23
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	15.5	17.2	18.6
Chromium (mg/l)	<0.04	<0.04	<0.004
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	2.37	2.46	2.71
Lead (mg/l)	0.002	0.002	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	12.6	12.4	11.6
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	0.029	<0.005
TDS (mg/l)	172	224	196
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 10 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: MW-6 Total Well Depth: 20.72 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	33.55	32.56	32.86
Conductivity (umho/cm)	120	150	150
pH (S.U.)	5.27	5.34	5.48
DO (mg/l)	1.27	1.54	1.93
Turbidity (NTU)	7.50	-	3.60
Bicarbonate Alkalinity (mg/l)	-	37	-
Temperature (C)	26.2	25.0	25.5
Color/Sheen (C.U.)	10	30	25
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.14	0.13	0.13
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.002	0.00	0.002
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	8.66	10.5	12.0
Chromium (mg/l)	<0.04	<0.04	<0.008
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	6.00	5.72	6.22
Lead (mg/l)	<0.001	0.002	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	6.89	8.79	9.53
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.011	0.023	<0.005
TDS (mg/l)	128	124	110
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 11 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: CW-4 Total Well Depth: 17.91 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	34.51	34.26	32.93
Conductivity (umho/cm)	1350	1225	1375
pH (S.U.)	6.52	6.47	6.66
DO (mg/l)	2.08	1.66	1.67
Turbidity (NTU)	0.30	-	0.19
Bicarbonate Alkalinity (mg/l)	-	337	-
Temperature (C)	25.5	24.0	24.5
Color/Sheen (C.U.)	15	35	40
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.15	0.14	0.22
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.029	0.025	0.024
Barium (mg/l)	0.17	0.15	0.18
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	171	150	201
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	5.66	4.84	7.52
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	0.0015	<0.0006
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	51.3	52.7	54.6
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	886	894	988
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 12 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: CW-5A Total Well Depth: 11.92 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	36.59	35.49	34.78
Conductivity (umho/cm)	700	700	650
pH (S.U.)	5.76	5.59	5.83
DO (mg/l)	1.61	1.90	1.80
Turbidity (NTU)	0.9	-	1.02
Bicarbonate Alkalinity (mg/l)	-	115	-
Temperature (C)	25.5	24.0	25.0
Color/Sheen (C.U.)	5	20	20
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.68	0.67	0.56
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.002	0.002	0.002
Barium (mg/l)	0.01	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	71.8	76.9	80.3
Chromium (mg/l)	<0.04	<0.04	0.003
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	10.2	8.81	7.49
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	35.9	39.7	41.1
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	504	441	397
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 13 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: GC-1A Total Well Depth: 23.76 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	26.62	26.26	26.59
Conductivity (umho/cm)	950	900	825
pH (S.U.)	6.37	6.40	6.57
DO (mg/l)	2.49	1.97	2.03
Turbidity (NTU)	0.3	-	0.26
Bicarbonate Alkalinity (mg/l)	-	376	-
Temperature (C)	23.0	22.5	22.5
Color/Sheen (C.U.)	15	10	10
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.15	0.19	0.20
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.023	0.019	0.010
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	<1.0	112	98.5
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	19.6	17.6	15.30
Lead (mg/l)	<0.001	<0.001	0.002
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	49.0	54.4	43.2
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.009	0.011	0.012
TDS (mg/l)	582	600	542
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 14 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: GC-2 Total Well Depth: 18.03 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	32.42	30.60	31.07
Conductivity (umho/cm)	480	500	500
pH (S.U.)	6.16	6.15	6.30
DO (mg/l)	2.42	1.64	1.45
Turbidity (NTU)	2.6	-	12.2
Bicarbonate Alkalinity (mg/l)	-	151	-
Temperature (C)	25.5	25.0	25.0
Color/Sheen (C.U.)	15	30	30
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.21	0.18	0.21
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.058	0.066	0.081
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	29.7	30.5	43.7
Chromium (mg/l)	<0.04	<0.04	0.004
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	27.5	24.7	35.0
Lead (mg/l)	<0.001	0.001	0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	0.20	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	20.4	22.5	19.5
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	0.010
TDS (mg/l)	286	378	348
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 15 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: GC-3 Total Well Depth: 22.58 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	30.20	28.28	28.54
Conductivity (umho/cm)	500	480	500
pH (S.U.)	6.24	6.27	6.31
