

file

**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**

**Professional  
Service  
Industries, Inc.**

April 17, 1996

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

**RECEIVED**  
APR 19 1996  
Department of Environmental Protection  
BY SOUTHWEST DISTRICT


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. Several of the requirements specified in F.A.C. Rule 62-701.510 (9) b, which are incorporated into the facility's operating permit No. S041 211176 were amended on July 21, 1994 and noted herein. The latest amendments to the permit were completed on July 3, 1995.

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  
Project Hydrogeologist

  
John R. Marquardt, P.E.  
Senior Engineer



Copy to: Ms. Allison Amram, FDEP  
  
Keith Butts, PSI Sarasota

*Information To Build On*

---

**Manatee County Government  
Public Works Department**

---

D.E.P.

APR 19 1996

SOUTHWEST DISTRICT  
TAMPA

**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  
Clearwater, Florida 34622**



---

**Manatee County Government  
Public Works Department**

---

**TABLE OF CONTENTS**

1.0	EXECUTIVE SUMMARY .....	1
2.0	INTRODUCTION .....	2
2.1	Scope .....	2
2.2	Objective.....	3
2.3	Location.....	3
2.4	Sources of Data .....	3
3.0	SITE BACKGROUND .....	3
3.1	Site History and Previous Investigations.....	3
3.2	Hydrogeological Setting .....	4
3.2.1	Subsurface Profile.....	4
3.2.2	Summary of Existing Landfill Design .....	5
4.0	DATA COLLECTION .....	5
4.1	Methods.....	5
4.2	Omissions in Data Collection.....	6
5.0	GROUNDWATER TREND ANALYSIS .....	7
5.1	Groundwater Background Information.....	7
5.2	Groundwater Elevation Map Analysis .....	10
5.2.1	Shallow Wells.....	10
5.2.2	Deep Wells.....	10
5.3	Monitoring Well Hydrograph Analysis .....	11
5.4	Shallow and Deep Well Comparison.....	11
6.0	GROUNDWATER ANALYTICAL TREND ANALYSIS.....	12
6.1	Groundwater Analytical Parameters .....	12
6.2	Shallow Zone Monitoring Well Analysis .....	14
6.2.1	Shallow Monitoring Well Analytical Trends.....	14
6.2.2	Shallow Monitoring Wells: With MCL Exceedance .....	15
6.3	Deep Zone Monitoring Well Analysis .....	16
6.3.1	Deep Monitoring Well Analytical Trends.....	17
6.3.2	Deep Monitoring Wells: With MCL Exceedance.....	17
6.4	Upgradient/Downgradient Monitoring Well Analysis.....	18

---

**Manatee County Government  
Public Works Department**

---

TABLE OF CONTENTS (Cont.)

7.0	CONCLUSIONS.....	19
8.0	WARRANTY.....	21
9.0	REFERENCES.....	22

---

**Manatee County Government  
Public Works Department**

---

**APPENDICES**

APPENDIX A - Figures

APPENDIX B - Monitoring Well Hydrographs

APPENDIX C - Groundwater Data for Each Monitoring Well

APPENDIX D - Shallow Monitoring Well Data Comparisons

APPENDIX E - Deep Monitoring Well Data Comparisons

## 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. S041-211176 for Lena Road Landfill. The evaluation provides 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, 1994 to December 31, 1995. The data consists of specific parameters requested by the FDEP permit for the site, as amended through July 3, 1995.

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 around each stage. Due to the confining layer beneath the landfill, it is assumed that these localized cells are restricted to the shallow or surficial aquifer.
- The monitor well hydrographs show a general increase in the groundwater elevations through the first half of 1995, followed by a decrease in the second half of 1995.
- For the shallow monitor wells, the analytical parameters that vary from FDEP Groundwater Guidance Concentrations include pH, total dissolved solids, and iron. Low concentrations of several EPA 8260 compounds were detected in twelve (12) of the shallow monitor wells over the two (2) year monitoring period.
- For the deep monitor wells, the analytical parameters that vary from FDEP Groundwater Guidance Concentrations include pH, total dissolved solids, and iron.

Low concentrations of EPA 8260 compounds were detected in five (5) of the deep monitor wells over the two (2) year monitoring period.

- The upgradient/downgradient monitor well analysis revealed negligible increases in the levels of various parameters in monitor wells to the south and west of the landfill. These increases represent minor fluctuations above the background levels measured in monitor well SMR-1.

## 2.0 INTRODUCTION

### 2.1 Scope

The Groundwater Monitoring Plan (GWMP) Annual Evaluation (AE) 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. Such evaluation provides 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, 1994 to December 31, 1995. The data consists of specific parameters requested by the FDEP permit for the site.

The evaluation will focus on the trend development of the data concerning each well over the two (2) year period, shallow/deep zone wells, and upgradient/downgradient wells. The AE will also provide tabular and graphical display of pertinent data as well as an interpretation of the findings.

The data presented in this AE falls under the current permit, FDEP Permit No. S041-211176, which was most recently amended on July 3, 1995. The most significant changes to the permit, by amendment, to this annual report included:

- 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 AE 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 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

The Revised Groundwater Monitoring Plan and subsequent addendums were performed by Ardaman & Associates, Inc. These reports discuss the history, hydrogeological setting and groundwater conditions of the subject site and have been used as reference material in preparing the AE. The available previous reports are listed in the references section of this AE.

In addition, the Manatee County Government Public Works Department, Solid Waste Division, has provided PSI with copies of the 1994 and 1995 semi-annual water quality results for the monitoring well network, monthly piezometer water table measurements, and the current permit for the subject site.

The 1992/1993 annual report, prepared by PSI, was utilized for comparisons with current 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 the additional landfill located to the north of Stage I. No refuse is 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.

April 17, 1996

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.

Two (2) permanent monitor wells, GC-1A and replacement CW-5A, were installed on August 19, 1994 by PSI at the subject property. One (1) pre-existing monitor well, CW-5, was damaged during construction activities on-site in 1993. CW-5 was abandoned in place by PSI on August 19, 1994 using tremie pipe method. Records of the monitor well abandonment are included with PSI's Comment/Response Report dated February 21, 1995.

The results of the 1992/1993 annual report indicated the existing landfill design and use did not appear to significantly impact 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.

### 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 border of the slurry wall. 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  $5 \times 10^{-8}$  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 data used in this AE was obtained from the groundwater quality reports that have been submitted to the Florida Department of Environmental Protection over the past two years (1994 and

April 17, 1996

1995). The Groundwater Monitoring Plan indicates that the sampling, collection, and testing procedures will adhere to the applicable procedures set forth by the Florida Department of Environmental Protection.

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.

#### 4.2 Omissions in Data Collection

Data was occasionally omitted due to malfunctioning or broken equipment, changes in the permit requirements, or damaged or inaccessible monitor wells. The following is a listing of these instances:

- Half 1 and Half 2, 1995 - Groundwater elevation values were not reported for deep monitor wells. No reason was given in the reports for this omission.
- Half 1 and Half 2, 1994 - Total ammonia values were not reported. No reason was given in the reports for this omission.
- Half 1, 1994 - Iron, silver, and vanadium values were not report. No reason was given in the report for this omission.
- Half 1 and 2, 1995 - Piezometer groundwater elevation values were not reported for LR-II-4, MW-3 and SMR-1. No reason was given in the report for this omission.
- Half 1, 1994 and Half 1, 1995 - Color/sheen values were not reported. No reason was given in the report for this omission.
- Half 1, 1995 - Turbidity was not measured in the field due to broken equipment.
- Half 2, 1994 and Half 1 and 2, 1995 - TOC was not reported due to permit requirement changes.
- Half 1, 1994 - Lead values were not reported for LR-II-1, LR-II-2, MW-1, MW-2, MW-3, MW-5, MW-6, CW-4, GC-1A, GC-3, GC-4, GC-5, GC-6, SMR-1, SMR-2, SA-2, SA-3, SA-4, SA-5, SA-6, SA-7 and SA-8. No reason was given in the report for these omissions.
- Half 2, 1994 - No samples collected from CW-4. Monitor well CW-4 was inaccessible at the time of sampling.

*Note: Half 1, 1994 sampled 5/17-19 + 6/1-2*

*Half 2, 1994 sampled 12/20/94 + 1/7, 3, 10, 11/95, 3/22/95*

*Half 1, 1995 - 8/21-23/95 + 4/22/95 (Fe, Hg, Na only)*

*Half 2, 1995 - 10/2-4 + 11/7, 8, 9/95*



*CWSA + GCIA only*

- Half 1, 1994 - No samples collected from CW-5. Monitoring well CW-5 was destroyed.

## 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 porosities 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.

April 17, 1996

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

April 17, 1996

GROUNDWATER MONITORING WELLS AT LENA ROAD LANDFILL		
MONITORING WELL	AQUIFER	WELL TYPE
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 (1)
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 (1)
PZ-16	Surficial	Piezometer
PZ-17	Surficial	Piezometer

(1) Installed March 18, 1996 - no data included for this report.

## 5.2 Groundwater Elevation Map Analysis

### 5.2.1 Shallow Wells

The groundwater elevation maps presented in Figures 3 through 10 in Appendix A, are a compilation of the shallow groundwater measurements taken over the past two years (1994 and 1995). The groundwater elevations were measured at each of the available piezometers and shallow monitor wells. Each groundwater elevation contour map represents the groundwater elevation data for each quarter at the shallow monitor wells and piezometers. 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 through 10, Appendix A, indicate that the regional groundwater flow of the shallow aquifer appears to extend to the northwest across the landfill. However, the construction of the slurry wall and leachate collection systems that surrounds Lena Road Landfill appears to have created localized cells of groundwater flow in and around each landfill stage.

In general, groundwater within the landfill flows outward from the center of each landfill stage 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. The two exceptions to the inward gradient are in selected areas of Stage II and between GC-1A and PZ-15. Stage II is not an active landfill stage and the leachate collection system was operated sporadically during the 1994/1995 period. In the area of GC-1A and PZ-15, a new piezometer was proposed closer to the slurry wall. PZ-15A was installed in March 1996 (report dated March 21, 1996) to monitor groundwater elevations in this area of concern.

### 5.2.2 Deep Wells

The groundwater elevation maps presented in Figures 11 and 12, Appendix A, are a compilation of the deep groundwater elevation measurements collected during the semi-annual sampling events in 1994. The groundwater elevations were measured at each of the available deep wells. The groundwater elevation contour maps represent snapshots of the deep groundwater elevation during two time periods in 1994. The deep monitor wells are generally located along the north and western sides of the landfill, particularly stages II and III.



April 17, 1996

Analysis of the deep groundwater flow patterns indicates the general gradient in toward the northwest. This corresponds with the general trend indicated by the shallow wells and piezometers. Comparisons of adjacent shallow and deep monitor wells indicates a general vertical gradient from the surficial aquifer to the deep aquifer (see Section 5.4).

### 5.3 Monitoring Well Hydrograph Analysis

The monitoring well hydrographs presented in Appendix B are based on groundwater elevation calculations. These hydrographs represent the fluctuation in the groundwater levels over the time frame of two years (1994 and 1995) for all of the shallow and deep monitor wells. The average fluctuation of the groundwater level over the two year period for the shallow wells was approximately 3.2 feet. Over the one year measurement period for the deep wells, the average groundwater elevation fluctuation was approximately 7.0 feet.

The general trend appears to be a gradual increase in groundwater elevations from 1994 to early 1995, followed by a general decrease through late 1995. Most of the groundwater elevation fluctuations in the monitor wells appear to mirror each other. The overall trends are as follows:

- Between Half 1, 1994 and Half 2, 1994 there is an average increase in the groundwater level of approximately 1.7 feet for the shallow wells and 7.0 feet for the deep wells.
- Between Half 2, 1994 and Half 1, 1995 there is an average rise in the groundwater level of approximately 1.5 feet for the shallow wells.
- Between Half 1, 1995 and Half 2, 1995 there is an average drop in the groundwater level of approximately 1.0 feet for the shallow wells.

There are some cases where a fluctuation of groundwater levels in individual wells does not support the general behavior exhibited by the groundwater levels overall. These cases may be due to local influence, or perhaps errors in the measurement procedures or in the reporting of the data. These "outliers" were not utilized for the development of the groundwater contour maps included in Appendix A of this report.

### 5.4 Shallow and Deep Well Comparison

The groundwater elevation data over the first and second half of 1994 from adjacent pairs of shallow and deep monitor wells; SMR-1 and SMR-2, G-1A and SA-4, LR11-1 and SA-5, LR11-2 and SA-6, LR11-3 and SA-7, and LR11-4 and SA-8, respectively, was 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)

April 17, 1996

to determine the average value of vertical hydraulic gradient. A detailed description of the calculation method is included in PSI's Comment/Response Report for Lena Road Landfill, dated February 21, 1995. Based on the available data and known and estimated site conditions, the average vertical gradient is 0.08 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  $5 \times 10^{-8}$  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 the each monitoring well at the subject landfill and the leachate produced at the subject landfill to 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

April 17, 1996

LABORATORY PARAMETERS	MCL
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	0.01 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	0.049 mg/l
Zinc	5.0 mg/l
Total Dissolved Solids	500 mg/l
Total Organic Carbon	**
EPA 8260 Parameters	Various

The field parameters listed above 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. Other irregularities in data collection will be addressed in the Data Collection section of this AE. 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, 1994 through Half 2, 1995 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 barium, beryllium, cadmium, chlorides, chromium, cobalt, copper, lead, mercury, nitrates, nickel, selenium, silver, sodium, thallium, vanadium and zinc were below maximum contamination levels (MCLs). Concentrations of antimony and arsenic each exceeded the MCL on one measurement date at one location. These occurred at GC-2 for antimony on Half 2, 1995 (0.055 mg/l) and for arsenic on Half 1, 1995 (0.052 mg/l).

April 17, 1996

Fluctuations in the other reported values for the parameters were slight and were not affected largely by seasonal changes. All organic constituents listed in EPA Method 8260 were below their respective MCLs during the 1994/1995 semi-annual sampling events.

As noted in Section 4.2, some data measurements were not reported regularly due to the change in permit requirements. The parameters effected were TOC and total ammonia. The TOC content of the water samples was reported during the first half of 1994. The results for total ammonia was reported for Half 1 and Half 2, 1995. The values obtained from the shallow wells for TOC and total ammonia fall within regulatory ranges.

Data from CW-4 and CW-5 was not available for the first half of 1994 and the second half of 1994, respectively. Records indicate these wells were inaccessible during these sampling periods.

#### **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 16 mg/l to 457 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 in Table and Graph 28, Appendix D, of this report.

Monitor wells GC-1A and CW-4 experienced fluctuations in the levels of TDS and exceeded the MCL. Monitor wells GC-1A and CW-4 are located off the north and west sides of Stage III of the landfill. Monitor well GC-1A exceeded the MCL only once by 153 mg/l during Half 1, 1994. This was a slight exceedance and TDS levels returned to within MCL by the next monitoring period. Monitor well CW-4 exceeded the MCL twice during the evaluation period. Similar results for these monitor wells were noted during the 1992/1993 Annual Reporting

- *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. Groundwater from the shallow monitoring wells that remained within this range were GC-1A, GC-3, and GC-4 during the first half of 1994. Monitor wells GC-1A, GC-3, and GC-4 are located on the north and west sides of landfill Stage III.

All wells, with the exception of those noted above, yielded pH values that fell 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 in 1992-1993 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 and Graph 29, Appendix A, illustrate the pH trends over the two year 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 0.64 mg/l to 51.5 mg/l. The highest concentrations were noted in GC-1A during the second half of 1994 and 1995 sampling events. 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 was consistent with the values observed in the landfill monitor 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	150.0	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-6 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.

Irregularities in the data measurements were generally the same as those for the shallow wells.

### 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 and Graph 31, Appendix E, of this report.

The main area of concern is deep monitoring well SA-6, whose reported values were above the MCL during Half 2, of 1994 and 1995. Monitor well SA-6 is located off the central west border of the landfill. This same concern was noted in the 1992/1993 annual report for this site. Therefore, these concentrations of TDS appear to be representative of natural conditions.

- *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 6.9 to 11.7. 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.

The largest variance occurred in Half 2, 1994. During this sampling event, the pH value from monitor well SA-8 was 11.7. SA-8 is located off the north side of Stage II. Stage II is currently inactive.

- *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 0.00 to 2.38 mg/l. A tabular and graphical representation of the semi-annual iron values for the deep wells is presented in Table and Graph 33, Appendix E, of this report.

#### 6.4 Upgradient/Downgradient Monitoring Well Analysis

The monitoring wells that consistently report the highest groundwater elevations are MW-2, MW-6, and CW-5A. These wells are used in this report as representations of upgradient behavior. The monitoring wells that consistently report the lowest groundwater elevations include LR11-3, 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. There does not appear to be a direct relation between 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* - There appears to be a slight increase in the reported total dissolved solids values from upgradient to downgradient wells. Monitor well GC-1A reported the largest increases.



April 17, 1996

- *pH* - There appears to be an overall increase in the reported pH values from upgradient to downgradient wells. Monitor well GC-1A reported the largest increase. However, monitor wells LRII-3 and LRII-4 consistently reported pH values less than those reported by upgradient wells.
- *Iron* - There appears to be an overall increase in the reported iron values from upgradient to downgradient wells. Monitor wells GC-1 and GC-4 reported the largest increases. However, monitor well LRII-3 reported iron values consistent with those reported by upgradient wells.

From these results, it appears that the downgradient wells GC-1A and GC-4 differ in a few parameters from values measured in the upgradient wells. This is in agreement with the present active status of Stage I of the landfill and the previous use of Stage III as a disposal area. However, the relative changes in the values between the upgradient and downgradient wells are minimal, and may be 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.

## 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, 1994 to December 31, 1995. The data consists of specific parameters requested by the FDEP permit for the site.

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

April 17, 1996

discrete cells within the overall regional shallow groundwater gradient. Flow within the cells appears to be contained, as designed.

- The monitor well hydrographs show a general increase in the groundwater elevations throughout the first half of 1995, followed by a decrease in the second half of 1995.
- 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.
- 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 values for antimony and arsenic exceeded their MCLs on one occasion each at one well location.
- For the deep monitor wells, the analytical parameters that vary above a regulatory value or outside a regulatory range include total dissolved solids, pH, 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 client. 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 Annual Evaluation, Manatee County Solid Waste Management Facility (Lena Road Landfill), Bradenton, Florida, Permit No. 5041-211176, October 27, 1994.

Professional Service Industries, Inc., Groundwater Monitoring Plan Comment/Response Report, Lena Road Landfill, Permit No. 5041-211176, Bradenton, Manatee County, Florida, February 21, 1996.

Professional Service Industries, Inc., Installation of Two Permanent Monitor Wells, Lena Road Landfill, Bradenton, Florida, March 21, 1996.

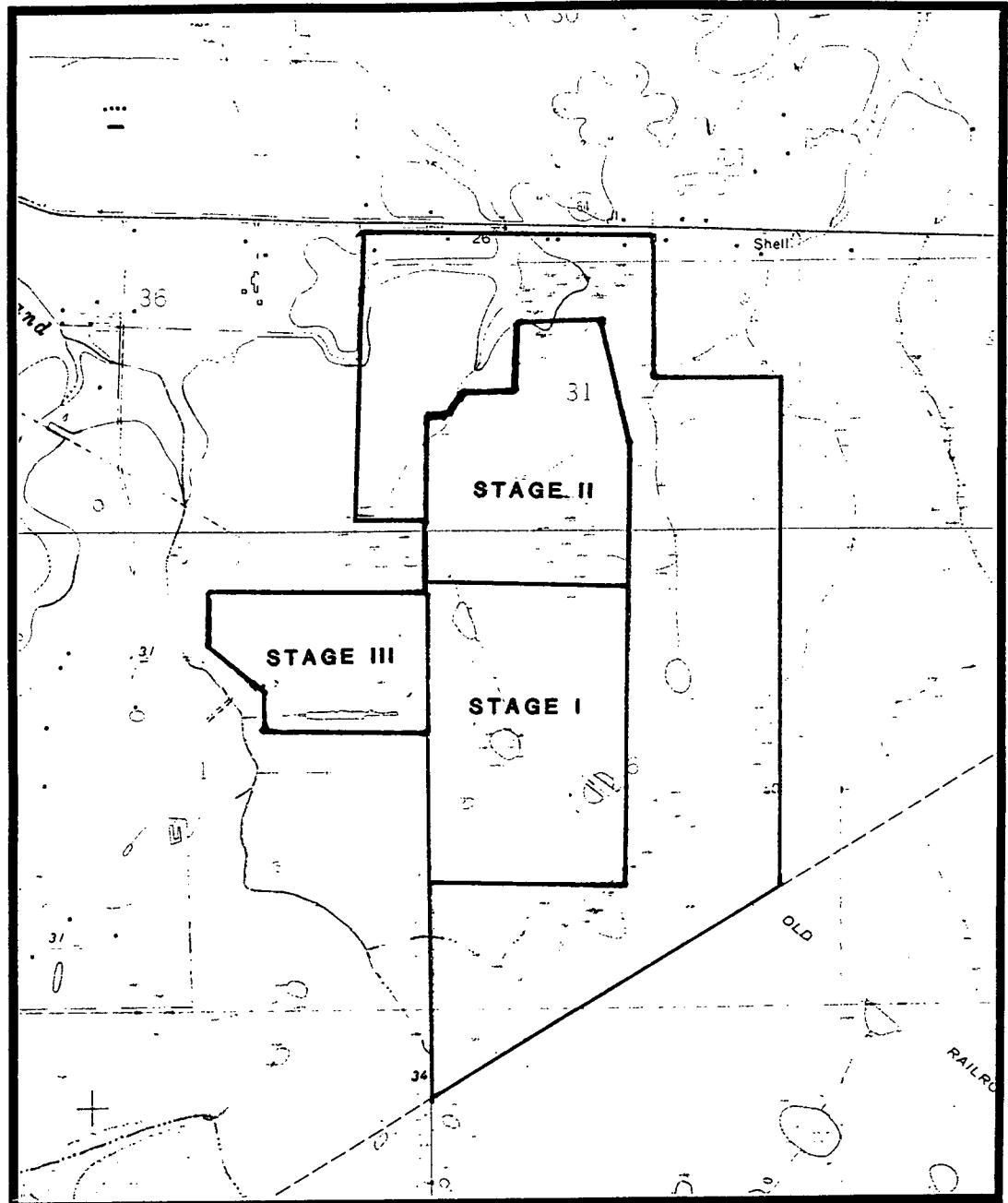
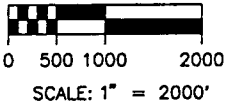
United States Department of Agriculture Soil Conservation Service, Soil Survey of Manatee County Florida, Issued April 1983.

## APPENDICES

**APPENDIX A**  
**FIGURES**



GRAPHIC SCALE



NOTE: THIS MAP TAKEN FROM USGS QUADRANGLE MAP

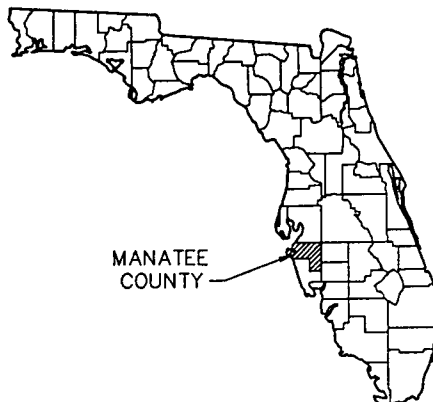
MAP NAME: LORRAINE

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



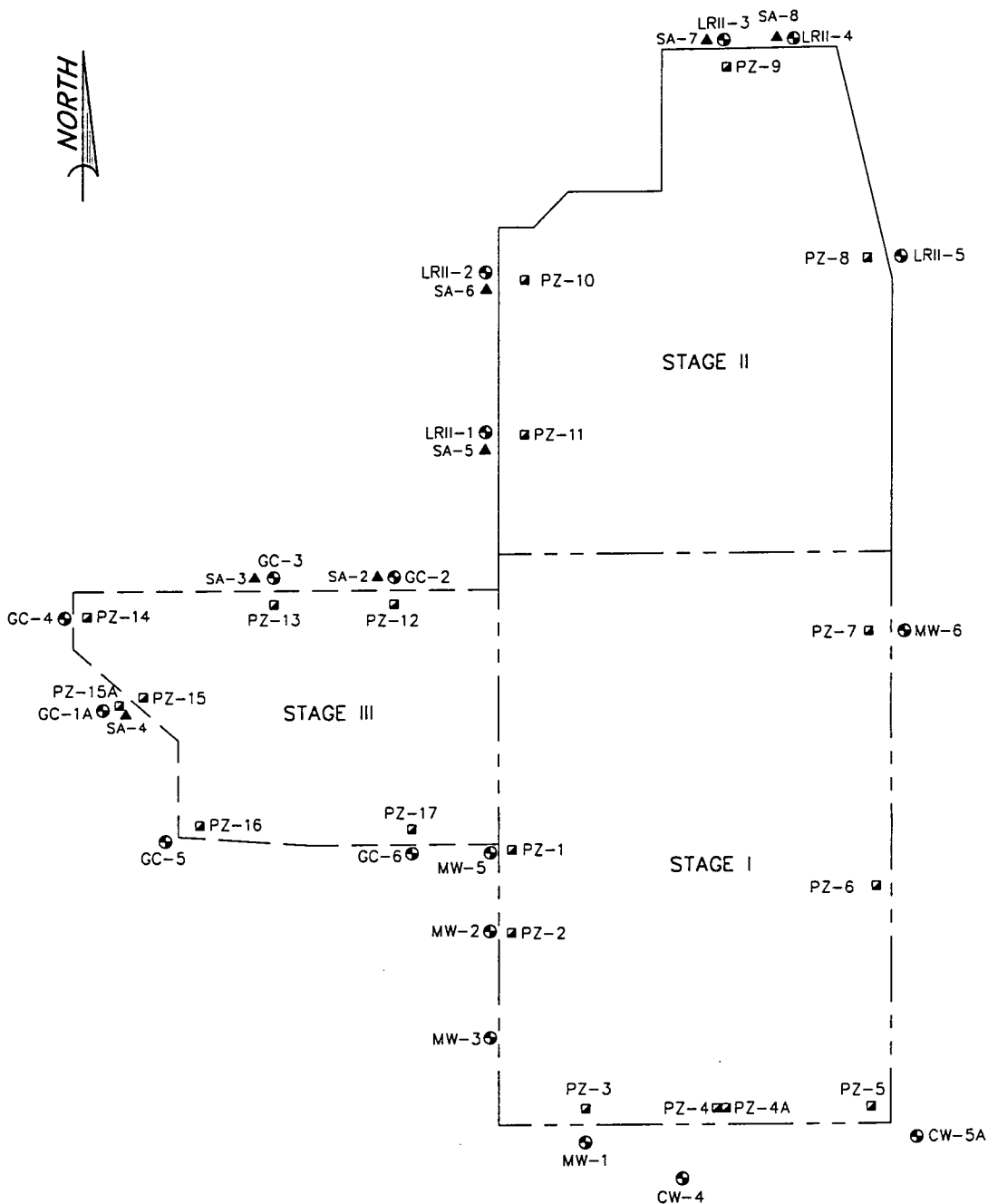
SITE VICINITY MAP  
GROUNDWATER MONITORING PLAN ANNUAL EVALUATION  
**LENA ROAD LANDFILL**  
11401-11435 N. DALE MABRY HWY.  
MANATEE COUNTY, FLORIDA



PROFESSIONAL SERVICE INDUSTRIES, INC.

13700 58th STREET NORTH  
SUITE 207  
CLEARWATER, FLORIDA 34620

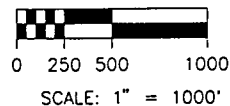
DRAWN BY: KT	SCALE: 1" = 2000'	PROJ. NO.: 378-4L015
CHKD. BY: DJS	DATE: 9/01/94	DWG.: FIGURE 1



### 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

### GRAPHIC SCALE



WELL LOCATION MAP  
LENA ROAD LANDFILL  
3333 LENA ROAD  
BRADENTON, FLORIDA

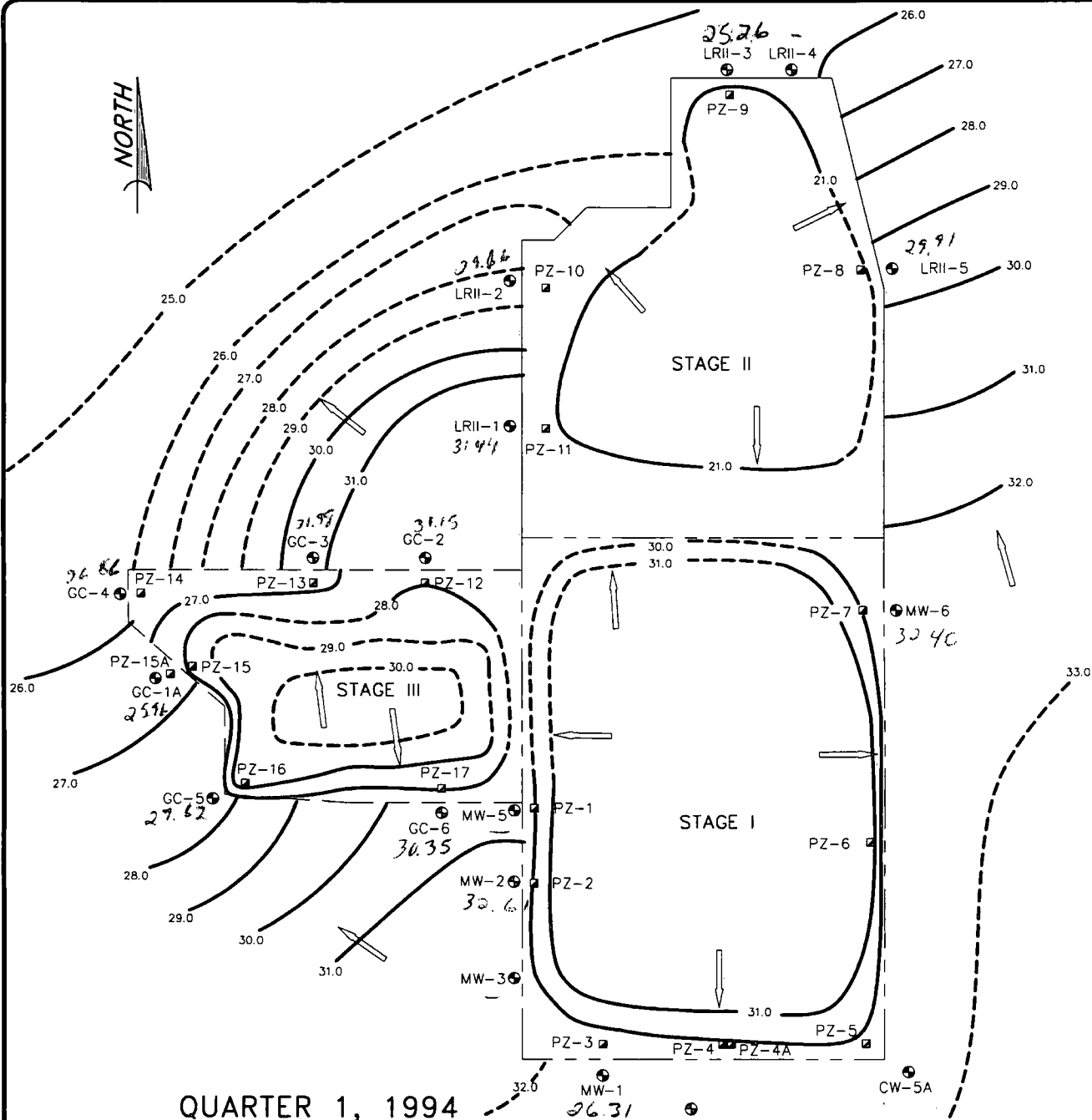


**ENVIRONMENTAL SERVICES**  
4400 - 140th. AVENUE NORTH  
SUITE 100  
CLEARWATER, FLORIDA 34622

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



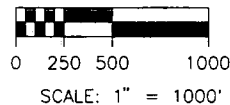
Figures 3-12  
Revised in  
10/96 P51  
submittal



QUARTER 1, 1994

MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)
STAGE I		STAGE II		STAGE III	
MW-1	26.31	LR11-1	31.44	GC-1A	25.96
MW-2	32.61	LR11-2	29.16	GC-2	31.15
MW-3	-	LR11-3	25.26	GC-3	31.98
MW-5	-	LR11-4	-	GC-4	26.86
MW-6	32.40	LR11-5	29.91	GC-5	27.62
CW-4	31.34	PZ-8	28.71	GC-6	30.35
CW-5A	-	PZ-9	23.56	PZ-12	28.55
PZ-1	30.18	PZ-10	18.97	PZ-13	26.57
PZ-2	29.30	PZ-11	20.82	PZ-14	26.27
PZ-3	29.30			PZ-15	28.55
PZ-4	30.04			PZ-16	29.71
PZ-5	30.21			PZ-17	28.32
PZ-6	31.66				
PZ-7	29.81				

GRAPHIC SCALE



### LEGEND

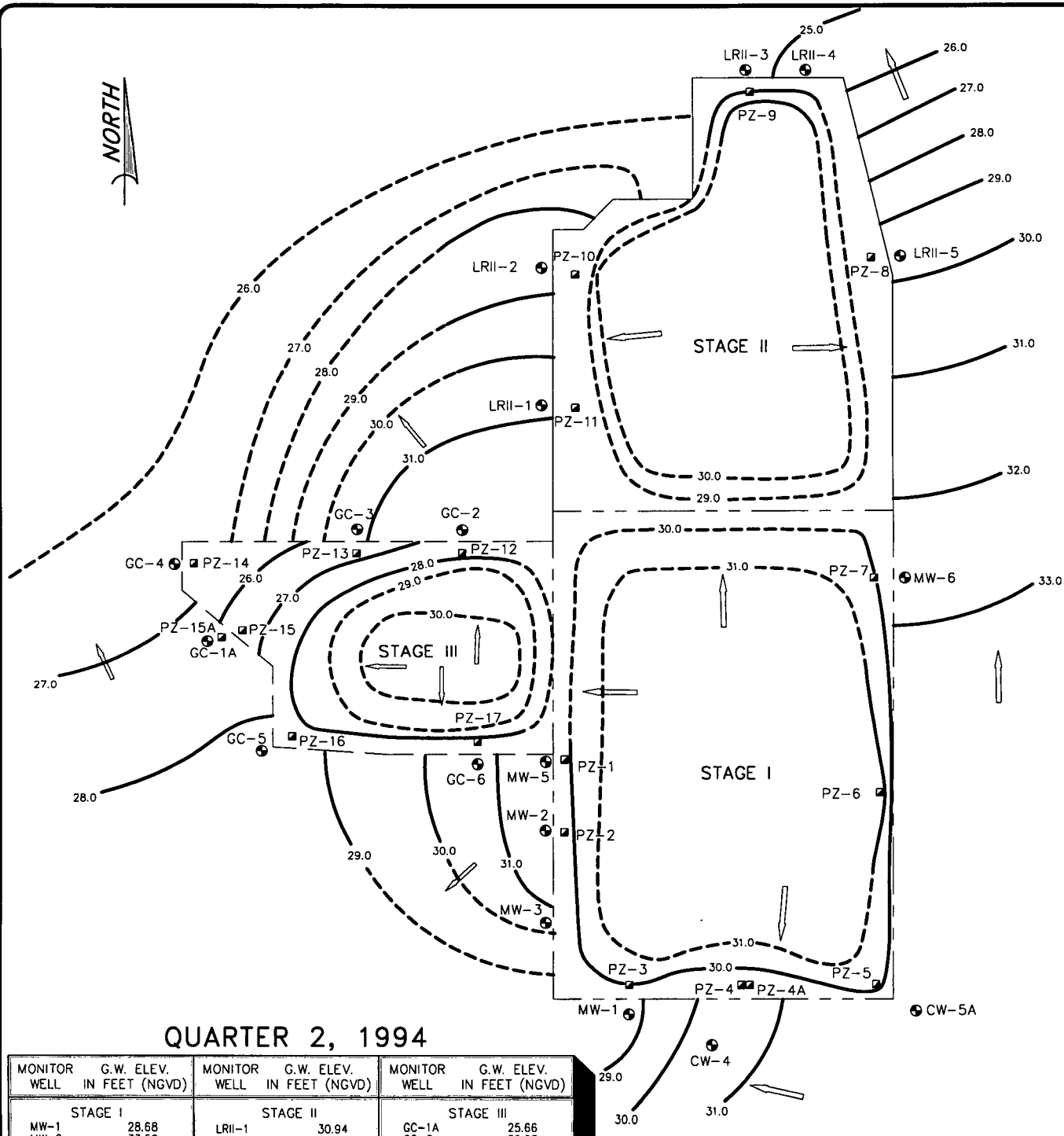
- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
LENA ROAD LANDFILL  
3333 LENA ROAD  
BRADENTON, FLORIDA



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

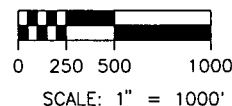
DRAWN BY: KT	SCALE: 1" = 1000'	PROJ. NO.: 552-4L015
CHKD. BY:	DATE: 4/15/96	DWG.: FIGURE 3



### QUARTER 2, 1994

MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)
STAGE I		STAGE II		STAGE III	
MW-1	28.68	LRII-1	30.94	GC-1A	25.66
MW-2	33.50	LRII-2	28.95	GC-2	30.23
MW-3	-	LRII-3	24.38	GC-3	31.86
MW-5	-	LRII-4	-	GC-4	26.48
MW-6	32.74	LRII-5	29.95	GC-5	28.18
CW-4	30.96	PZ-8	23.93	GC-6	30.62
CW-5A	-	PZ-9	28.90	PZ-12	28.42
PZ-1	-	PZ-10	23.05	PZ-13	26.51
PZ-2	30.20	PZ-11	23.86	PZ-14	25.53
PZ-3	30.05			PZ-15	26.37
PZ-4	26.21			PZ-16	27.38
PZ-5	30.29			PZ-17	28.40
PZ-6	31.58				
PZ-7	29.89				

### GRAPHIC SCALE



### LEGEND

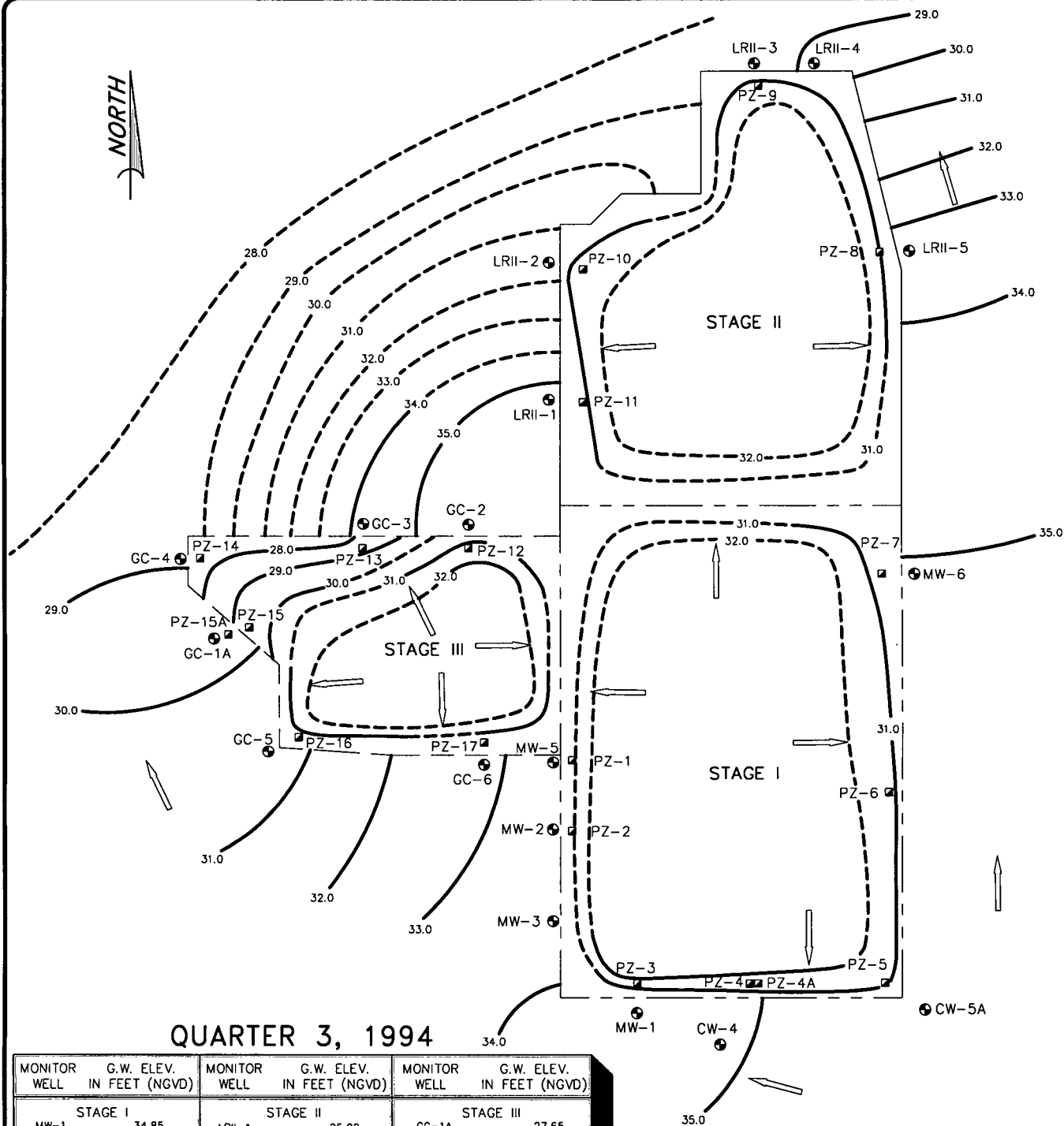
- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
**LENA ROAD LANDFILL**  
3333 LENA ROAD  
BRADENTON, FLORIDA