DO (mg/l)	1.61	2.62	2.31
Turbidity (NTU)	1.0	-	0.92
Bicarbonate Alkalinity (mg/l)	-	249	-
Temperature (C)	25.5	25.0	25.0
Color/Sheen (C.U.)	5	35	10
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.17	0.12	0.15
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.007	0.007	0.007
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	24.3	23.5	26.8
Chromium (mg/l)	<0.04	<0.04	0.001
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	7.01	6.50	7.07
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	19.6	20.3	17.7
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.01
Zinc (mg/l)	0.01	0.007	0.007
TDS (mg/l)	304	354	374
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 16 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: GC-4 Total Well Depth: 22.18 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	27.58	26.18	26.72
Conductivity (umho/cm)	445	425	440
pH (S.U.)	6.39	6.37	6.53
DO (mg/l)	2.21	1.37	1.41
Turbidity (NTU)	3.4	-	4.17
Bicarbonate Alkalinity (mg/l)	-	193	-
Temperature (C)	25.5	24.0	25.0
Color/Sheen (C.U.)	10	10	<5
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	<0.01	0.10	0.15
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.01	0.01	0.009
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	22.9	20.5	20.5
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	13.8	12.8	14.0
Lead (mg/l)	<0.001	<0.001	0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	0.23	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	19.3	20.6	16.8
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	0.007	0.019
TDS (mg/l)	244	320	216
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 17 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: GC-5 Total Well Depth: 22.02 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	29.43	27.97	28.3
Conductivity (umho/cm)	230	420	300
pH (S.U.)	5.84	6.37	6.13
DO (mg/l)	2.19	1.14	1.58
Turbidity (NTU)	2.5	-	0.99
Bicarbonate Alkalinity (mg/l)	-	212	-
Temperature (C)	27.0	25.5	27.0
Color/Sheen (C.U.)	10	55	65
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	1.38	1.50	1.47
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	24.5	24.5	18.0
Chromium (mg/l)	<0.04	<0.04	0.004
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	1.27	2.46	2.23
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	12.1	13.6	14.2
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.008	<0.005	<0.005
TDS (mg/l)	148	308	198
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 18 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: GC-6 Total Well Depth: 22.40 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	31.22	30.82	30.78
Conductivity (umho/cm)	250	295	390
pH (S.U.)	5.71	5.92	6.14
DO (mg/l)	1.84	1.36	1.02
Turbidity (NTU)	3.0	-	1.5
Bicarbonate Alkalinity (mg/l)	-	81	-
Temperature (C)	27.0	25.5	26.0
Color/Sheen (C.U.)	10	30	30
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.72	0.59	0.55
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.001	0.002	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	14.1	15.7	17.8
Chromium (mg/l)	<0.04	<0.04	0.002
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	1.32	2.04	2.17
Lead (mg/l)	<0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	4.95	6.23	7.73
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	203	264	228
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 19 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Shallow Monitoring Well: SMR-1 Total Well Depth: 22.88 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	30.46	28.63	29.22
Conductivity (umho/cm)	140	215	205
pH (S.U.)	5.45	5.48	5.59
DO (mg/l)	0.96	1.90	1.50
Turbidity (NTU)	4.0	-	3.02
Bicarbonate Alkalinity (mg/l)	-	49	-
Temperature (C)	26.5	25.0	24.5
Color/Sheen (C.U.)	10	25	30
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.19	0.19	0.18
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	0.002	0.002	0.003
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	12.2	14.4	15.2
Chromium (mg/l)	<0.04	<0.04	0.006
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	6.34	7.35	7.59
Lead (mg/l)	<0.001	<0.001	0.002
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	12.7	18.3	17.3
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.009	<0.005	0.006
TDS (mg/l)	130	142	152
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 20 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Deep Monitoring Well: SMR-2 Total Well Depth: 150.00 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	18.49	18.72	14.81
Conductivity (umho/cm)	700	650	650
pH (S.U.)	7.32	7.23	7.49
DO (mg/l)	4.12	2.35	3.32
Turbidity (NTU)	0.4	-	0.35
Bicarbonate Alkalinity (mg/l)	-	239	-
Temperature (C)	26	24.5	25.0
Color/Sheen (C.U.)	5	5	5
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.13	0.26	0.11
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	0.11	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	102	96.5	97.9
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	0.12	0.02	0.07
Lead (mg/l)	0.004	<0.001	0.003
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	0.20	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	55.0	48.9	56.3
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.024	<0.005	0.009
TDS (mg/l)	318	398	348
EPA 8260 (ug/l)	(1)	BDL	BDL