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

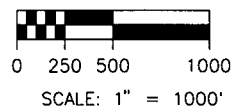
DRAWN BY: KT	SCALE: 1" = 1000'	PROJ. NO.: 552-4L015
CHKD. BY: MAS	DATE: 4/15/96	DWG.: FIGURE 4



QUARTER 3, 1994

MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)
STAGE I		STAGE II		STAGE III	
MW-1	34.85	LR II-1	25.02	GC-1A	27.65
MW-2	37.27	LR II-2	32.28	GC-2	34.56
MW-3	-	LR II-3	28.53	GC-3	35.07
MW-5	-	LR II-4	-	GC-4	29.02
MW-6	35.07	LR II-5	33.48	GC-5	30.48
CW-4	-	PZ-8	31.13	GC-6	32.73
CW-5A	-	PZ-9	31.23	PZ-12	31.81
PZ-1	-	PZ-10	31.76	PZ-13	28.36
PZ-2	30.18	PZ-11	31.07	PZ-14	27.24
PZ-3	32.08			PZ-15	29.49
PZ-4	31.50			PZ-16	31.34
PZ-5	31.38			PZ-17	29.76
PZ-6	31.60				
PZ-7	30.32				

GRAPHIC SCALE



### LEGEND

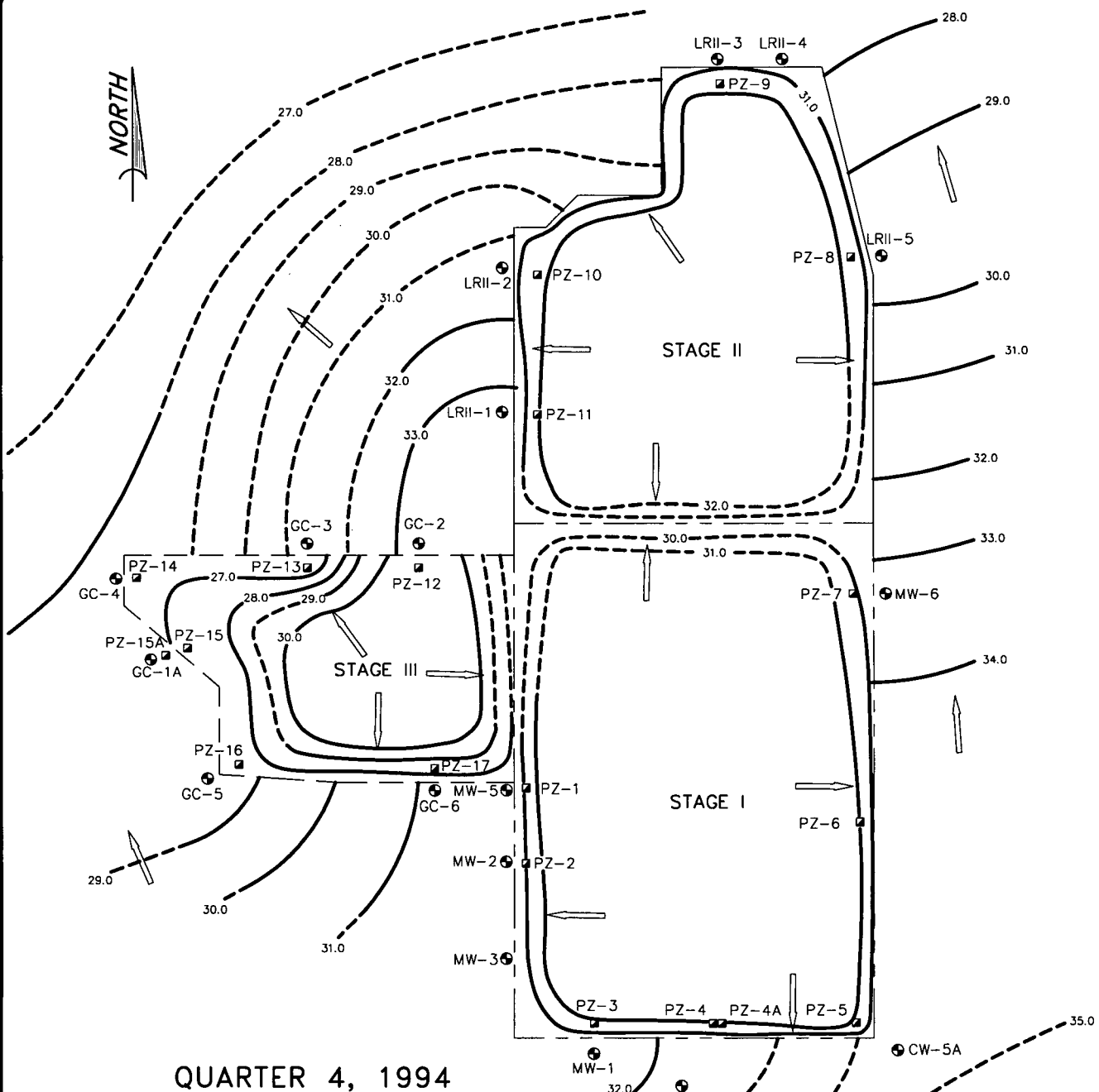
- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
**LENA ROAD LANDFILL**  
3333 LENA ROAD  
BRADENTON, FLORIDA



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

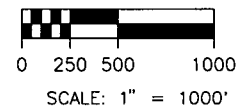
DRAWN BY:	KT	SCALE:	1" = 1000'	PROJ. NO.:	552-4L015
CHKD. BY:	DS	DATE:	4/15/96	DWG.:	FIGURE 5



QUARTER 4, 1994

MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)
STAGE I		STAGE II		STAGE III	
MW-1	32.51	LR II-1	33.31	GC-1A	26.52
MW-2	34.61	LR II-2	31.28	GC-2	33.11
MW-3	-	LR II-3	27.51	GC-3	23.38
MW-5	-	LR II-4	-	GC-4	28.16
MW-6	33.32	LR II-5	30.50	GC-5	28.48
CW-4	-	PZ-8	31.75	GC-6	31.27
CW-5A	-	PZ-9	31.56	PZ-12	31.95
PZ-1	-	PZ-10	31.75	PZ-13	27.24
PZ-2	30.20	PZ-11	31.96	PZ-14	26.33
PZ-3	31.01			PZ-15	27.20
PZ-4	31.04			PZ-16	27.63
PZ-5	30.98			PZ-17	28.86
PZ-6	31.39				
PZ-7	30.02				

GRAPHIC SCALE



### LEGEND

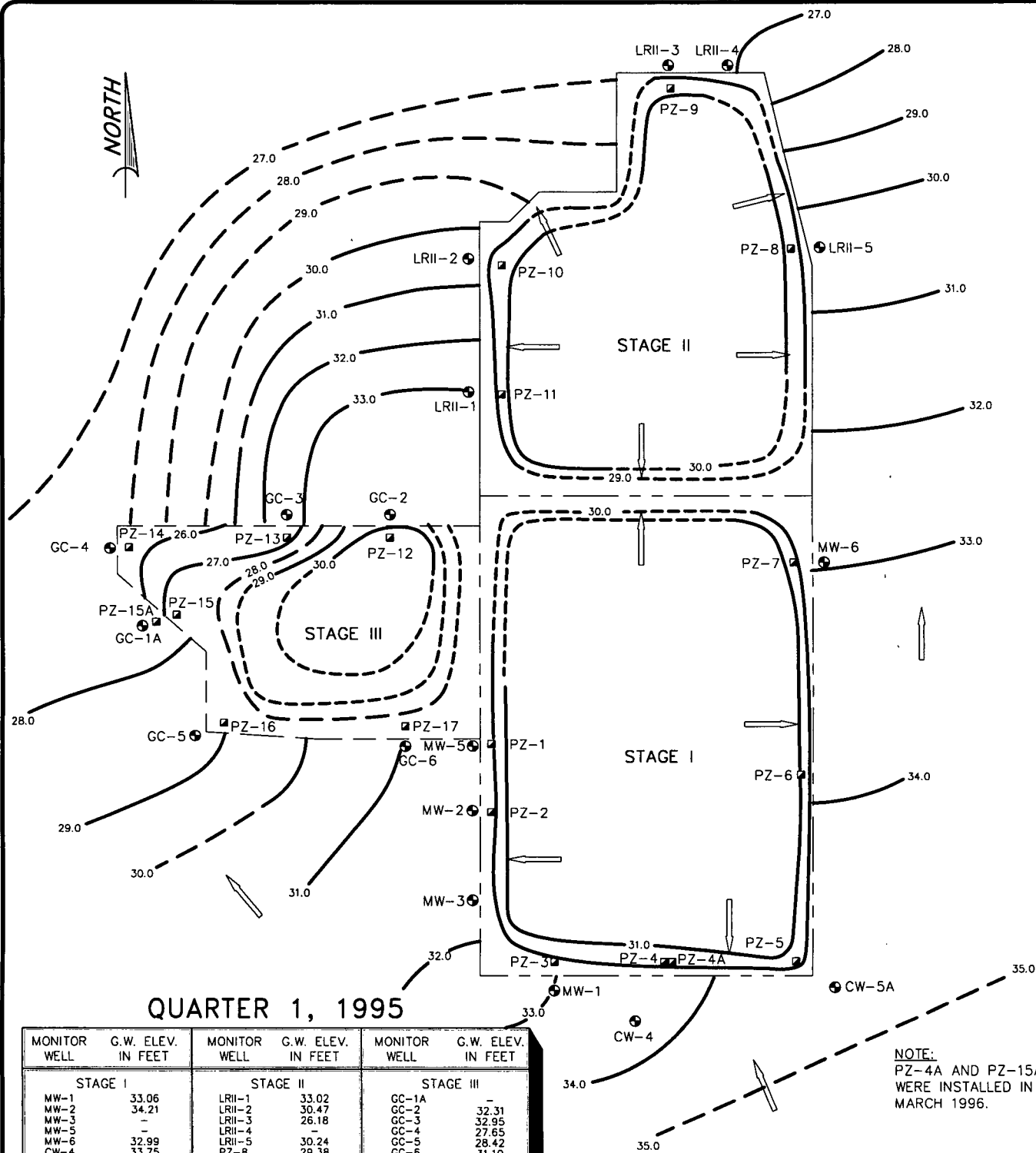
- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
**LENA ROAD LANDFILL**  
 3333 LENA ROAD  
 BRADENTON, FLORIDA



**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 6



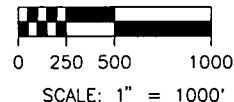
QUARTER 1, 1995

MONITOR WELL	G.W. ELEV. IN FEET	MONITOR WELL	G.W. ELEV. IN FEET	MONITOR WELL	G.W. ELEV. IN FEET
STAGE I		STAGE II		STAGE III	
MW-1	33.06	LR II-1	33.02	GC-1A	-
MW-2	34.21	LR II-2	30.47	GC-2	32.31
MW-3	-	LR II-3	26.18	GC-3	32.95
MW-5	-	LR II-4	-	GC-4	27.65
MW-6	32.99	LR II-5	30.24	GC-5	28.42
CW-4	33.75	PZ-8	29.38	GC-6	31.10
CW-5A	-	PZ-9	29.60	PZ-12	30.99
PZ-1	-	PZ-10	29.32	PZ-13	26.91
PZ-2	30.03	PZ-11	29.44	PZ-14	25.22
PZ-3	28.93			PZ-15	27.37
PZ-4	34.69			PZ-16	27.71
PZ-5	30.34			PZ-17	28.59
PZ-6	31.29				
PZ-7	30.11				

### 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

GRAPHIC SCALE



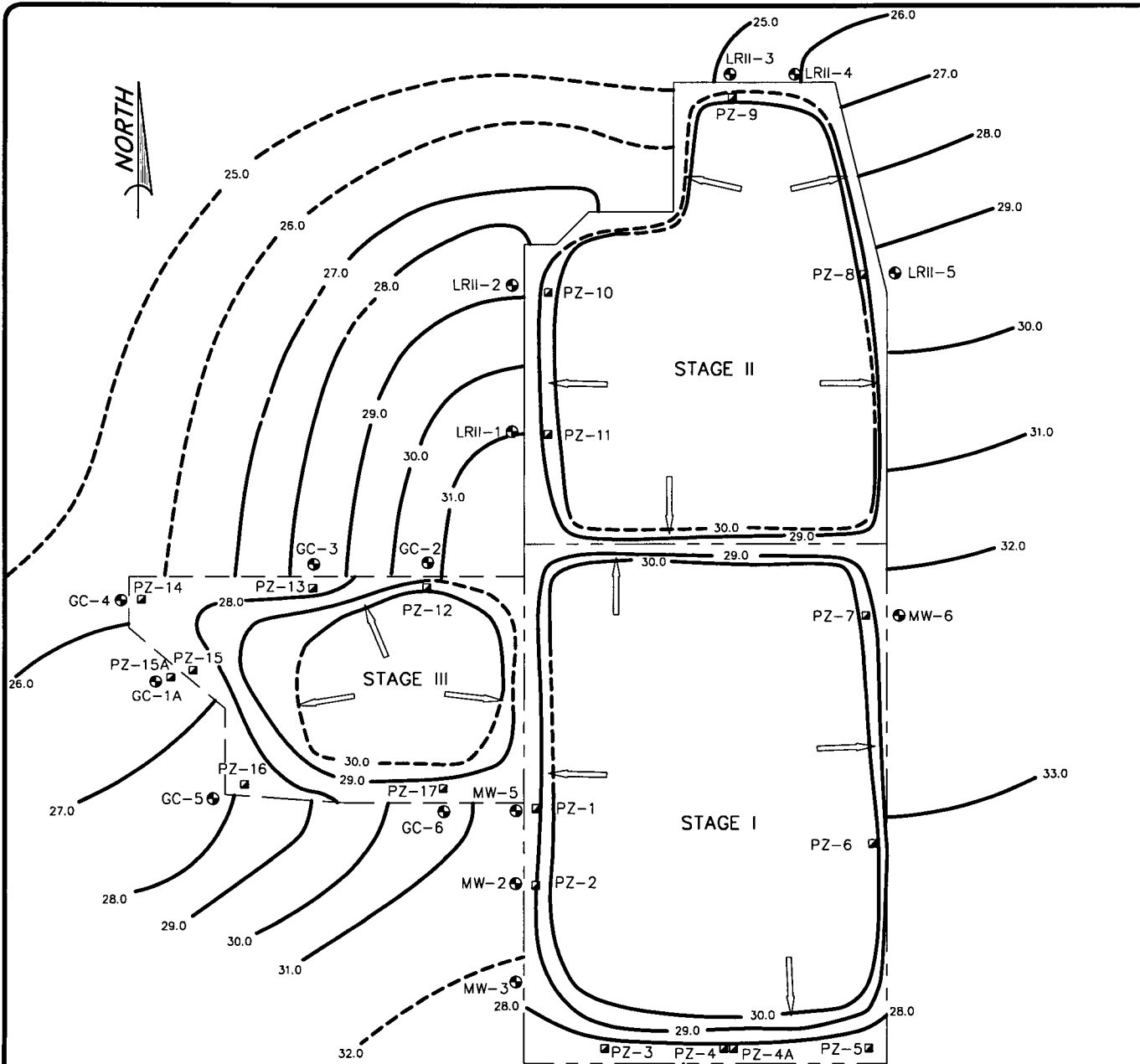
NOTE:  
PZ-4A AND PZ-15A  
WERE INSTALLED IN  
MARCH 1996.

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
**LENA ROAD LANDFILL**  
3333 LENA ROAD  
BRADENTON, FLORIDA



**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 7

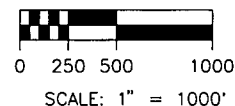


QUARTER 2, 1995

MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)
STAGE I		STAGE II		STAGE III	
MW-1	32.81	LR II-1	31.02	GC-1A	-
MW-2	33.23	LR II-2	28.95	GC-2	30.71
MW-3	-	LR II-3	28.95	GC-3	28.16
MW-5	-	LR II-4	25.09	GC-4	25.86
MW-6	32.49	LR II-5	29.32	GC-5	27.81
CW-4	31.17	PZ-8	29.80	GC-6	30.60
CW-5A	-	PZ-9	29.86	PZ-12	30.14
PZ-1	-	PZ-10	29.22	PZ-13	26.67
PZ-2	29.53	PZ-11	29.52	PZ-14	28.64
PZ-3	27.26			PZ-15	26.45
PZ-4	27.37			PZ-16	27.30
PZ-5	25.29			PZ-17	28.32
PZ-6	31.12				
PZ-7	29.69				

NOTE:  
PZ-4A AND PZ-15A  
WERE INSTALLED IN  
MARCH 1996.

GRAPHIC SCALE



### LEGEND

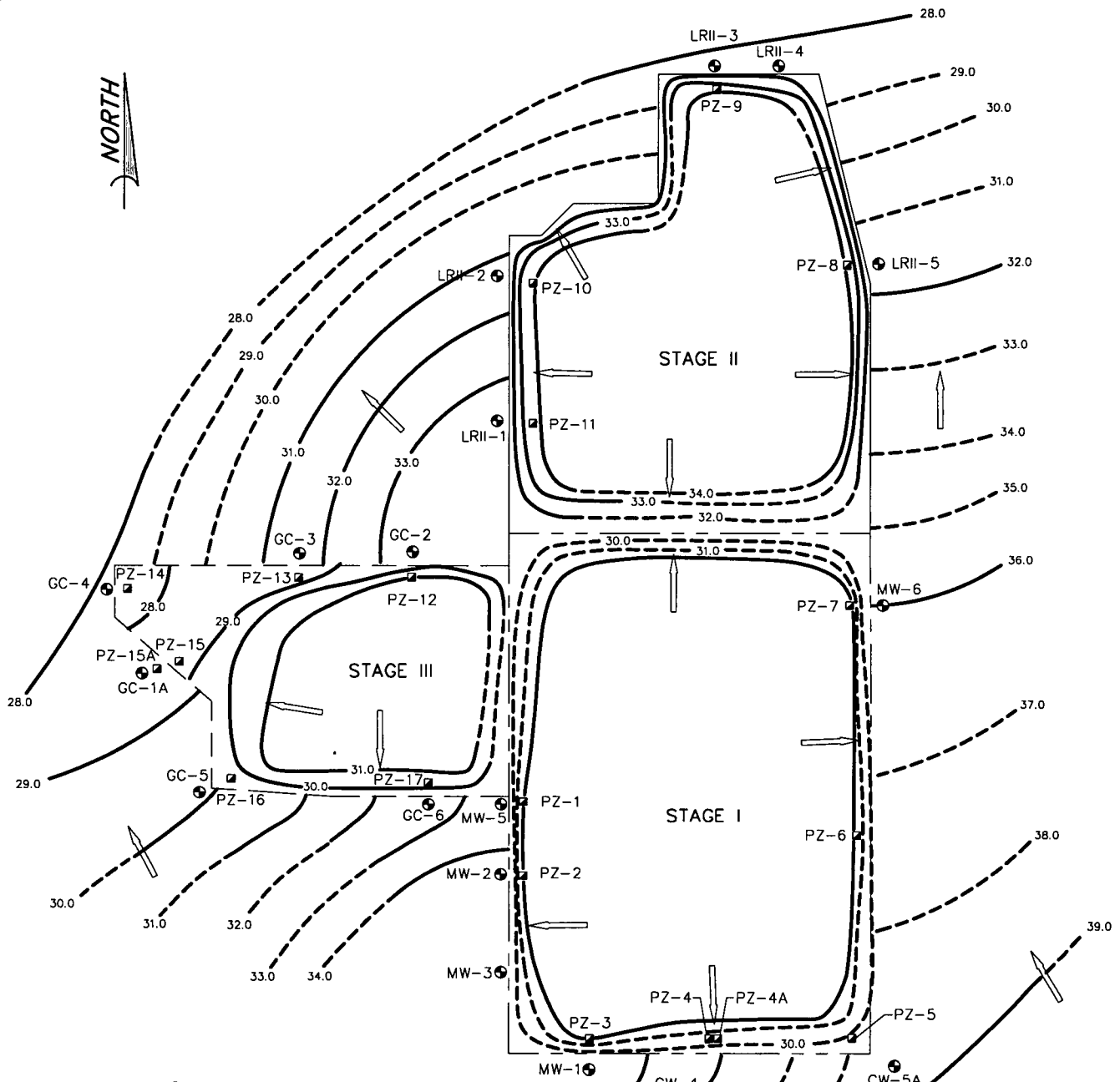
- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
**LENA ROAD LANDFILL**  
3333 LENA ROAD  
BRADENTON, FLORIDA



**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 8

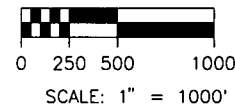


QUARTER 3, 1995

MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)
STAGE I		STAGE II		STAGE III	
MW-1	35.06	LR11-1	33.64	GC-1A	26.73
MW-2	34.51	LR11-2	31.52	GC-2	33.31
MW-3	-	LR11-3	27.97	GC-3	31.53
MW-5	32.82	LR11-4	-	GC-4	28.06
MW-6	35.99	LR11-5	31.75	GC-5	29.87
CW-4	34.89	PZ-8	33.71	GC-6	32.51
CW-5A	38.77	PZ-9	34.13	PZ-12	32.13
PZ-1	32.50	PZ-10	34.13	PZ-13	28.39
PZ-2	33.08	PZ-11	33.92	PZ-14	27.87
PZ-3	-	-	-	PZ-15	28.24
PZ-4	-	-	-	PZ-16	29.61
PZ-5	29.96	-	-	PZ-17	30.68
PZ-6	31.60	-	-	-	-
PZ-7	32.54	-	-	-	-

NOTE:  
PZ-4A AND PZ-15A  
WERE INSTALLED IN  
MARCH 1996.

GRAPHIC SCALE



### 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

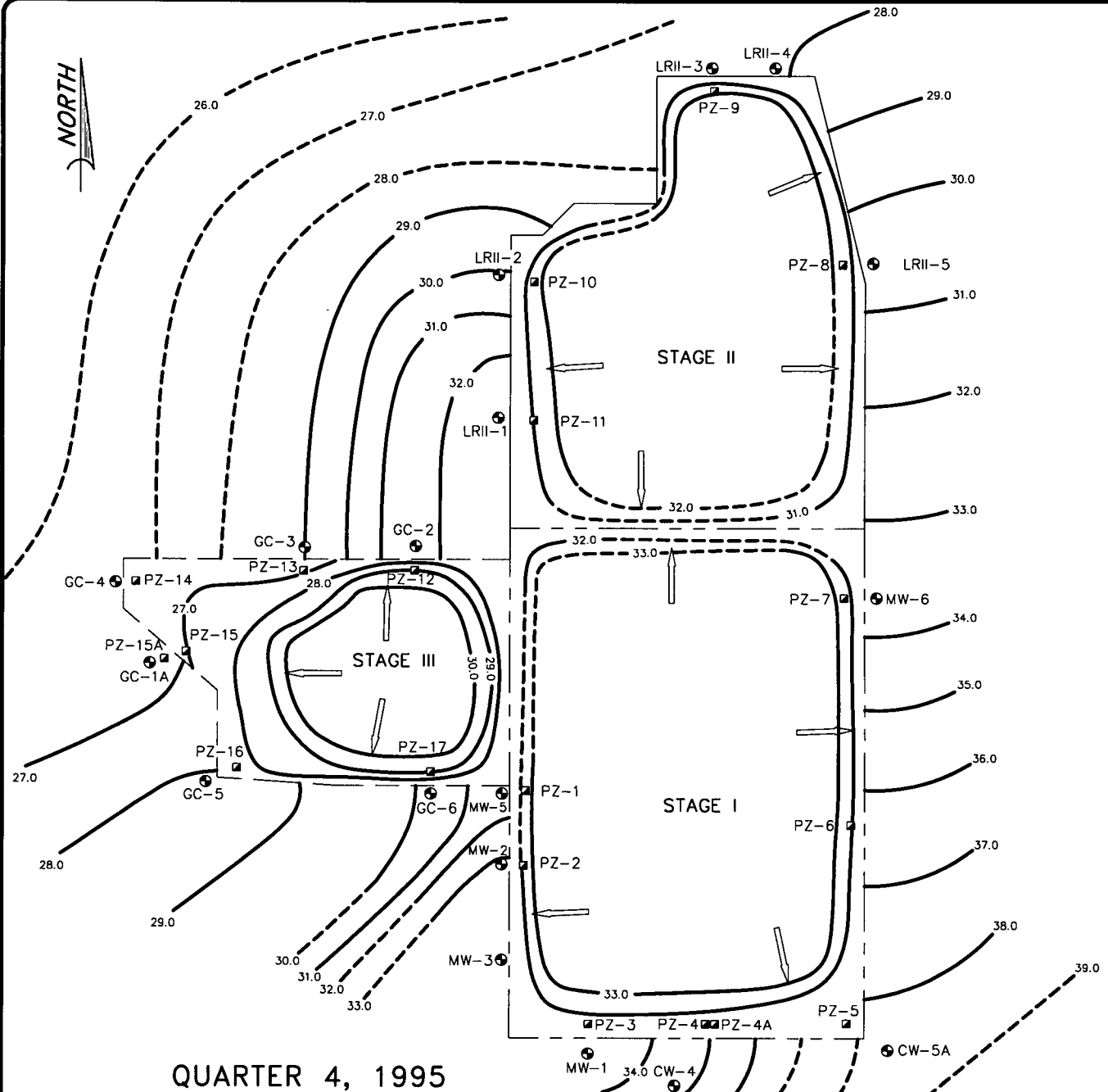
SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
**LENA ROAD LANDFILL**  
3333 LENA ROAD  
BRADENTON, FLORIDA



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

DRAWN BY: KT	SCALE: 1" = 1000'	PROJ. NO.: 552-4L015
CHKD. BY: DJS	DATE: 4/15/96	DWG.: FIGURE 9

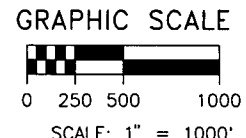




### QUARTER 4, 1995

MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)	MONITOR WELL	G.W. ELEV. IN FEET (NGVD)
STAGE I		STAGE II		STAGE III	
MW-1	33.52	LRII-1	33.38	GC-1A	26.02
MW-2	33.12	LRII-2	29.98	GC-2	31.45
MW-3		LRII-3	27.35	GC-3	29.02
MW-5	31.62	LRII-4		GC-4	26.69
MW-6	33.40	LRII-5	30.39	GC-5	28.03
CW-4	34.88	PZ-8	31.23	GC-6	30.71
CW-5A	38.43	PZ-9	32.13	PZ-12	28.98
PZ-1	32.29	PZ-10	32.12	PZ-13	26.66
PZ-2	31.44	PZ-11	30.95	PZ-14	26.12
PZ-3				PZ-15	27.03
PZ-4				PZ-16	27.64
PZ-5	29.91			PZ-17	28.82
PZ-6	32.04				
PZ-7	32.53				

NOTE:  
PZ-4A AND PZ-15A  
WERE INSTALLED IN  
MARCH 1996.



### LEGEND

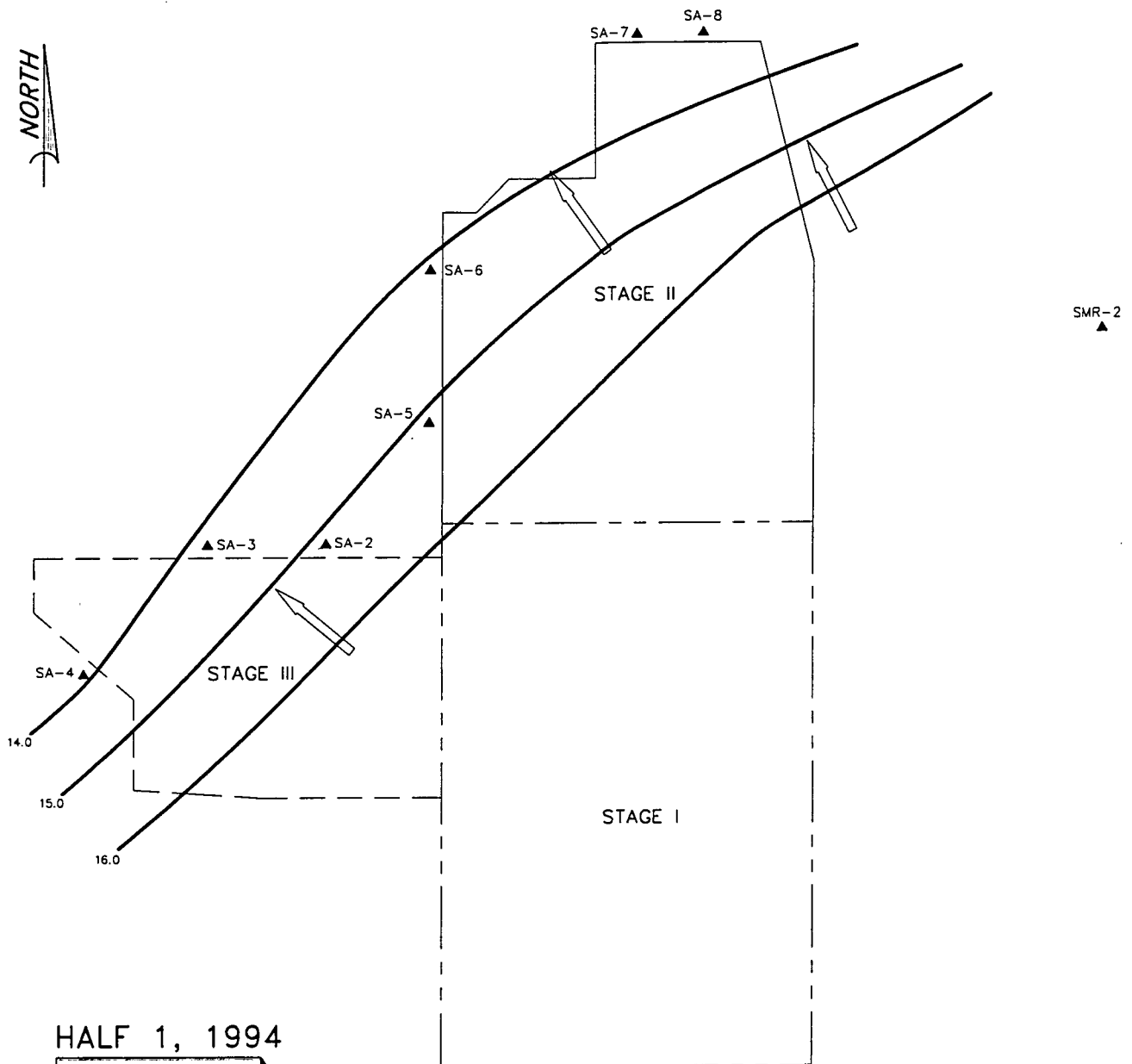
- EXISTING STAGE I SLURRY WALL
- EXISTING STAGE II SLURRY WALL
- EXISTING STAGE III SLURRY WALL
- APPROXIMATE SURFICIAL AQUIFER MONITOR WELL LOCATION
- APPROXIMATE SURFICIAL AQUIFER PIEZOMETER LOCATION
- INFERRED DIRECTION OF GROUNDWATER FLOW

SURFICIAL AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
**LENA ROAD LANDFILL**  
3333 LENA ROAD  
BRADENTON, FLORIDA

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

DRAWN BY: KT	SCALE: 1" = 1000'	PROJ. NO.: 552-4L015
CHKD. BY: <i>DS</i>	DATE: 4/15/96	DWG.: FIGURE 10

55201510.DWG



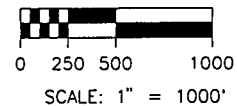
HALF 1, 1994

MONITOR WELL	G.W. ELEV. IN FEET (NGVD)
SA-2	33.90
SA-3	13.02
SA-4	14.18
SA-5	15.12
SA-6	14.54
SA-7	10.07
SA-8	11.38
SMR-2	21.70

### 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

GRAPHIC SCALE

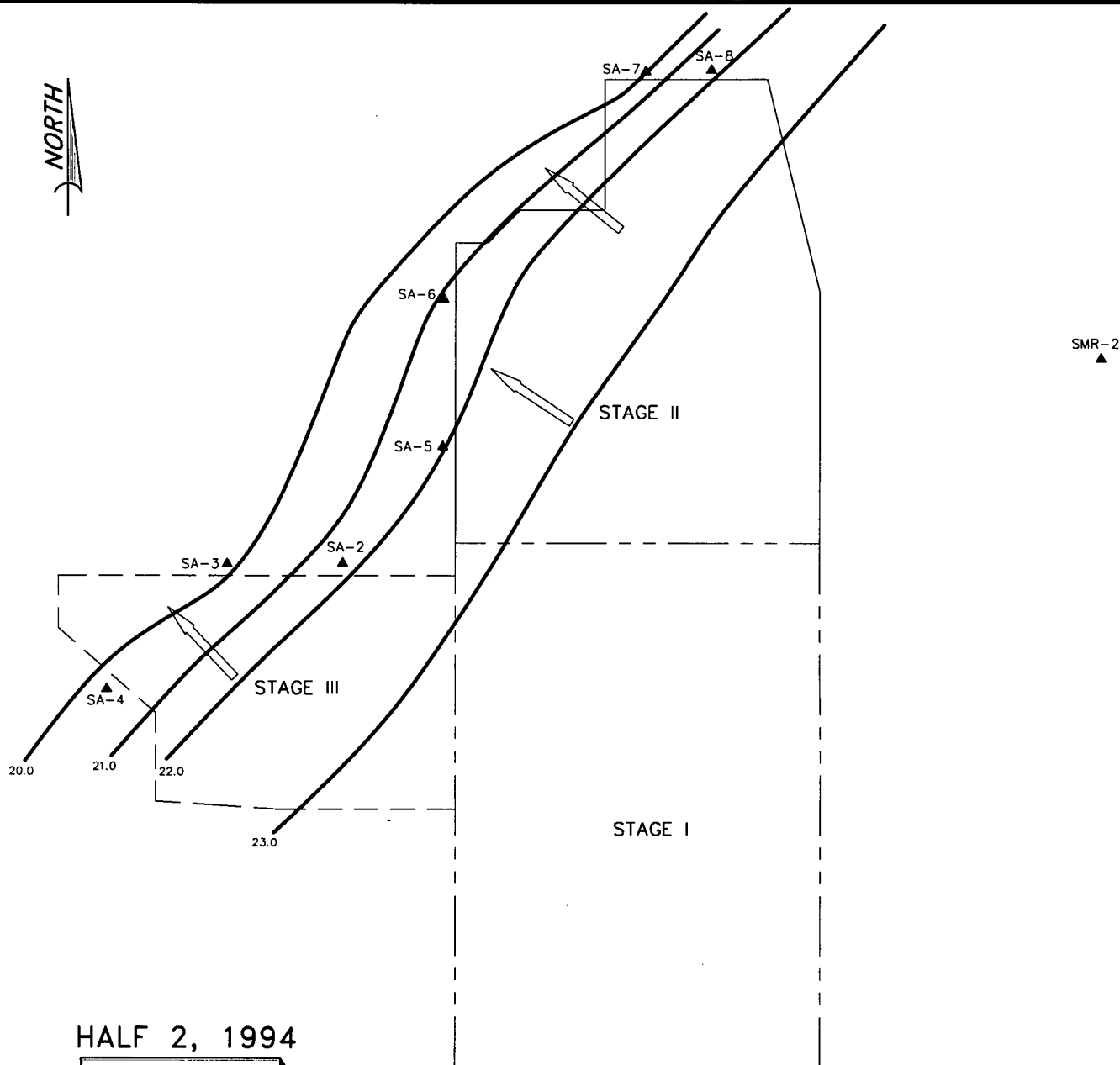


DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
LENA ROAD LANDFILL  
3333 LENA ROAD  
BRADENTON, FLORIDA



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

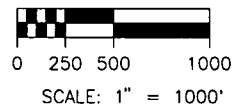
DRAWN BY: KT	SCALE: 1" = 1000'	PROJ. NO.: 552-4L015
CHKD. BY: <i>DS</i>	DATE: 4/15/96	DWG.: FIGURE 11



HALF 2, 1994

MONITOR WELL	G.W. ELEV. IN FEET (NGVD)
SA-2	-
SA-3	19.52
SA-4	20.38
SA-5	22.02
SA-6	22.84
SA-7	19.71
SA-8	21.98
SMR-2	21.50

GRAPHIC SCALE



### 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

DEEP AQUIFER GROUNDWATER ELEVATION CONTOUR MAP  
**LENA ROAD LANDFILL**  
3333 LENA ROAD  
BRADENTON, FLORIDA



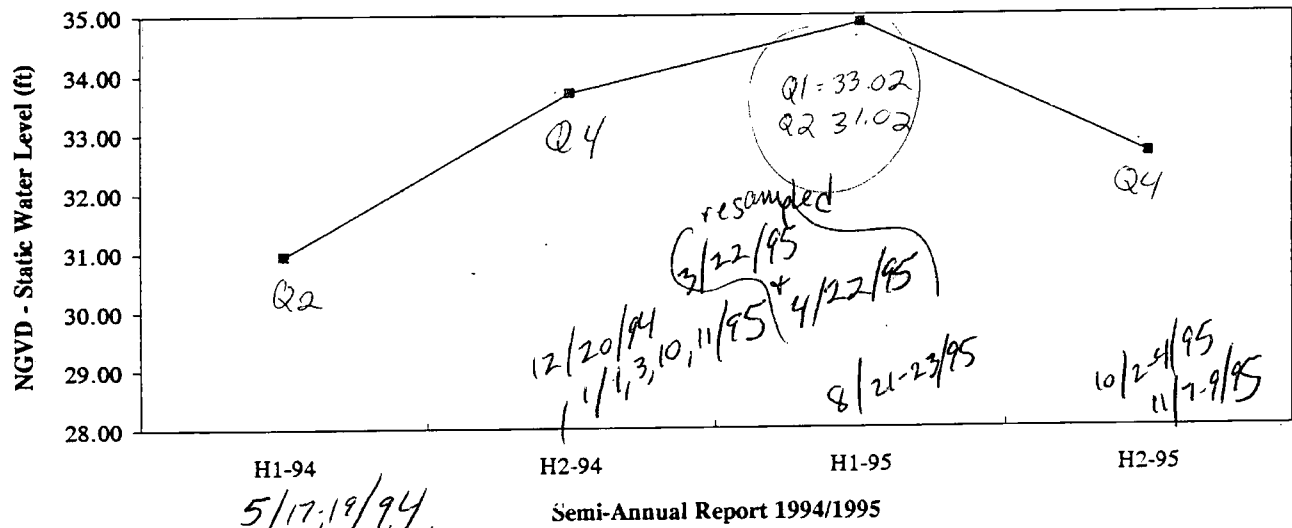
**ENVIRONMENTAL SERVICES**  
4400 - 140th. AVENUE NORTH  
SUITE 100  
CLEARWATER, FLORIDA 34622