1 - All EPA 8260 parameters below detection limits except for concentration listed
Benzene 0.09 ug/l, Toluene 0.55 ug/l, M,P-Xylene 0.38 ug/l, O-Xylene 0.30 ug/l

TABLE 21 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Deep Monitoring Well: SA-2 Total Well Depth: 154.93 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	20.86	20.01	17.12
Conductivity (umho/cm)	550	550	525
pH (S.U.)	7.18	7.14	7.34
DO (mg/l)	2.6	2.10	0.95
Turbidity (NTU)	0.96	-	0.5
Bicarbonate Alkalinity (mg/l)	-	298	-
Temperature (C)	24.5	24.5	25.0
Color/Sheen (C.U.)	5	10	20
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.27	0.25	0.23
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	29.7	32.0	33.5
Chromium (mg/l)	<0.04	<0.04	0.004
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	0.33	0.06	0.58
Lead (mg/l)	0.003	0.004	0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	0.10	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	30.6	29.9	27.5
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.013	<0.005	0.010
TDS (mg/l)	322	392	308
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 22 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Deep Monitoring Well: SA-3 Total Well Depth: 163.02 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	17.86	16.88	13.76
Conductivity (umho/cm)	650	600	650
pH (S.U.)	7.07	7.15	7.31
DO (mg/l)	1.68	3.20	0.40
Turbidity (NTU)	3.9	-	2.48
Bicarbonate Alkalinity (mg/l)	-	315	-
Temperature (C)	25.0	24.5	25.0
Color/Sheen (C.U.)	5	35	10
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.17	0.19	0.22
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	34.0	24.9	20.0
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	0.700	0.29	0.45
Lead (mg/l)	0.002	0.002	0.002
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	34.2	30.1	22.7
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	0.22
Zinc (mg/l)	0.009	0.031	0.007
TDS (mg/l)	400	426	244
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 23 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Deep Monitoring Well: SA-4 Total Well Depth: 143.78 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	17.32	15.59	12.94
Conductivity (umho/cm)	650	625	650
pH (S.U.)	7.34	7.35	7.45
DO (mg/l)	1.24	1.84	2.29
Turbidity (NTU)	0.3	-	0.53
Bicarbonate Alkalinity (mg/l)	-	234	-
Temperature (C)	24	23.5	23.5
Color/Sheen (C.U.)	5	<5	<5
LABORATORY PARMETERS			
Total Ammonia as N (mg/l)	0.16	0.14	0.18
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	65.4	67.7	71.1
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	0.08	0.09	0.09
Lead (mg/l)	0.005	0.004	0.004
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	62.8	61.4	59.8
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.017	0.009	0.007
TDS (mg/l)	440	480	446
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 24 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Deep Monitoring Well: SA-5 Total Well Depth: 153.02 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARMETERS			
NDVD - Static Water Level (ft)	19.96	19.35	16.15
Conductivity (umho/cm)	675	650	650
pH (S.U.)	7.36	7.26	7.35
DO (mg/l)	4.38	2.65	1.77
Turbidity (NTU)	0.6	-	0.27
Bicarbonate Alkalinity (mg/l)	-	224	-
Temperature (C)	25.0	24.0	25.0
Color/Sheen (C.U.)	5	5	<5
LABORATORY PARMETERS			
Total Ammonia as N (mg/l)	0.21	0.24	0.12
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	72.2	63.7	66.3
Chromium (mg/l)	<0.04	<0.04	0.001
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	0.05	0.04	0.20
Lead (mg/l)	0.002	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	0.23	0.46
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	58.8	57.6	55.1
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	<0.005
TDS (mg/l)	440	504	314
EPA 8260 (ug/l)	(1)	BDL	BDL

1 - All EPA 8260 parameters below detection limits except for concentration listed Benzene 0.23 ug/l, Toluene 0.8 ug/l, M,P-Xylene 0.68 ug/l, O-Xylene 0.37ug/l.
"-" - Not analyzed or sampled for this parameter.

TABLE 25 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Deep Monitoring Well: SA-6 Total Well Depth: 153.04 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARMETERS			
NGVD - Static Water Level (ft)	17.98	18.16	14.6
Conductivity (umho/cm)	800	800	800
pH (S.U.)	7.33	7.24	7.40
DO (mg/l)	7.34	2.53	2.10
Turbidity (NTU)	0.3	-	0.56
Bicarbonate Alkalinity (mg/l)	-	81	-
Temperature (C)	25.5	24.0	25.0
Color/Sheen (C.U.)	5	5	<5
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.28	0.26	0.27
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	0.10
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	46.3	47.6	48.3
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	0.14	0.06	0.04
Lead (mg/l)	0.002	<0.001	0.002
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	0.08	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	34.1	35.4	34.4
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.015	0.007	<0.005
TDS (mg/l)	396	508	386
EPA 8260 (ug/l)	1	BDL	BDL

1 - All EPA 8260 parameters below detection limits except for concentration listed Benzene 0.15 ug/l, Toluene 0.62 ug/l, M,P-Xylene 0.26 ug/l, O-Xylene 0.15 ug/l.
"-" - Not analyzed or sampled for this parameter.