DRAWN BY: KT	SCALE: 1" = 1000'	PROJ. NO.: 552-4L015
CHKD. BY: DAS	DATE: 4/15/96	DWG.: FIGURE 12

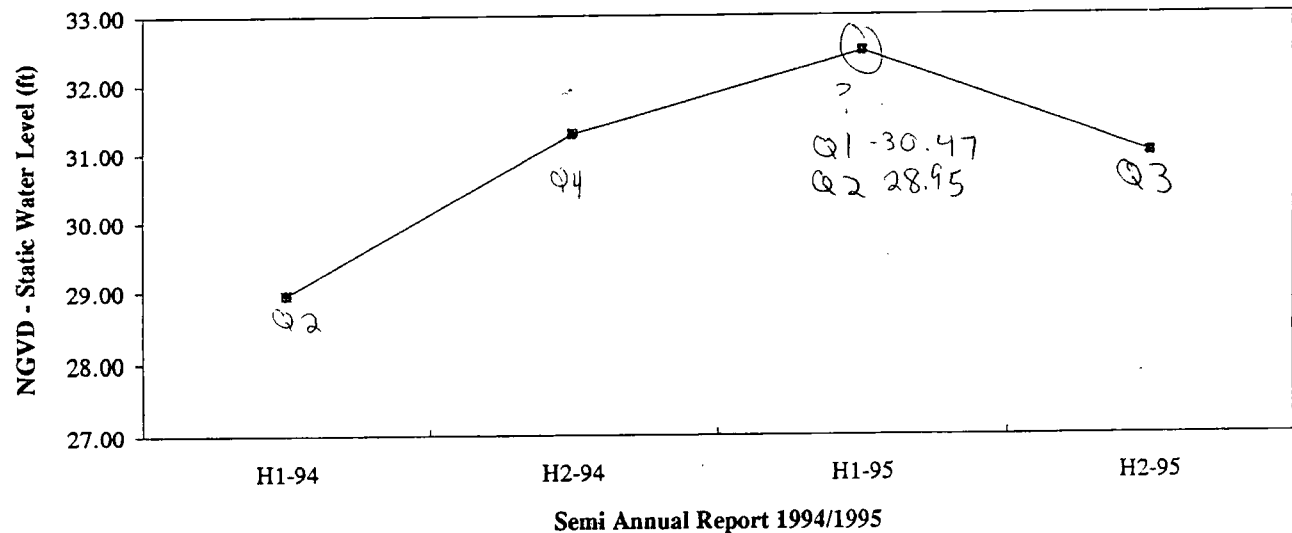
**APPENDIX B**

**MONITORING WELL HYDROGRAPHS**

**Graph 1 Monitoring Well Hydrograph**  
Shallow Well: LR11 -1



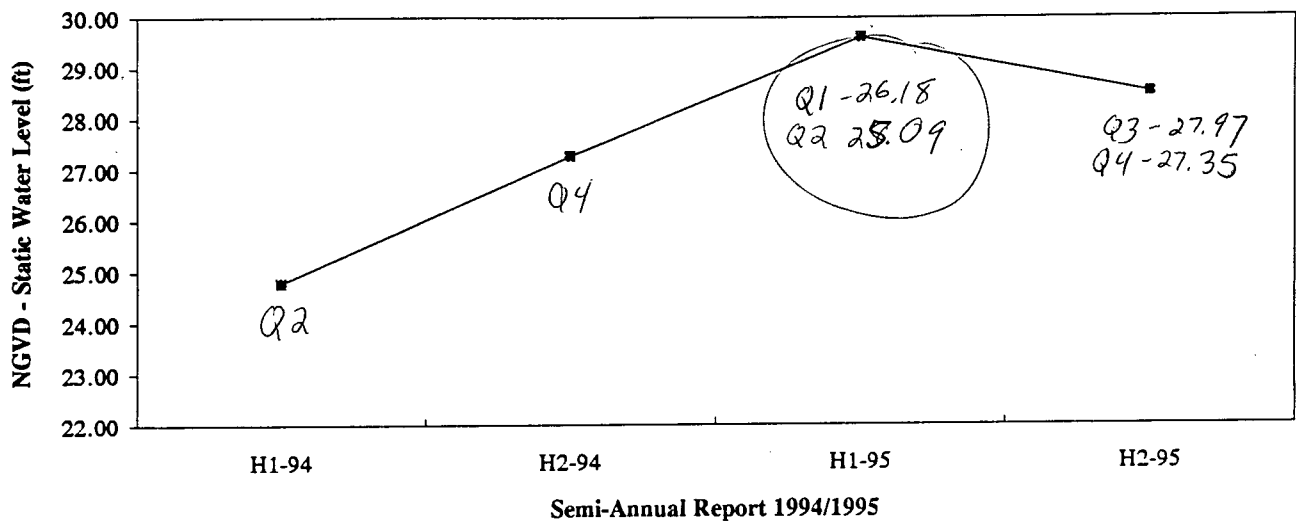
**Graph 2 Monitoring Well Hydrograph**  
Shallow Well: LR11-2



Q1 94	31.44
2	30.94
3	25.02
4	33.31
1 95	33.02
2	31.02
3	33.64
4	33.38

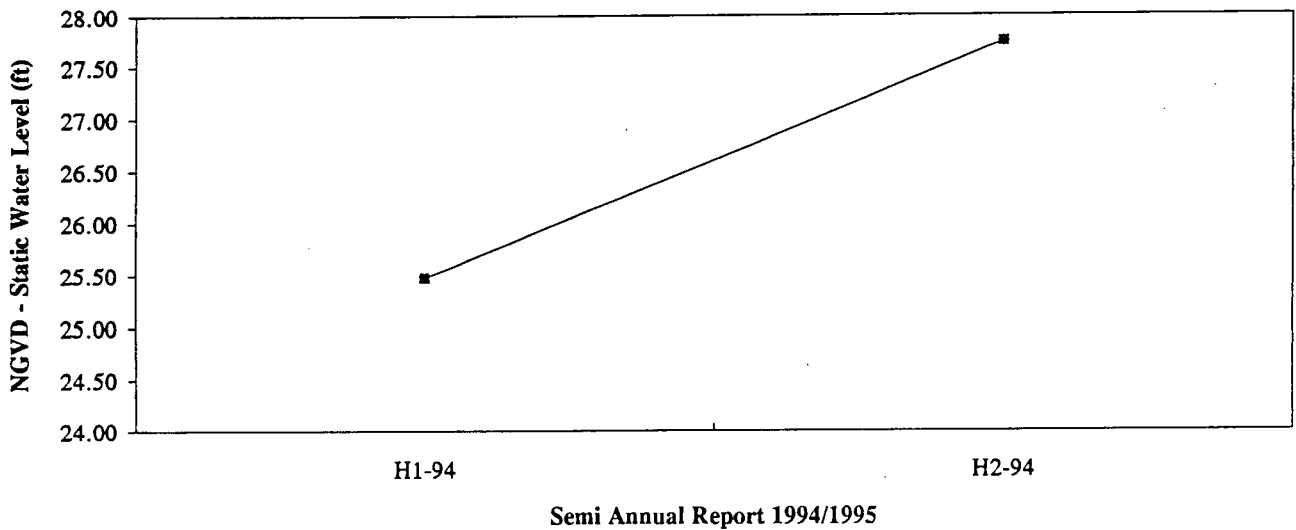
### Graph 3 Monitoring Well Hydrograph

Shallow Well: LR11 -3



### Graph 4 Monitoring Well Hydrograph

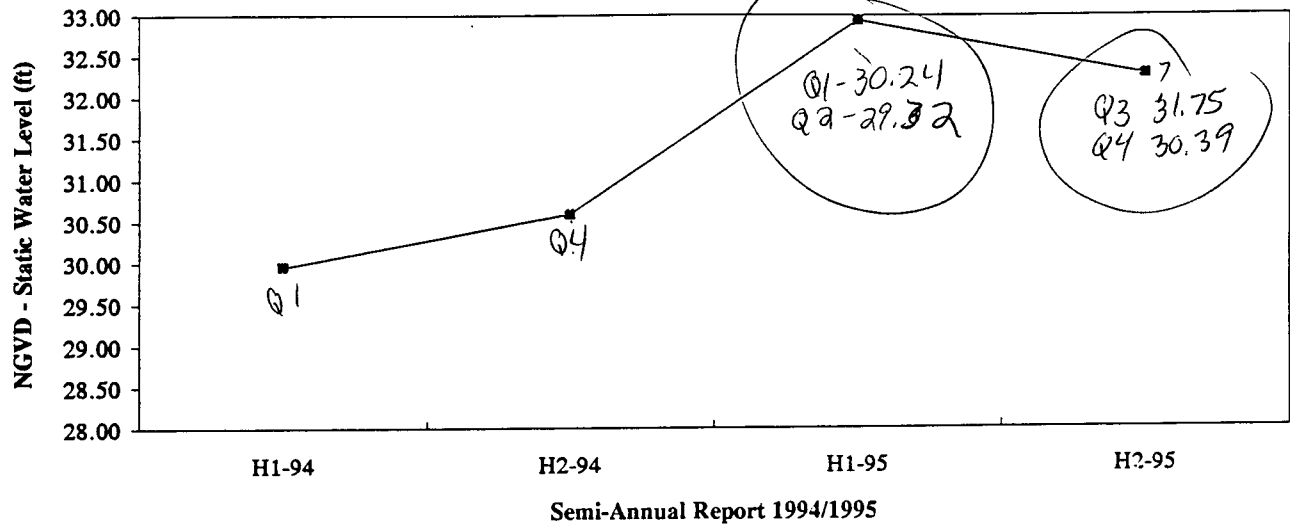
Shallow Well: LR11-4



No data in App. A

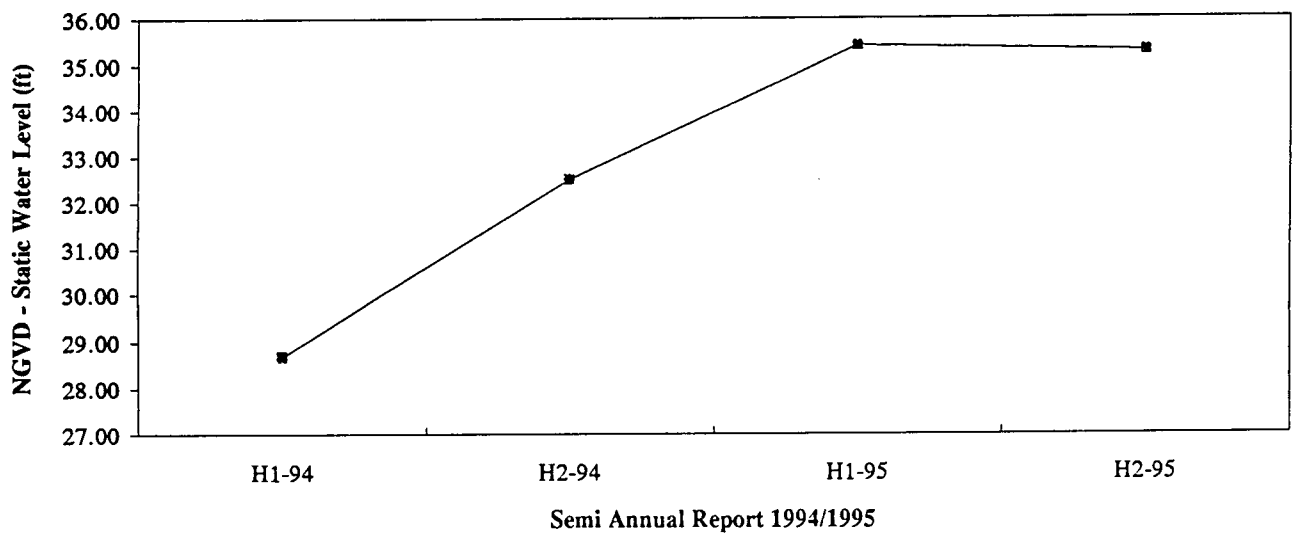
**Graph 5 Monitoring Well Hydrograph**

Shallow Well: LR11 -5



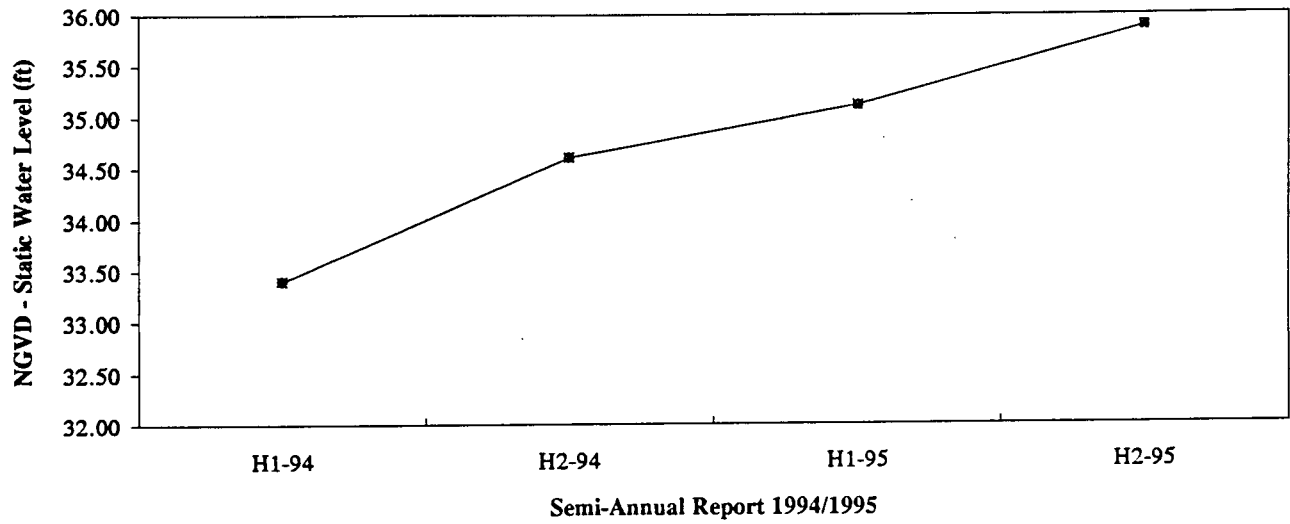
**Graph 6 Monitoring Well Hydrograph**

Shallow Well: MW-1



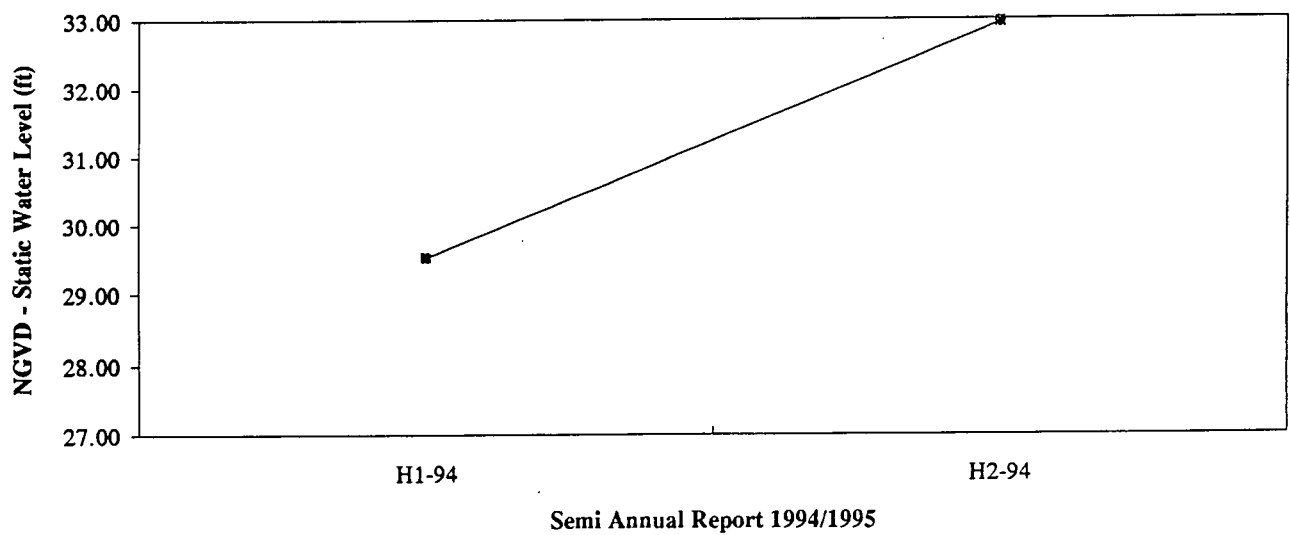
**Graph 7 Monitoring Well Hydrograph**

Shallow Well: MW -2



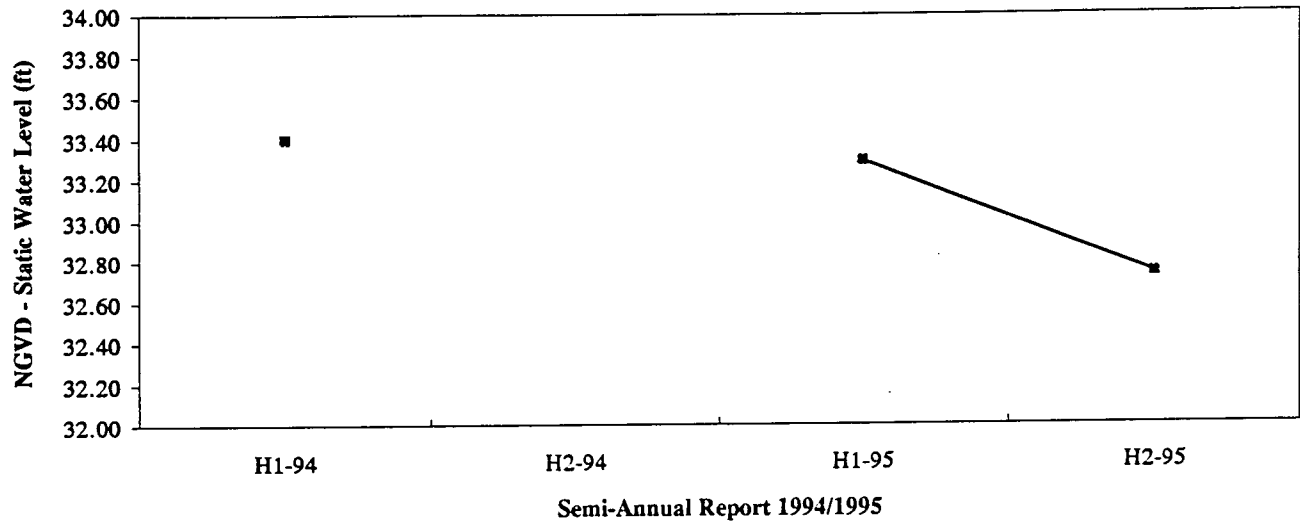
**Graph 8 Monitoring Well Hydrograph**

Shallow Well: MW-3

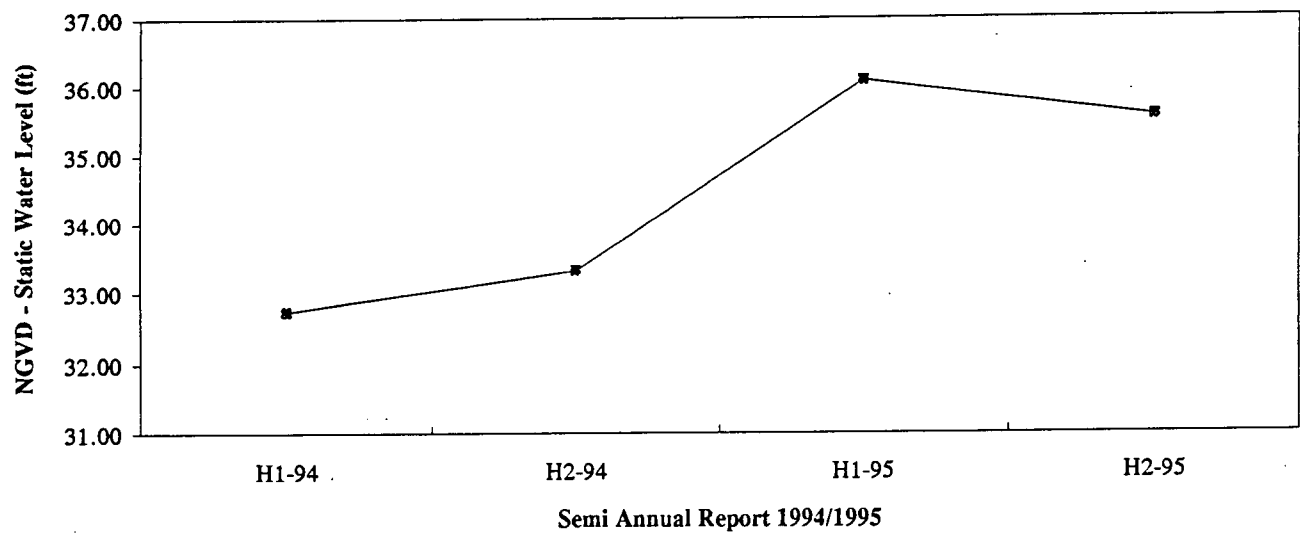




**Graph 9 Monitoring Well Hydrograph**  
Shallow Well: MW -5

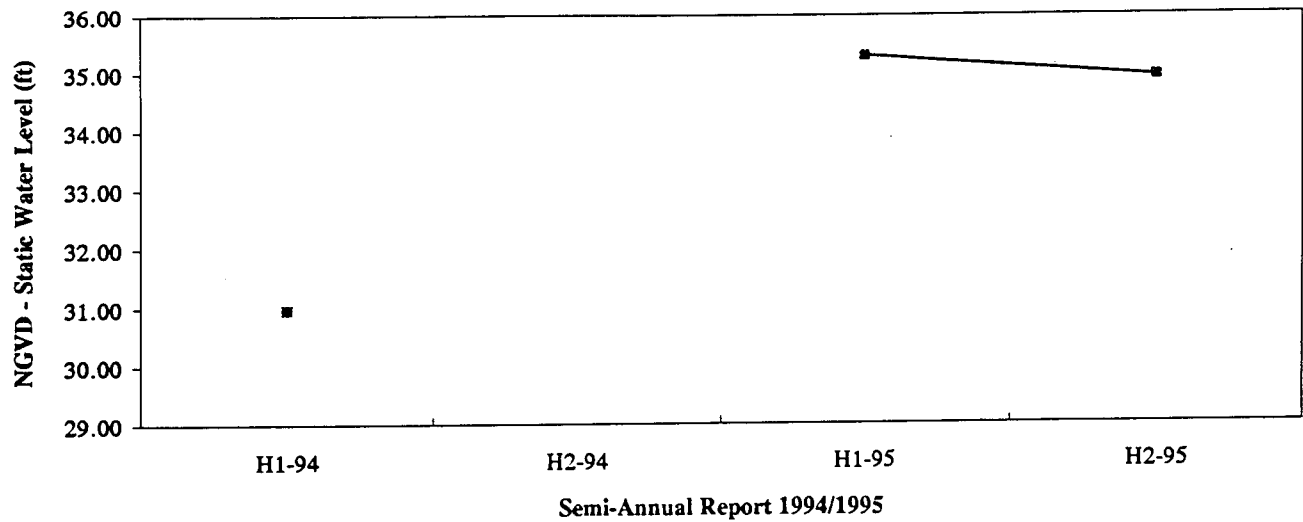


**Graph 10 Monitoring Well Hydrograph**  
Shallow Well: MW-6



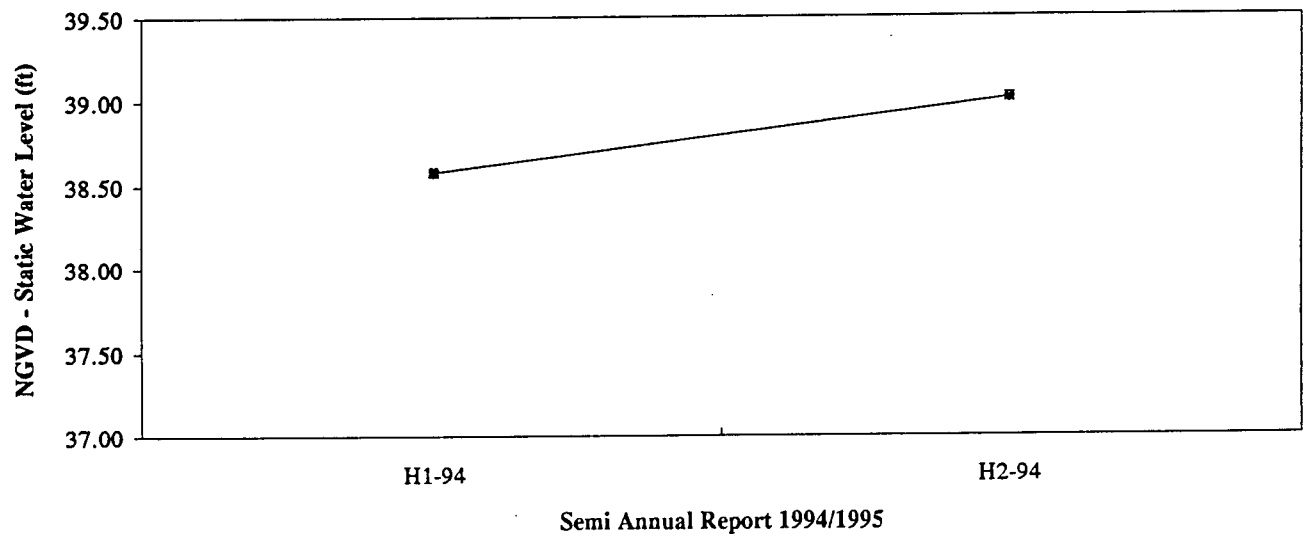
**Graph 11 Monitoring Well Hydrograph**

Shallow Well: CW -4

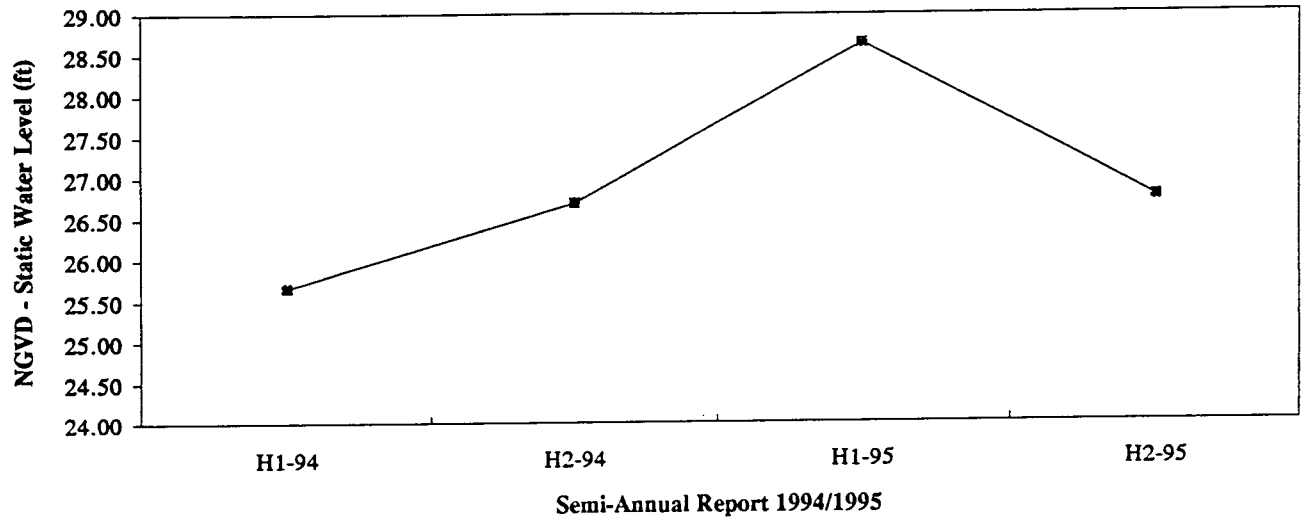


**Graph 12 Monitoring Well Hydrograph**

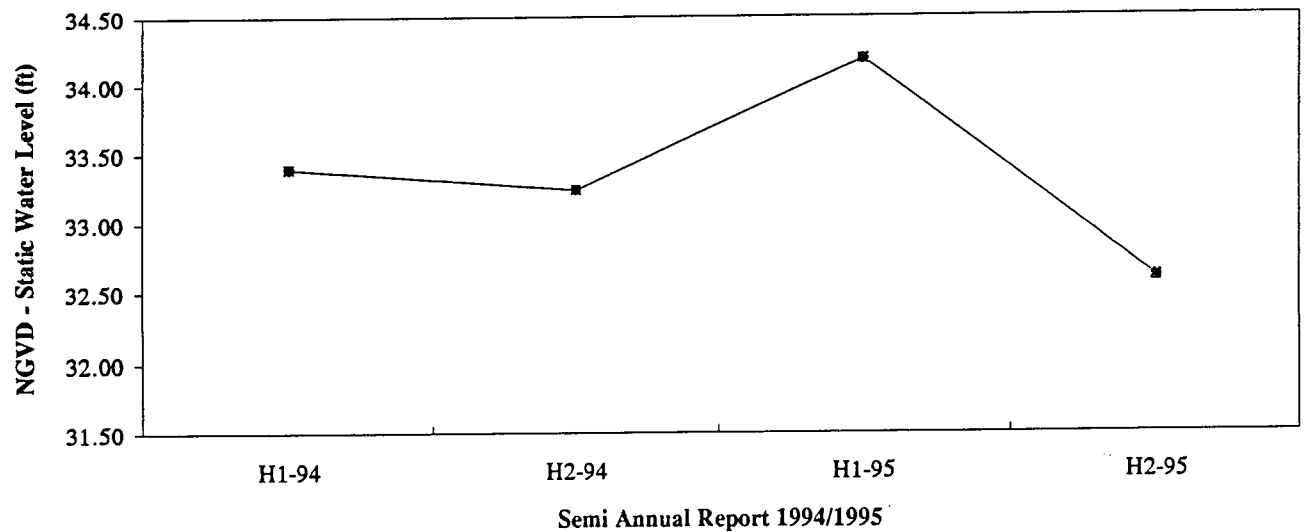
Shallow Well: CW-5A



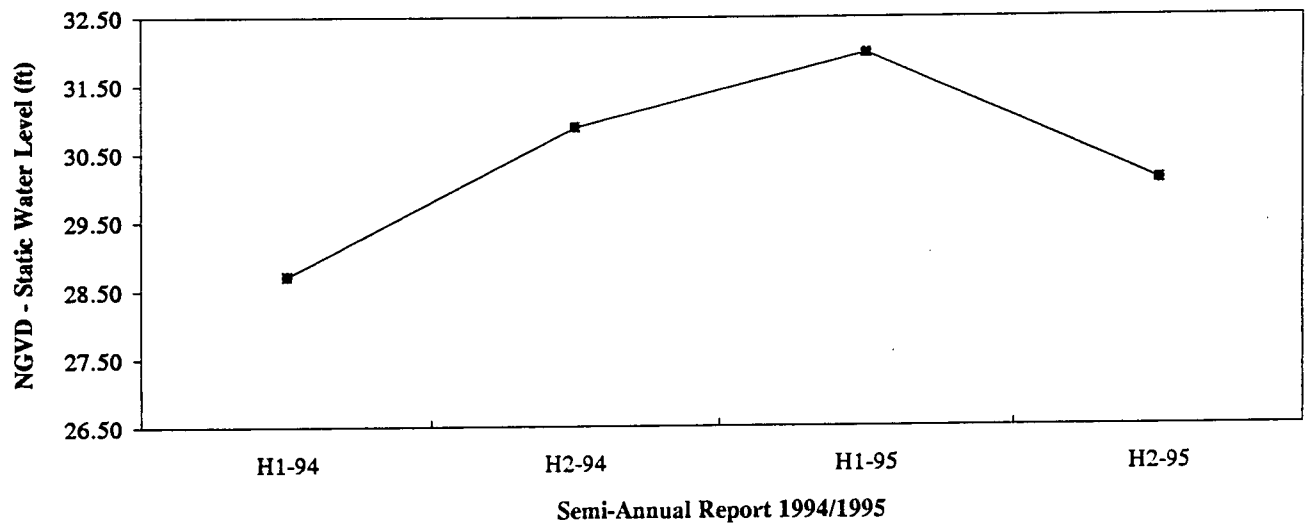
**Graph 13 Monitoring Well Hydrograph**  
Shallow Well: GC -1A



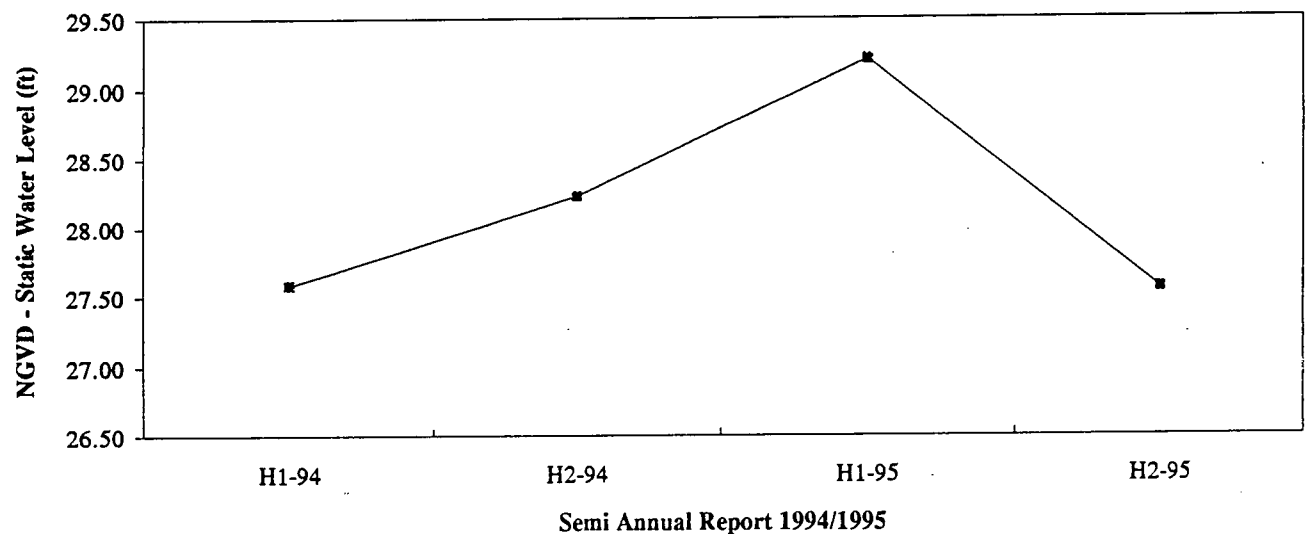
**Graph 14 Monitoring Well Hydrograph**  
Shallow Well: GC-2