TABLE 26 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Deep Monitoring Well: SA-7 Total Well Depth: 152.97 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARMETERS			
NGVD - Static Water Level (ft)	22.93	22.42	19.13
Conductivity (umho/cm)	480	465	475
pH (S.U.)	7.49	7.29	7.64
DO (mg/l)	4.64	2.08	2.39
Turbidity (NTU)	0.5	-	0.62
Bicarbonate Alkalinity (mg/l)	-	107	-
Temperature (C)	25.0	24.0	25.0
Color/Sheen (C.U.)	5	5	<5
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.19	0.23	0.23
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	<0.1	<0.1	<0.1
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	60.3	55.8	56.9
Chromium (mg/l)	<0.04	<0.04	<0.04
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	<0.02	<0.02	<0.02
Iron (mg/l)	0.02	<0.02	<0.02
Lead (mg/l)	0.001	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	0.06	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	41.8	39.4	39.6
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	<0.005	<0.005	0.010
TDS (mg/l)	293	370	302
EPA 8260 (ug/l)	BDL (1)	BDL (1)	BDL (1)

1 - All EPA 8260 parameters below detection limits (varies with parameter).
"-" - Not analyzed or sampled for this parameter.

TABLE 27 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING

Deep Monitoring Well: SA-8 Total Well Depth: 153.38 ft	1996/1997 SAMPLING EVENT (see text for dates)		
HALF-YEAR	H1-96	H2-96	H1-97
FIELD PARAMETERS			
NGVD - Static Water Level (ft)	16.46	16.17	12.31
Conductivity (umho/cm)	475	480	490
pH (S.U.)	7.64	7.84	8.26
DO (mg/l)	2.0	2.4	2.4
Turbidity (NTU)	2.5	-	3.12
Bicarbonate Alkalinity (mg/l)	-	261	-
Temperature (C)	24.5	24.5	24.5
Color/Sheen (C.U.)	5	10	10
LABORATORY PARAMETERS			
Total Ammonia as N (mg/l)	0.43	0.29	0.30
Antimony (mg/l)	<0.005	<0.005	<0.005
Arsenic (mg/l)	<0.001	<0.001	<0.001
Barium (mg/l)	0.27	0.14	0.24
Beryllium (mg/l)	<0.003	<0.003	<0.003
Cadmium (mg/l)	<0.005	<0.005	<0.005
Chlorides (mg/l)	54.7	51.3	55.5
Chromium (mg/l)	<0.04	<0.004	<0.004
Cobalt (mg/l)	<0.05	<0.05	<0.05
Copper (mg/l)	0.02	<0.02	<0.02
Iron (mg/l)	0.07	<0.02	0.06
Lead (mg/l)	0.003	<0.001	<0.001
Mercury (mg/l)	<0.0001	<0.0001	<0.0001
Nitrate (as N mg/l)	<0.05	<0.05	<0.05
Nickel (mg/l)	<0.02	<0.02	<0.02
Selenium (mg/l)	<0.002	<0.002	<0.002
Silver (mg/l)	<0.005	<0.005	<0.005
Sodium (mg/l)	30.4	38.3	32.2
Thallium (mg/l)	<0.001	<0.001	<0.001
Vanadium (mg/l)	<0.10	<0.10	<0.10
Zinc (mg/l)	0.022	<0.005	<0.005
TDS (mg/l)	556	276	342
EPA 8260 (ug/l)	(1)	BDL	BDL

1 - All EPA 8260 parameters below detection limits except for concentration listed
Benzene 0.39 ug/l, Ethylbenzene 0.59 ug/l, Toluene 2.14 ug/l, M,P-Xylene 2.32 ug/l, O-Xylene 1.31ug/l.
"-" - Not analyzed or sampled for this parameter.

APPENDIX D

SHALLOW MONITORING WELL DATA COMPARISONS

TABLE and GRAPH 28 LENA ROAD LANDFILL GROUDWATER PARAMETER TREND ANALYSIS

1996/1997 Semi-Annual Sampling Results Grouped by Landfill Stage

Location: Shallow Monitor Wells
Depth: 10 - 25 feet
Parameter: Total Dissolved Solids
Units: mg/l

SAMPLING EVENT	STAGE III							STAGE I						STAGE II					(1)
	GC-1A	GC-2	GC-3	GC-4	GC-5	GC-6	MW-5	MW-1	MW-2	MW-3	CW-4	CW-5A	MW-6	LRII-1	LRII-2	LRII-3	LRII-4	LRII-5	SMR-1
H1-96	582	286	304	244	148	203	172	218	224	360	886	504	128	314	136	52	256	202	130
H2-96	600	378	354	320	308	264	224	210	195	398	894	430	124	468	218	198	250	336	142
H1-97	542	348	374	216	198	228	196	134	178	382	988	397	110	330	72	90	244	200	152

1 - SMR-1 is a background well located to the east of Stage II.

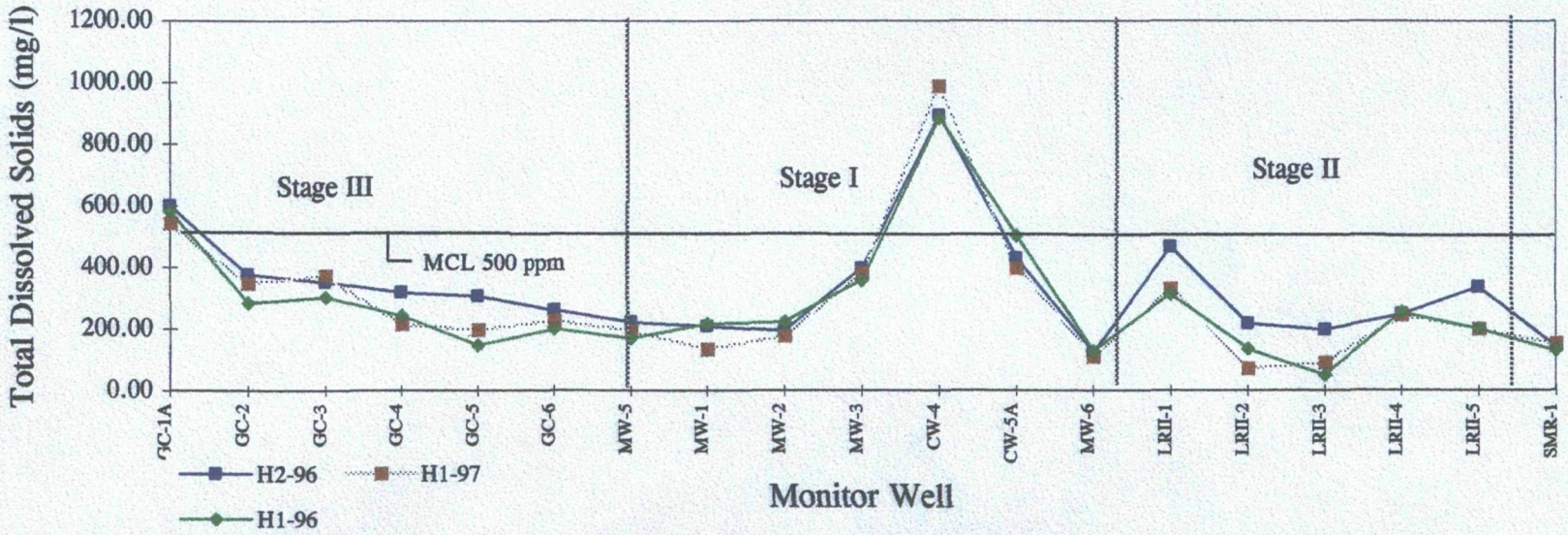


TABLE and GRAPH 29 LENA ROAD LANDFILL GROUDWATER PARAMETER TREND ANALYSIS

1996/1997 Semi-Annual Sampling Results Grouped by Landfill Stage

Location: Shallow Monitor Wells
Depth: 10 - 25 feet
Parameter: pH
Units: S.U.

SAMPLING EVENT	STAGE III							STAGE I						STAGE II					(1)
	GC-1A	GC-2	GC-3	GC-4	GC-5	GC-6	MW-5	MW-1	MW-2	MW-3	CW-4	CW-5A	MW-6	LRII-1	LRII-2	LRII-3	LRII-4	LRII-5	SMR-1
H1-96	6.37	6.16	6.24	6.39	5.84	5.71	6.11	4.81	4.85	5.73	6.52	5.76	5.27	6.09	5.83	5.19	6.05	5.83	5.45
H2-96	6.40	6.2	6.17	6.37	6.37	5.92	6.12	4.80	4.66	5.73	6.47	5.59	5.34	6.04	5.85	4.90	6.01	5.90	5.48
H1-97	6.57	6.30	6.31	6.53	6.13	6.14	6.4	5.14	5.02	6.06	6.66	5.83	5.48	6.15	5.9	4.91	6.17	5.99	5.59

1 - SMR-1 is a background well located to the east of Stage II.