**Graph 15 Monitoring Well Hydrograph**  
Shallow Well: GC -3

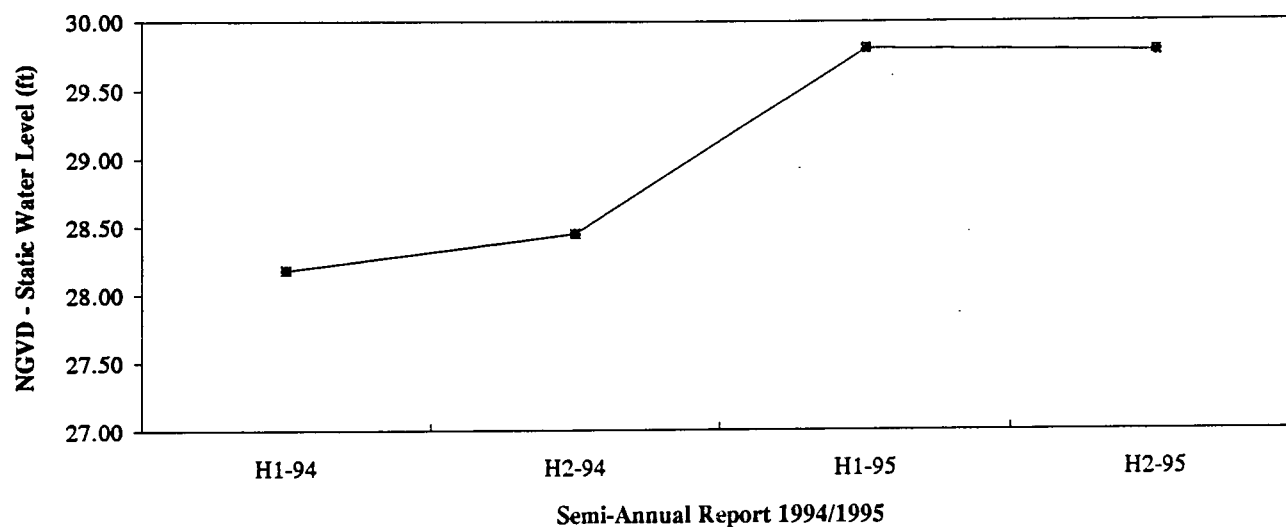


**Graph 16 Monitoring Well Hydrograph**  
Shallow Well: GC-4



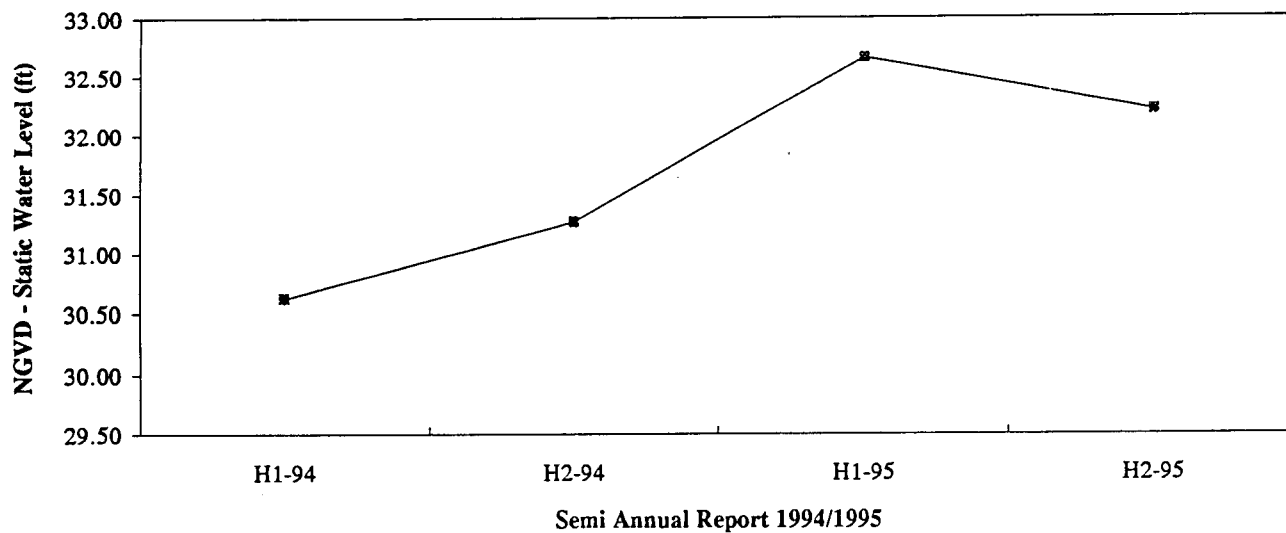
**Graph 17 Monitoring Well Hydrograph**

Shallow Well: GC -5



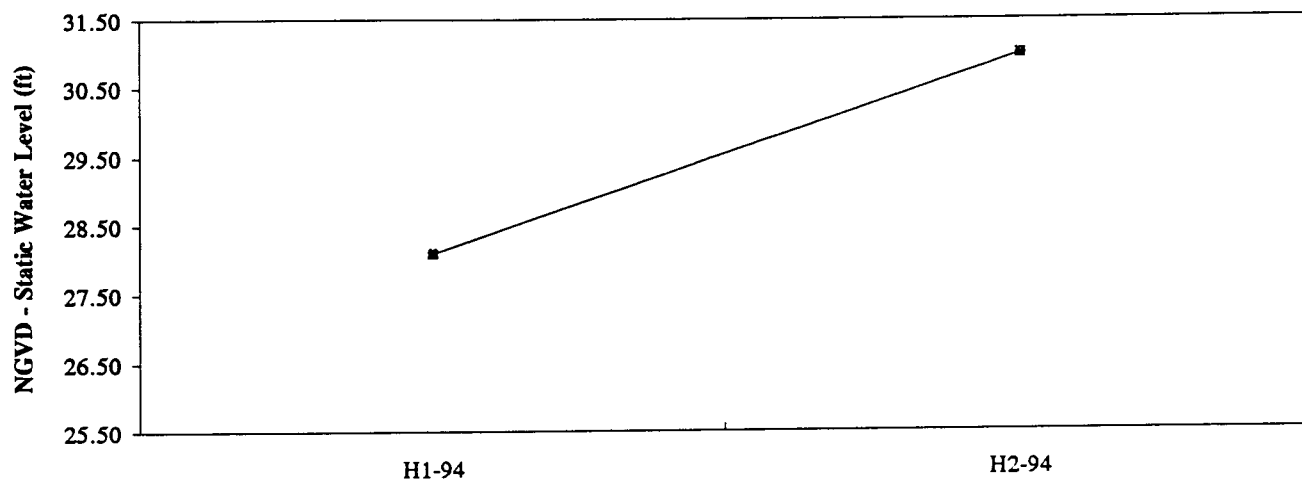
**Graph 18 Monitoring Well Hydrograph**

Shallow Well: GC-6



### Graph 19 Monitoring Well Hydrograph

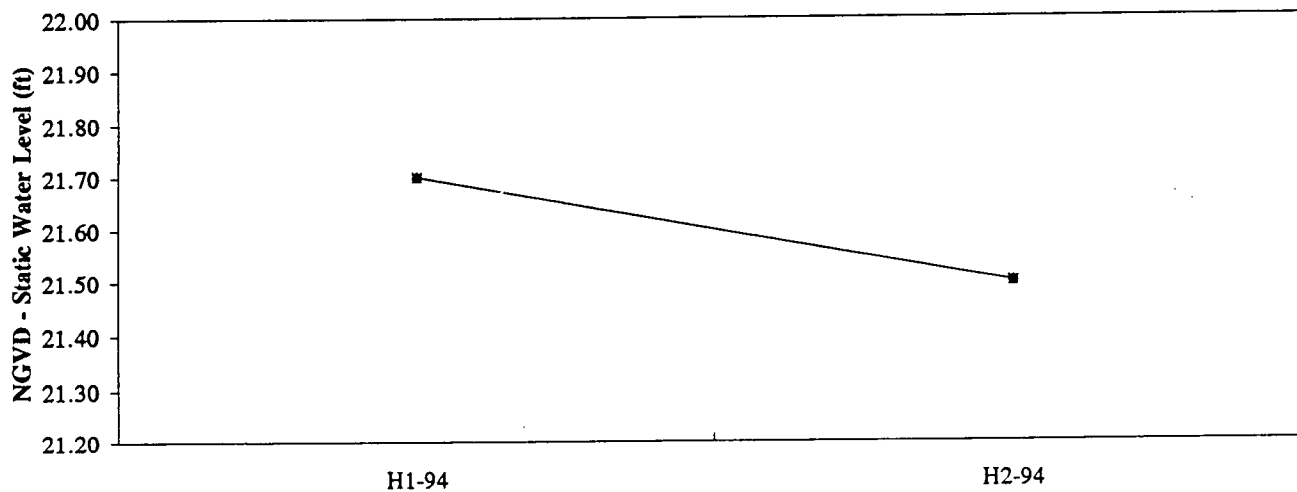
Shallow Well: SMR -1



Semi-Annual Report 1994/1995

### Graph 20 Monitoring Well Hydrograph

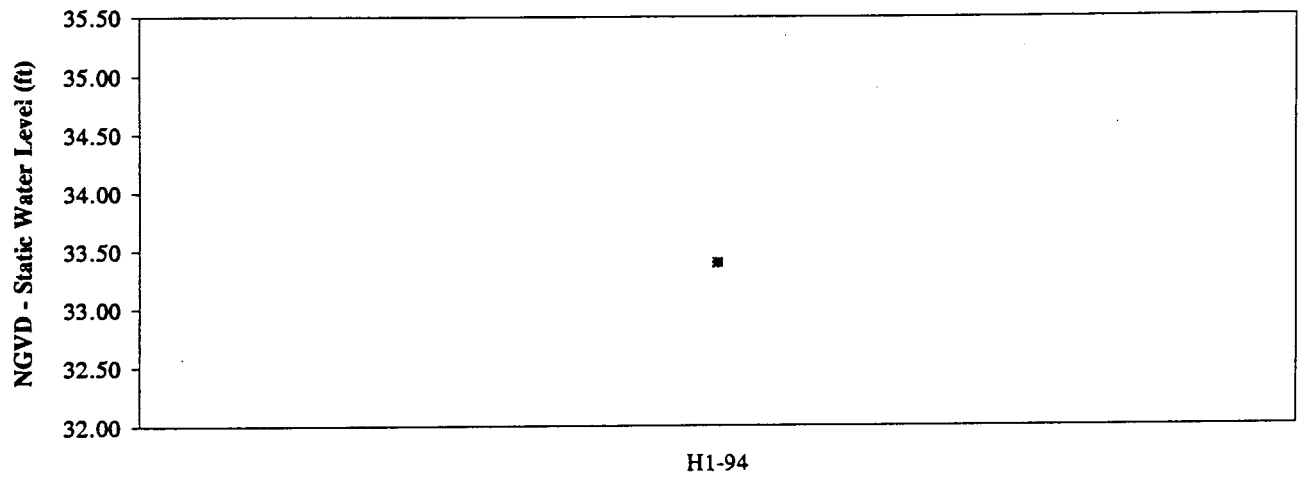
Deep Well: SMR-2



Semi Annual Report 1994/1995

### Graph 21 Monitoring Well Hydrograph

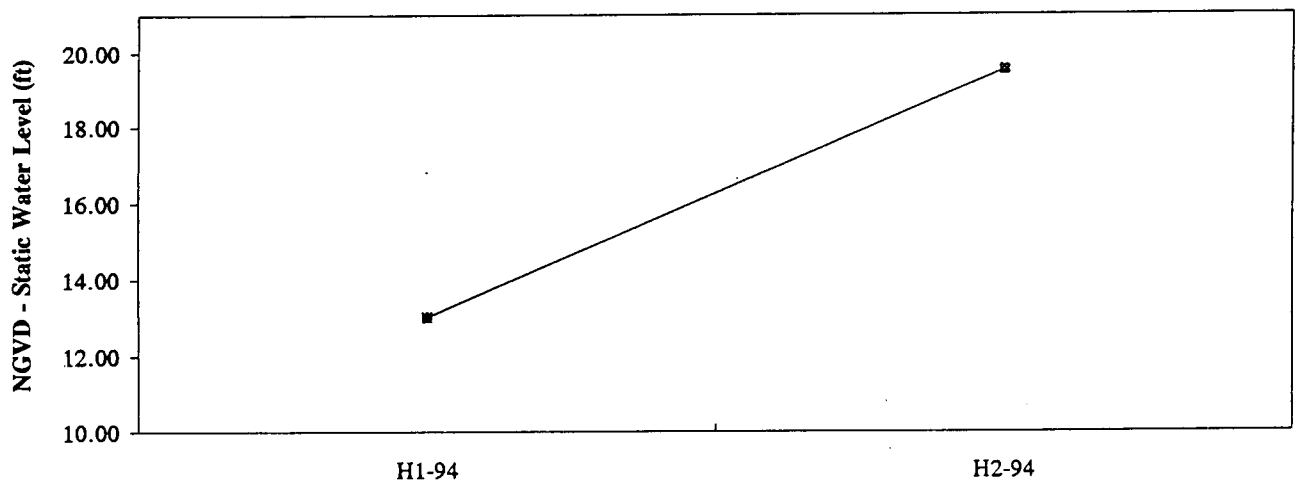
Deep Well: SA -2



Semi-Annual Report 1994/1995

### Graph 22 Monitoring Well Hydrograph

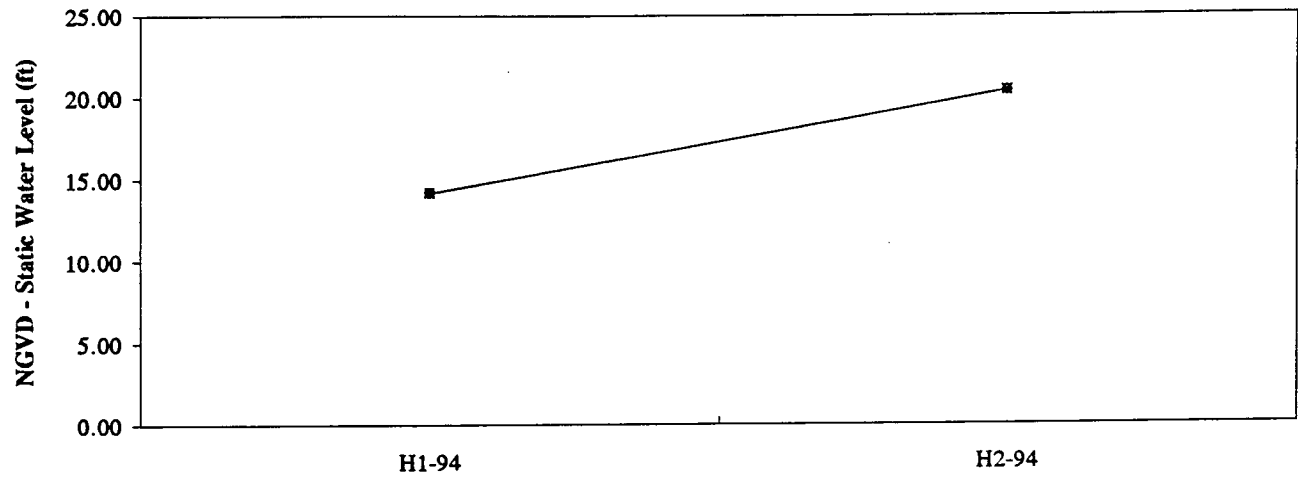
Deep Well: SA-3



Semi Annual Report 1994/1995

**Graph 23 Monitoring Well Hydrograph**

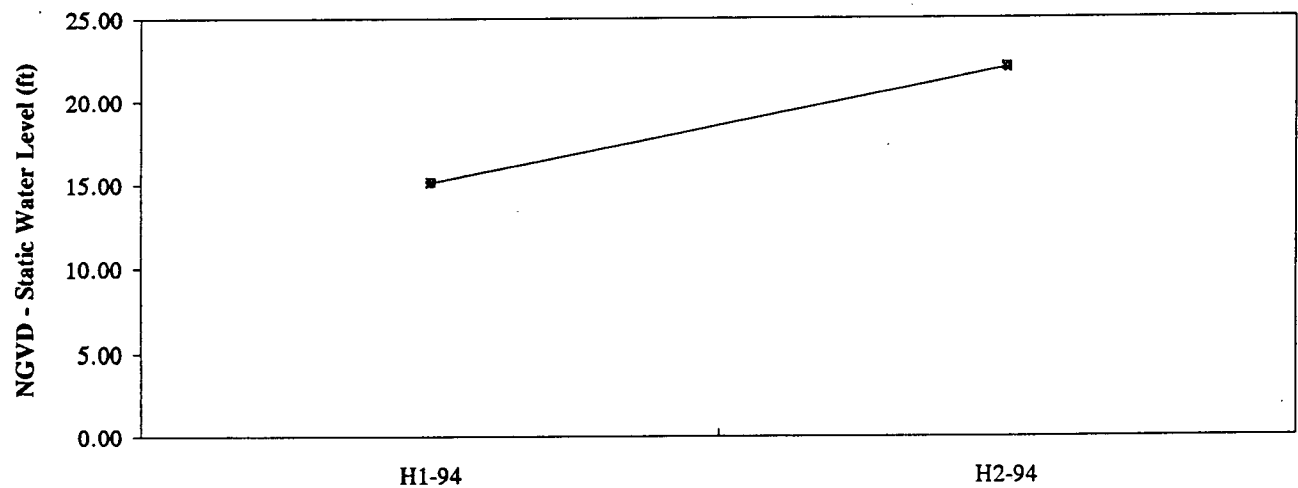
**Deep Well: SA -4**



**Semi-Annual Report 1994/1995**

**Graph 24 Monitoring Well Hydrograph**

**Deep Well: SA-5**

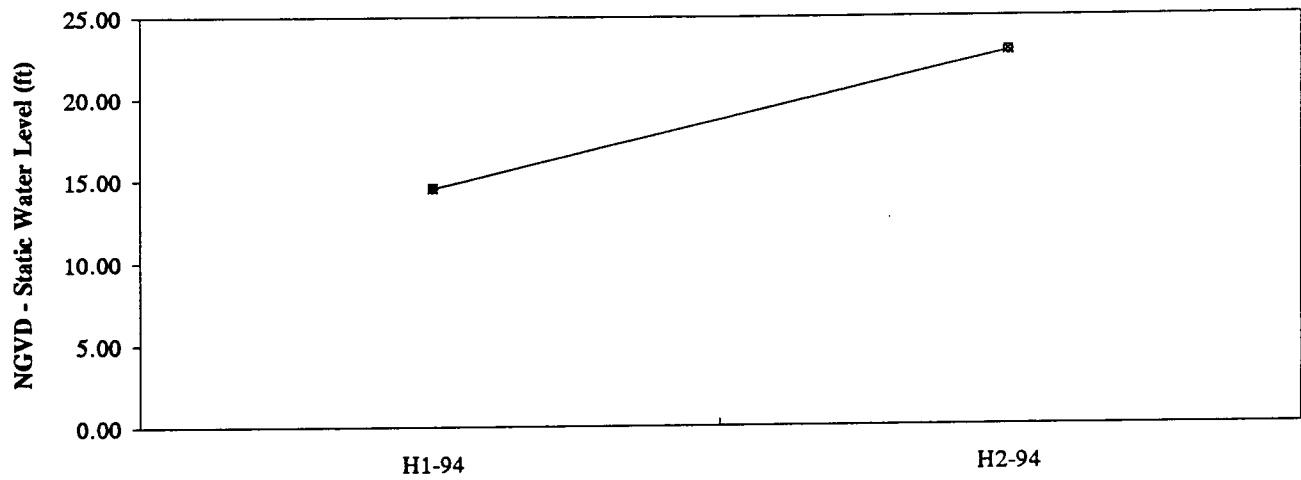


**Semi Annual Report 1994/1995**



### Graph 25 Monitoring Well Hydrograph

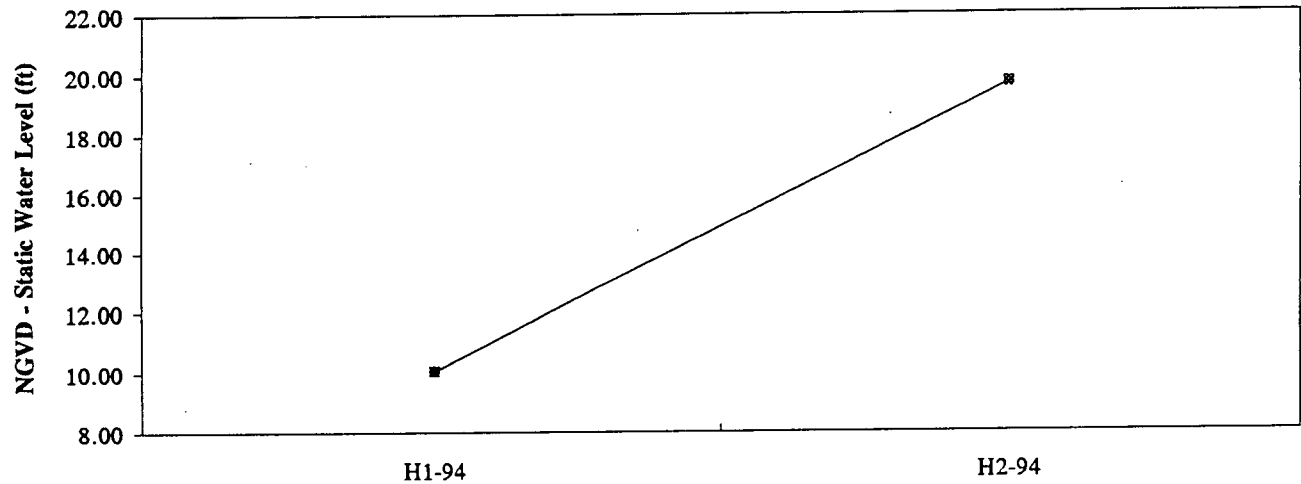
Deep Well: SA -6



Semi-Annual Report 1994/1995

### Graph 26 Monitoring Well Hydrograph

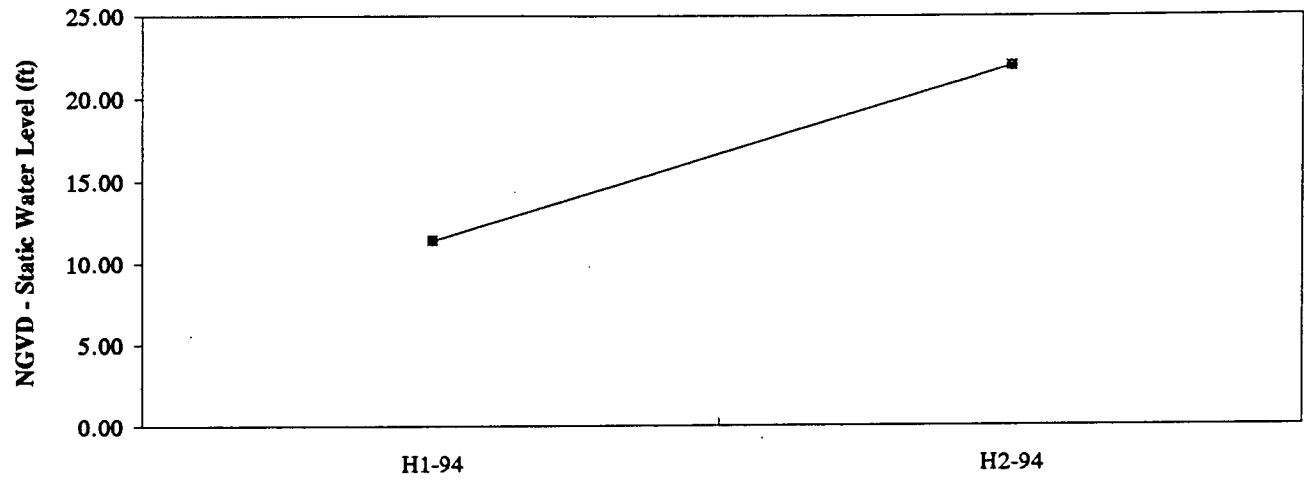
Deep Well: SA-7



Semi Annual Report 1994/1995

### Graph 27 Monitoring Well Hydrograph

Deep Well: SA -8



Semi-Annual Report 1994/1995

**APPENDIX C**

**GROUNDWATER DATA FOR EACH MONITOR WELL**

**TABLE 1 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING**

Shallow Monitoring Well: LR11-1 Total Well Depth: 21.12 ft HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	30.94	33.69	34.87	32.65
Conductivity (umho/cm)	444 365	300	300	400
pH (S.U.)	6.4	6.2	6.19	6.05
DO (mg/l)	1	1.6	1.1	0.1
Turbidity (NTU)	160 0.4	3.1	-	0.05
Temperature (C)	25.9	23.2	25.7	24.6
Color/Sheen (C.U.)	-	clear, yellow	-	brown

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.71	0.82
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	0.005	0.005	0.004	0.004
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	28 25.9	23.2	20.8	35.9
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	22.2	22	24.3
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	19.9	17.9	18.5	20.6
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	BDL	BDL
TDS (mg/l)	286 314	219	332	346
TOC (mg/l)	18.8	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	0.24 (1)

1 - All EPA 8260 parameters below detection limits except for concentration listed 1,4  
Dichlorobenzene.

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - Not analyzed or sampled for this parameter.

**TABLE 2 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING**

Shallow Monitoring Well: LR11-2 Total Well Depth: 22.83 ft HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	28.95	31.28	32.48	30.99
Conductivity (umho/cm)	135	120	110	120
pH (S.U.)	6.40	5.90	5.45	5.85
DO (mg/l)	1.0	2.6	0.4	0.7
Turbidity (NTU)	0.50	32.00	-	1.00
Temperature (C)	23.8	24.1	26.3	27.3
Color/Sheen (C.U.)	-	cloudy	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.09	0.12
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	8.15	79.0	7.40	8.28
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	6.18	6.18	4.49
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	4.69	4.37	<1.50	4.08
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	0.013	BDL
TDS (mg/l)	123	79	456	68
TOC (mg/l)	4.80	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.39 (1)	BDL

1 - All EPA 8260 parameters below detection limits except for concentration listed

Trichloromethane

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - Not analyzed or sampled for this parameter.

**TABLE 3 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING**

Shallow Monitoring Well: LR11-3	1994/1995			
Total Well Depth: 22.61 ft	SAMPLING EVENT			
HALF-YEAR	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	24.78	27.28	29.61	28.51
Conductivity (umho/cm)	141 150	285	248	290
pH (S.U.)	4.9 4.80	4.60	4.22	5.40
DO (mg/l)	1.4	0.9	0.6	0.5
Turbidity (NTU)	2.70	0.30	-	1.40
Temperature (C)	23.8	24.1	25.5	27.2
Color/Sheen (C.U.)	-	clear	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.11	0.16
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	BDL	BDL	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	15.6	23.6	10.4	17.3
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	6.28	4.21	4.15
Lead (mg/l)	BDL	BDL	BDL	BDL
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	19.5	46.1	39.8	46.1
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	BDL	BDL
TDS (mg/l)	242	236	204	194
TOC (mg/l)	6.00	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - Not analyzed or sampled for this parameter.

**TABLE 4 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING**

Shallow Monitoring Well: LR11-4 Total Well Depth: 22.50 ft HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	25.47	27.74	-	-
Conductivity (umho/cm)	380	340	310	300
pH (S.U.)	6.30	6.30	6.03	6.37
DO (mg/l)	0.0	0.7	1.4	36.0
Turbidity (NTU)	7.30	3.30	-	0.06
Temperature (C)	24.0	24.6	25.6	28.7
Color/Sheen (C.U.)	-	clear	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.07	0.08
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	BDL	BDL	BDL	0.004
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	15.20	23.70	5.88	10.20
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	4.27	3.26	2.96
Lead (mg/l)	BDL	BDL	BDL	BDL
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	10.30	9.97	9.98	8.64
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	BDL	BDL
TDS (mg/l)	241 275	237	150	252
TOC (mg/l)	24.90	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - Not analyzed or sampled for this parameter.