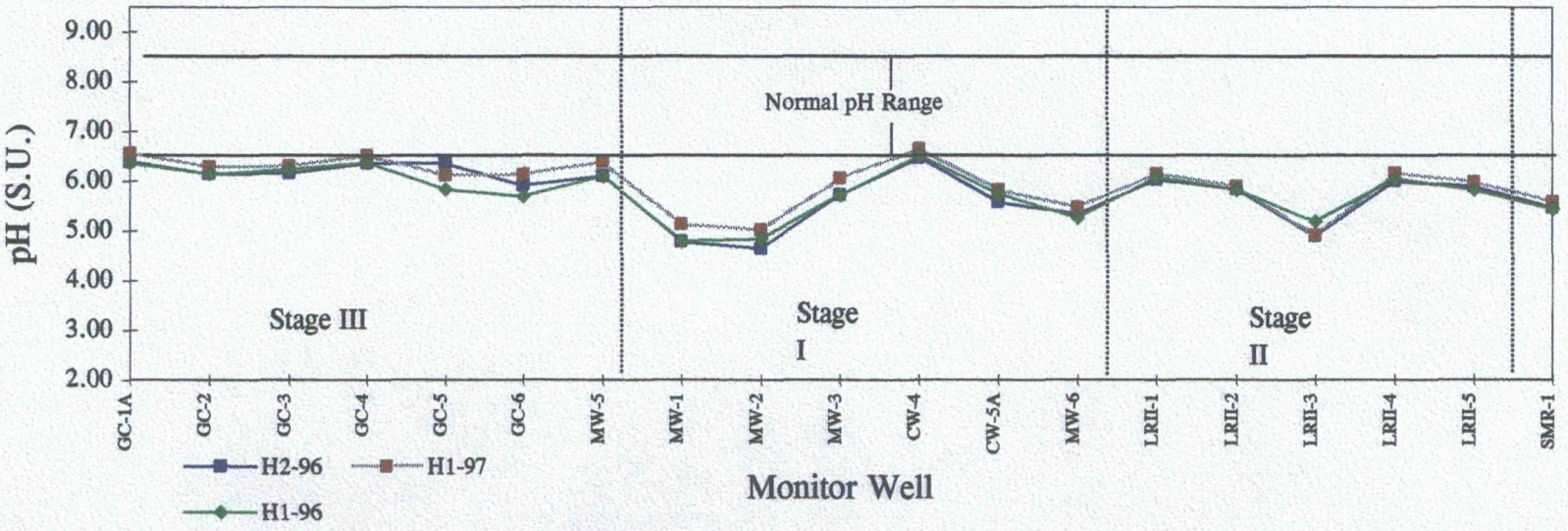


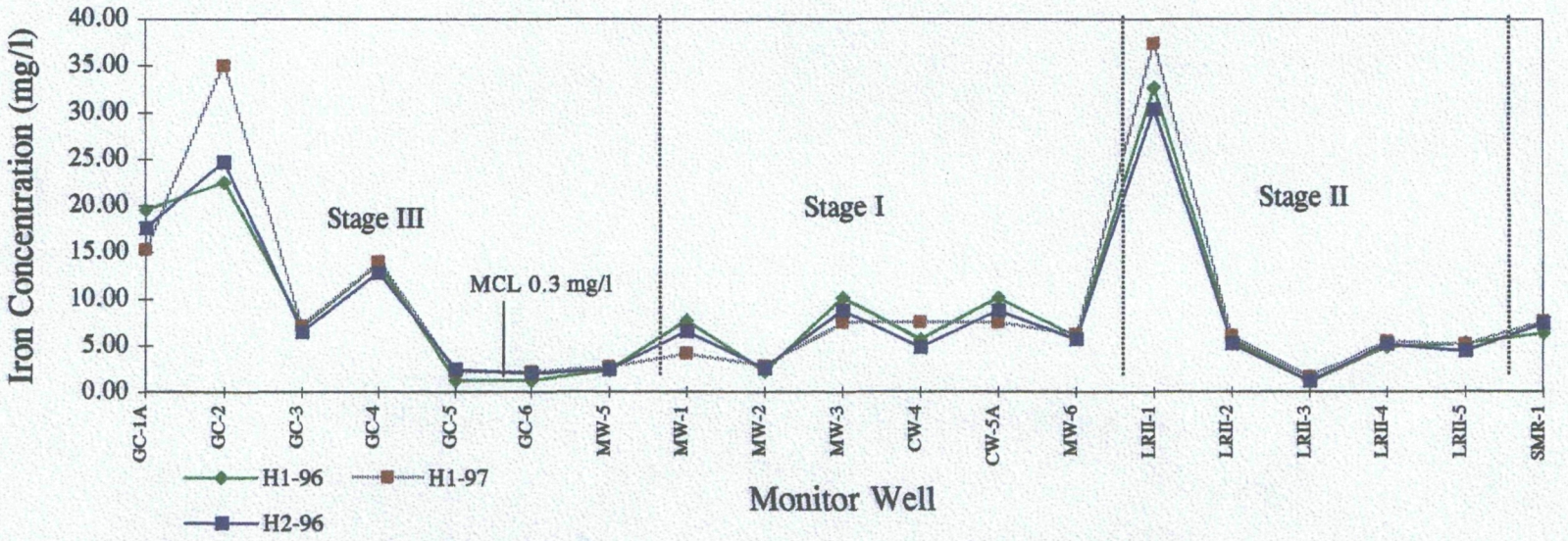
TABLE and GRAPH 30 LENA ROAD LANDFILL GROUDWATER PARAMETER TREND ANALYSIS

1996/1997 Semi-Annual Sampling Results Grouped by Landfill Stage

Location: Shallow Monitor Wells
Depth: 10 - 25 feet
Parameter: Iron
Units: mg/l

SAMPLING	STAGE III							STAGE I						STAGE II					(1)
EVENT	GC-1	GC-2	GC-3	GC-4	GC-5	GC-6	MW-5	MW-1	MW-2	MW-3	CW-4	CW-5	MW-6	LRII-1	LRII-2	LRII-3	LRII-4	LRII-5	SMR-1
H1-96	19.6	22.5	7.01	13.8	1.27	1.32	2.37	7.74	2.22	10.2	5.66	10.2	6.00	32.7	5.61	1.19	4.90	5.26	6.34
H2-96	17.6	24.7	6.5	12.8	2.46	2.04	2.46	6.6	2.61	8.81	4.84	8.81	5.72	30.4	5.23	1.26	5.17	4.47	7.35
H1-97	15.3	35.0	7.07	14.0	2.23	2.17	2.71	4.15	2.81	7.49	7.5	7.49	6.22	37.4	6.06	1.65	5.48	5.12	7.59

1 - SMR-1 is a background well located to the east of Stage II.



APPENDIX E

DEEP MONITORING WELL DATA COMPARISONS

TABLE and GRAPH 31 LENA ROAD LANDFILL GROUNDWATER PARAMETER TREND ANALYSIS

1996/1997 Semi-Annual Sampling Results

Grouped Relative to Landfill Stages

Location: Deep Monitor Wells
Depth: 143 - 163 feet
Parameter: Total Dissolved Solids
Units: mg/l

SAMPLING EVENT	STAGE III			STAGE II				(1)
	SA-2	SA-3	SA-4	SA-5	SA-6	SA-7	SA-8	SMR-2
H1-96	322	400	440	440	396	293	556	318
H2-96	392	426	480	504	508	370	276	398
H1-97	308	244	446	314	386	302	342	348

1 - SMR-2 is a background well located to the east of Stage II.

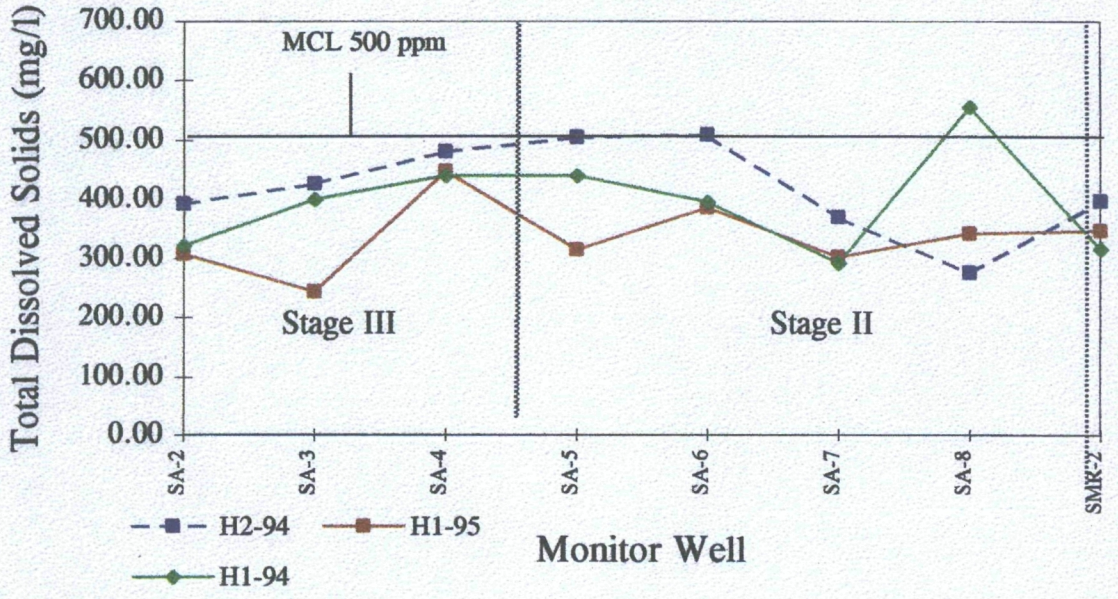


TABLE and GRAPH 32 LENA ROAD LANDFILL GROUNDWATER PARAMETER TREND ANALYSIS

1996/1997 Semi-Annual Sampling Results

Grouped Relative to Landfill Stages

Location: Deep Monitor Wells
Depth: 143 - 163 feet
Parameter: pH
Units: S.U.

SAMPLING EVENT	STAGE III			STAGE II				(1)
	SA-2	SA-3	SA-4	SA-5	SA-6	SA-7	SA-8	SMR-2
H1-96	7.18	7.07	7.34	7.46	7.33	7.49	7.64	7.32
H2-96	7.14	7.15	7.35	7.26	7.24	7.29	7.84	7.23
H1-97	7.34	7.31	7.45	7.35	7.40	7.64	8	7.49

1 - SMR-2 is a background well located to the east of Stage II.

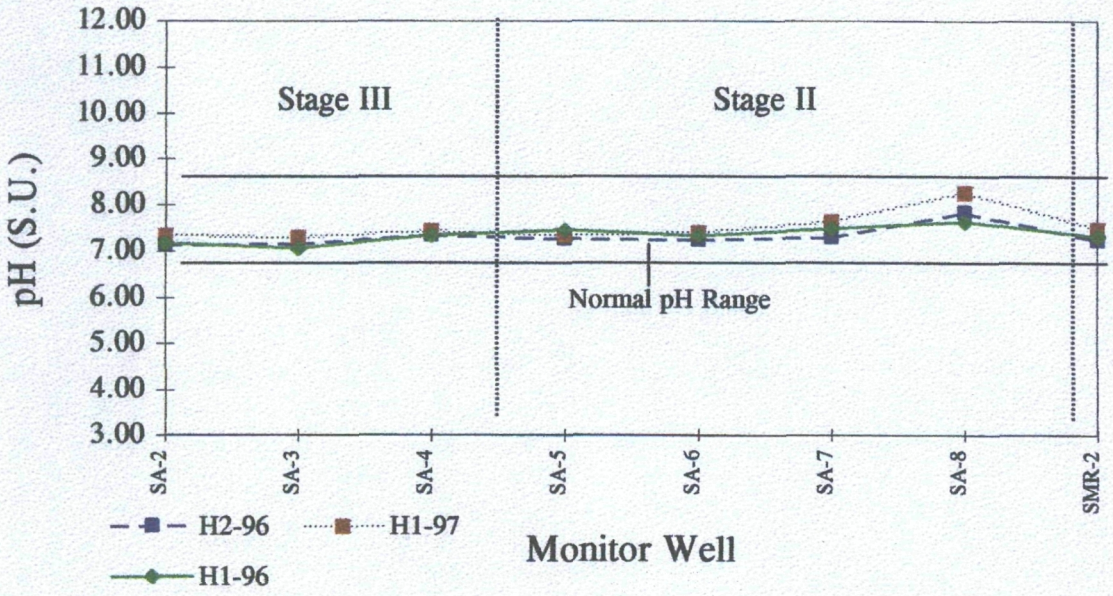


TABLE and GRAPH 33 LENA ROAD LANDFILL GROUNDWATER PARAMETER TREND ANALYSIS

1996/1997 Semi-Annual Sampling Results

Grouped Relative to Landfill Stages

Location: Deep Monitor Wells
Depth: 143 - 163 feet
Parameter: Iron
Units: mg/l

SAMPLING EVENT	STAGE III			STAGE II				(1)
	SA-2	SA-3	SA-4	SA-5	SA-6	SA-7	SA-8	SMR-2
H1-96	0.33	0.70	0.08	0.05	0.14	0.02	0.07	0.12
H2-96	0.1	0.3	0.09	0.04	0.06	0.02	0.02	0.02
H1-97	0.58	0.45	0.09	0.20	0.04	0.02	0.06	0.07

1 - SMR-2 is a background well located to the east of Stage II.