**TABLE 5 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING**

Shallow Monitoring Well: LR11-5 Total Well Depth: 22.78 ft HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	29.95	30.60	32.94	32.28
Conductivity (umho/cm)	190	275	260	260
pH (S.U.)	-	5.90	5.99	5.74
DO (mg/l)	0.5	1.8	1.9	2.2
Turbidity (NTU)	1.20	2.10	-	0.36
Temperature (C)	25.0	23.4	26.5	26.6
Color/Sheen (C.U.)	-	clear	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.27	0.27
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	BDL	BDL	BDL	0.004
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	16.2	17.7	12.6	18.3
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	5.02	4.45	5.17
Lead (mg/l)	BDL	BDL	BDL	0.004
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	-	BDL	BDL
Sodium (mg/l)	8.34	10.90	9.89	8.99
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	-	BDL	BDL
Zinc (mg/l)	BDL	0.035	BDL	BDL
TDS (mg/l)	169 246	209	124	256
TOC (mg/l)	13.20	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.55	1.56(1)

1 - All EPA 8260 parameters below detection limits except for concentration listed

Trichloromethane

BDL - Below Laboratory Detection Limit (variable by 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	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	28.68	32.51	35.42	35.29
Conductivity (umho/cm)	240	140	165	170
pH (S.U.)	-	5.00	5.42	4.99
DO (mg/l)	0.9	1.9	0.3	0.3
Turbidity (NTU)	4.30	4.70	-	3.29
Temperature (C)	24.5	24.7	27.7	29.2
Color/Sheen (C.U.)	-	clear, gold	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	1.20	1.29
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	0.012	0.013
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	49.70	5.50	5.13	11.50
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	4.87	4.56	4.13
Lead (mg/l)	-	BDL	BDL	-
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	17.0	9.0	6.5	5.1
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	0.018	0.008	BDL
TDS (mg/l)	152-157	129	120	138
TOC (mg/l)	8.20	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by 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 HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	33.40	34.61	35.12	35.88
Conductivity (umho/cm)	185	198	220	270
pH (S.U.)	-	4.90	5.16	5.49
DO (mg/l)	0.5	N/A	0.6	0.7
Turbidity (NTU)	1.20	1.70	-	2.09
Temperature (C)	24.0	24.5	27.3	29.1
Color/Sheen (C.U.)	-	clear	-	clear

**LABROATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.29	0.30
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	28.7	21.2	12.7	37.9
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	3.61	3.35	4.00
Lead (mg/l)	-	0.001	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	0.004
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	45.6	23.1	20.7	22.4
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	0.014	0.018	BDL
TDS (mg/l)	217	161	288	216
TOC (mg/l)	18.60	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.09 (1)	BDL

1 - All EPA 8260 parameters below detection limits except for concentration listed

Trichloromethane

BDL - Below Laboratory Detection Limit (variable by 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	1994/1995			
	SAMPLING EVENT			
	HALF-YEAR	H1-94	H2-94	H1-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	29.53	32.95	-	-
Conductivity (umho/cm)	1025	405	290	310
pH (S.U.)	-	5.40	5.52	5.10
DO (mg/l)	0.3	1.5	2.5	0.6
Turbidity (NTU)	7.50	3.80	-	1.47
Temperature (C)	22.5	23.0	25.8	26.0
Color/Sheen (C.U.)	-	clear	-	yellow

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.09	0.14
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	0.002	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	100.0	-	72.6	91.2
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	9.33	6.75	6.98
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	BDL	0.0004	BDL	BDL
Nitrate (as N mg/l)	<0.01	-	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	52.7	61.6	45.7	51.0
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	0.026	0.020	BDL
TDS (mg/l)	380	-	246	368
TOC (mg/l)	10.20	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by 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 HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	33.40	-	33.29	32.74
Conductivity (umho/cm)	380	295	190	220
pH (S.U.)	-	6.30	6.27	6.28
DO (mg/l)	0.1	1.1	2.0	1.2
Turbidity (NTU)	27.20	25.50	-	1.00
Temperature (C)	24.0	24.5	26.5	28.2
Color/Sheen (C.U.)	-	cloudy, yellow	-	y/w/c/dy

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	4.01	3.60
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	27.7	19.7	15.3	18.7
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	2.95	1.87	2.46
Lead (mg/l)	-	BDL	0.002	0.003
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	23.9	22.2	14.9	12.5
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	0.026	0.017	BDL
TDS (mg/l)	248	213	88	186
TOC (mg/l)	28.00	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	See note (1)

1 - All EPA 8260 parameters below detection limits except for

0.14 ug/l Trichloromethane and 0.37 ug/l Benzene

BDL - Below Laboratory Detection Limit (variable by 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	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	32.74	33.32	36.08	35.55
Conductivity (umho/cm)	180	128	90	130
pH (S.U.)	-	5.50	5.66	5.19
DO (mg/l)	0.0	1.5	1.9	1.7
Turbidity (NTU)	12.10	28.60	-	3.02
Temperature (C)	24.0	24.5	26.9	26.7
Color/Sheen (C.U.)	-	cloudy, yellow	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.16	0.16
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	0.01	BDL	0.003
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	14.00	7.50	1.09	14.30
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	5.42	4.53	6.33
Lead (mg/l)	-	BDL	0.001	-
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	145.0	10.9	6.33	8.37
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	0.022	0.013	BDL
TDS (mg/l)	142	138	16	188
TOC (mg/l)	16.20	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.58 (1)	3.73 (1)

1 - All EPA 8260 parameters below detection limits except for concentration listed

Trichloromethane

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - Not analyzed or sampled for this parameter.

**TABLE 11 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING**

<b>Shallow Monitoring Well: CW-4</b> <b>Total Well Depth: 17.91 ft</b> <b>HALF-YEAR</b>	<b>1994/1995</b> <b>SAMPLING EVENT</b>			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	30.96	-	35.29	34.93
Conductivity (umho/cm)	1220	-	850	1100
pH (S.U.)	-	-	6.50	6.41
DO (mg/l)	0.9	-	1.1	1.7
Turbidity (NTU)	2.61	-	-	2.20
Temperature (C)	22.0	-	26.0	26.7
Color/Sheen (C.U.)	-	-	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.19	0.23
Antimony (mg/l)	BDL	-	-	BDL
Arsenic (mg/l)	-	-	0.027	0.030
Barium (mg/l)	BDL	-	0.18	BDL
Beryllium (mg/l)	BDL	-	BDL	BDL
Cadmium (mg/l)	BDL	-	BDL	BDL
Chlorides (mg/l)	167	-	191	214
Chromium (mg/l)	BDL	-	BDL	BDL
Cobalt (mg/l)	BDL	-	BDL	BDL
Copper (mg/l)	BDL	-	BDL	BDL
Iron (mg/l)	-	-	5.00	6.25
Lead (mg/l)	-	-	BDL	-
Mercury (mg/l)	BDL	-	BDL	BDL
Nitrate (as N mg/l)	<0.01	-	BDL	BDL
Nickel (mg/l)	BDL	-	BDL	BDL
Selenium (mg/l)	BDL	-	BDL	BDL
Silver (mg/l)	-	-	BDL	BDL
Sodium (mg/l)	51.4	-	53.1	57.7
Thallium (mg/l)	BDL	-	BDL	BDL
Vanadium (mg/l)	-	-	BDL	BDL
Zinc (mg/l)	BDL	-	BDL	0.020
TDS (mg/l)	1010	-	410	1150
TOC (mg/l)	16.90	-	-	-
EPA 8260 (ug/l)	BDL	-	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by 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 HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	-	-	38.58	39.01
Conductivity (umho/cm)	-	-	340	430
pH (S.U.)	-	5.91	6.18	6.32
DO (mg/l)	-	-	6.2	1.5
Turbidity (NTU)	-	-	-	2.80
Temperature (C)	-	-	26.3	28.1
Color/Sheen (C.U.)	-	-	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	0.01	0.16	0.47
Antimony (mg/l)	-	BDL	BDL	BDL
Arsenic (mg/l)	-	0.007	BDL	0.005
Barium (mg/l)	-	BDL	BDL	BDL
Beryllium (mg/l)	-	BDL	BDL	BDL
Cadmium (mg/l)	-	BDL	BDL	BDL
Chlorides (mg/l)	-	-	29.3	51.6
Chromium (mg/l)	-	BDL	BDL	BDL
Cobalt (mg/l)	-	-	BDL	BDL
Copper (mg/l)	-	0.06	BDL	BDL
Iron (mg/l)	-	9.37	0.64	2.19
Lead (mg/l)	-	0.002	BDL	0.002
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	-	BDL	BDL	BDL
Nickel (mg/l)	-	BDL	BDL	BDL
Selenium (mg/l)	-	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	-	34.0	23.4	25.9
Thallium (mg/l)	-	BDL	BDL	BDL
Vanadium (mg/l)	-	-	BDL	BDL
Zinc (mg/l)	-	-	0.013	0.002
TDS (mg/l)	-	-	248	398
TOC (mg/l)	-	-	BDL	-
EPA 8260 (ug/l)	-	-	0.35 (1)	3.73 (1)

1 - All EPA 8260 parameters below detection limits except for concentration listed

Trichloromethane

BDL - Below Laboratory Detection Limit (variable by 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	1994/1995			
	SAMPLING EVENT			
	HALF-YEAR	H1-94	H2-94	H1-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	25.66	26.69	28.64	26.75
Conductivity (umho/cm)	900	405	230	700
pH (S.U.)	6.80	6.50	6.30	6.30
DO (mg/l)	0.0	1.1	0.9	4.1
Turbidity (NTU)	8.00	4.50		2.10
Temperature (C)	22.0	19.5	26.2	26.7
Color/Sheen (C.U.)	-	cloudy		clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	2.43	17.10
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	0.022	0.01	0.020
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	125.00	22.70	1.43	22.10
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	51.5	2.2	29.7
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	53.7	51.1	13.1	32.4
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	0.653	0.413
TDS (mg/l)	653	332	132	457
TOC (mg/l)	17.70	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	See note (1)

1 - All EPA 8260 parameters below detection limits except for 0.52 ug/l 1,4 Dichlorobenzene, 0.05 ug/l 1,2 Dichlorobenzene, 0.21 ug/l Benzene and 2.44 ug/l Chlorobenzene.

BDL - Below Laboratory Detection Limit (variable by 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	1994/1995 SAMPLING EVENT			
	HALF-YEAR	H1-94	H2-94	H1-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	33.39	33.24	34.19	32.61
Conductivity (umho/cm)	455	390	380	400
pH (S.U.)	6.30	6.00	6.27	6.14
DO (mg/l)	0.0	1.8	0.8	0.8
Turbidity (NTU)	7.20	1.40	-	1.15
Temperature (C)	24.3	24.5	26.5	26.0
Color/Sheen (C.U.)	-	clear	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.33	0.26
Antimony (mg/l)	BDL	BDL	BDL	0.055
Arsenic (mg/l)	BDL	0.048	0.052	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	40.4	29.9	19.1	33.7
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	36.7	26.8	28.5
Lead (mg/l)	BDL	BDL	BDL	BDL
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	22.2	24.0	19.7	20.1
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	0.060	BDL	BDL
TDS (mg/l)	311	296	260	288
TOC (mg/l)	14.70	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.68 (1)	0.49 (2)

1 - All EPA 8260 parameters below detection limits except for concentration listed Trichloromethane.

2 - All EPA 8260 parameters below detection limits except for concentration listed Dichlorobenzene.

BDL - Below Laboratory Detection Limit (variable by 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	1994/1995 SAMPLING EVENT			
	HALF-YEAR	H1-94	H2-94	H1-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	28.71	30.88	31.97	30.10
Conductivity (umho/cm)	475	375	360	400
pH (S.U.)	6.60	6.10	6.40	6.19
DO (mg/l)	1.3	1.0	1.3	2.0
Turbidity (NTU)	173.0	2.9	-	0.3
Temperature (C)	23.0	23.4	27.6	26.2
Color/Sheen (C.U.)	-	clear	-	clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.21	0.18
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	0.004	0.005
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	19.8	24.0	24.9	24.2
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	8.71	6.62	6.17
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	20.3	20.3	18.5	18.8
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	BDL	BDL	BDL	BDL
Zinc (mg/l)	-	BDL	BDL	BDL
TDS (mg/l)	290	284	250	268
TOC (mg/l)	8.30	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.55 (1)	See note (2)

1 - All EPA 8260 parameters below detection limits except for concentration listed

Trichloromethane

2 - All EPA 8260 parameters below detection limits except for 0.32 ug/l 1,4 Dichlorobenzene, and 0.85 ug/l Trichloromethane.

BDL - Below Laboratory Detection Limit (variable by 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 HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	27.58	28.23	29.21	27.56
Conductivity (umho/cm)	410	365	330	300
pH (S.U.)	8.3	6.4	6.45	6.31
DO (mg/l)	0.6	1.3	0.9	2.3
Turbidity (NTU)	0.3	0.7	-	0.65
Temperature (C)	23.5	23.5	26.8	24.6
Color/Sheen (C.U.)	-	Cloudy	-	Clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.18	0.14
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	0.009	0.008	0.011
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	27.5	24.5	24.7	23.2
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	15.8	11.7	12.1
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	20.3	19.9	18.2	18.9
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	BDL	BDL
TDS (mg/l)	275	215	296	246
TOC (mg/l)	10.6	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.44 (1)	See note (2)

1 - All EPA 8260 parameters below detection limits except for concentration listed

Trichloromethane

2 - All EPA 8260 parameters below detection limits except for 0.32 ug/l 1,4 Dichlorobenzene, and 0.85 ug/l Trichloromethane.

BDL - Below Laboratory Detection Limit (variable by 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 HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	28.18	28.45	29.8	29.78
Conductivity (umho/cm)	255	380	192	160
pH (S.U.)	-	6.3	5.73	5.89
DO (mg/l)	0.3	1.7	0.4	2.1
Turbidity (NTU)	> 200	3.4	-	4.29
Temperature (C)	25	25.6	28.4	30.3
Color/Sheen (C.U.)	-	Clear/Yellow	-	Yellow

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	1.78	1.43
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	BDL	0.004
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	12.1	17.5	14.5	11.1
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	3.71	1.85	1.36
Lead (mg/l)	-	0.002	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	< 0.01	< 0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	13.4	15.6	18.9	11.3
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	0.018	BDL	BDL
TDS (mg/l)	204	275	296	180
TOC (mg/l)	38.5	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	0.85 (1)

1 - All EPA 8260 parameters below detection limits except for concentration listed Trichloromethane.

BDL - Below Laboratory Detection Limit (variable by 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	1994/1995			
	SAMPLING EVENT			
	HALF-YEAR	H1-94	H2-94	H1-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	30.62	31.27	32.66	32.21
Conductivity (umho/cm)	185	330	230	200
pH (S.U.)	-	5.3	5.76	5.83
DO (mg/l)	0.5	1.2	0.1	4.8
Turbidity (NTU)	0.6	11.9	-	0.98
Temperature (C)	25.0	25.5	27.9	29.6
Color/Sheen (C.U.)	-	Clear/gold	-	Yellow

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	1.01	0.81
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	0.002	BDL	0.004
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	24.2	18.3	11.2	21.4
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	3.88	2.04	1.81
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	8.25	12.0	6.83	5.79
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	0.028	BDL	BDL
TDS (mg/l)	219	274	184	190
TOC (mg/l)	11.8	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by 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 HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	28.10	30.98	-	-
Conductivity (umho/cm)	205	165	200	180
pH (S.U.)	7.6	5.4	5.23	5.67
DO (mg/l)	0.6	1.2	0.8	2.3
Turbidity (NTU)	3.9	4.1	-	0.3
Temperature (C)	23.3	23.0	24.2	25.1
Color/Sheen (C.U.)	-	Clear	-	Clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.23	0.24
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	BDL	BDL	BDL	0.006
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	21.8	17.3	14.0	17.2
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	8.25	6.73	7.25
Lead (mg/l)	-	BDL	BDL	0.006
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	0.07	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	20.4	16.9	21.2	17.4
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	BDL	BDL	BDL	BDL
Zinc (mg/l)	-	0.029	BDL	BDL
TDS (mg/l)	170	176	114	188
TOC (mg/l)	18.4	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by 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 HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	21.70	21.50	-	-
Conductivity (umho/cm)	625	575	430	500
pH (S.U.)	7.6	7.5	7.21	7.03
DO (mg/l)	0.0	1.2	1.0	1.6
Turbidity (NTU)	0.4	0.6	-	0.13
Temperature (C)	99.9	23.9	24.1	24.7
Color/Sheen (C.U.)	-	Clear/gold	-	Clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.28	0.27
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	BDL	BDL	BDL	0.004
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	99.9	93.3	87.8	102
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	0.04	0.03	BDL
Lead (mg/l)	-	BDL	BDL	0.006
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	0.07	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	61.3	54.7	53.4	61.6
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	BDL	BDL	BDL	BDL
Zinc (mg/l)	-	BDL	BDL	BDL
TDS (mg/l)	411	431	370	420
TOC (mg/l)	6.8	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - Not analyzed or sampled for this parameter.

**TABLE 21 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING**

Deep Monitoring Well: SA-2 Total Well Depth: 154.93 ft HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	33.39	-	-	-
Conductivity (umho/cm)	475	400	370	300
pH (S.U.)	7.4	7.0	7.05	7.07
DO (mg/l)	0.0	0.9	0.4	0.3
Turbidity (NTU)	2.8	7.2	-	2.1
Temperature (C)	24.6	24.9	25.0	24.1
Color/Sheen (C.U.)	-	Cloudy/gold	-	Cloudy

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.3	0.31
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	BDL	BDL	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	35.3	41.3	13.7	34.9
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	0.63	0.14	0.22
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	28.0	22.6	27.6	30.5
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	BDL	BDL
TDS (mg/l)	353	278	324	280
TOC (mg/l)	18.4	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.51 (1)	BDL

1 - All EPA 8260 parameters below detection limits except for concentration listed Trichloromethane.

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - Not analyzed or sampled for this parameter.



**TABLE 22 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING**

<b>Deep Monitoring Well: SA-3</b> <b>Total Well Depth: 163.02 ft</b> <b>HALF-YEAR</b>	<b>1994/1995</b> <b>SAMPLING EVENT</b>			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	13.02	19.52	-	-
Conductivity (umho/cm)	600	470	400	400
pH (S.U.)	8.7	7.3	6.92	7.21
DO (mg/l)	0.8	1.5	0.6	0.1
Turbidity (NTU)	7.3	2.4	-	11.5
Temperature (C)	24.0	24.4	24.9	23.7
Color/Sheen (C.U.)	-	Clear/gold	-	Clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.23	0.27
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	44.7	26.9	33.1	27.9
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	1.57	0.59	2.38
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	35.9	23.3	31.8	26.7
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	BDL	BDL
TDS (mg/l)	447	384	288	374
TOC (mg/l)	19.4	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.34 (1)	0.03 (1)

1 - All EPA 8260 parameters below detection limits except for concentration listed Trichloromethane.

BDL - Below Laboratory Detection Limit (variable by 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 HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	14.18	20.38	-	-
Conductivity (umho/cm)	650	455	340	600
pH (S.U.)	7.5	7.3	7.1	6.98
DO (mg/l)	1.7	1.3	0.3	1.4
Turbidity (NTU)	0.2	0.6	-	0.65
Temperature (C)	23.5	23.8	23.3	24.3
Color/Sheen (C.U.)	-	Clear	-	Clear

**LABORATORY PARMETERS**

Total Ammonia as N (mg/l)	-	-	0.27	0.25
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	BDL	0.004
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	58.1	59.7	54.2	66.9
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	0.11	BDL	0.04
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	14.3	59.5	56.9	61.4
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	0.009	BDL
TDS (mg/l)	440	409	324	464
TOC (mg/l)	14.8	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by 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	1994/1995			
	SAMPLING EVENT			
	HALF-YEAR	H1-94	H2-94	H1-95

**FIELD PARMETERS**

NDVD - Static Water Level (ft)	15.12	22.02	-	-
Conductivity (umho/cm)	600	550	420	400
pH (S.U.)	7.5	7.4	7.18	8.36
DO (mg/l)	1.1	0.6	0.5	3.5
Turbidity (NTU)	0.3	0.3	-	0.1
Temperature (C)	22.8	23.7	24.8	24.6
Color/Sheen (C.U.)	-	Clear/gold	-	Clear

**LABORATORY PARMETERS**

Total Ammonia as N (mg/l)	-	-	0.26	0.32
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	BDL	BDL	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	71.7	68.0	59.1	66.4
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	BDL	0.05	0.14
Lead (mg/l)	BDL	BDL	BDL	BDL
Mercury (mg/l)	-	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	53.2	49.5	50.3	52.3
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	BDL	BDL
TDS (mg/l)	444	371	316	340
TOC (mg/l)	8.1	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.55 (1)	0.72 (2)

1 - All EPA 8260 parameters below detection limits except for concentration listed Trichloromethane.

2 - All EPA 8260 parameters below detection limits except for concentration listed 1,4 - Dichlorobenzene.

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - 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	1994/1995 SAMPLING EVENT			
	HALF-YEAR	H1-94	H2-94	H1-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	14.54	22.84	-	-
Conductivity (umho/cm)	750	625	650	700
pH (S.U.)	-	7.3	7.11	6.93
DO (mg/l)	-	1.8	0.9	0.7
Turbidity (NTU)	32.0	0.2	-	2.09
Temperature (C)	24.0	23.5	25.5	25.9
Color/Sheen (C.U.)	-	Clear/gold	-	Clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.28	0.25
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	39.7	49.1	50	53.6
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	0.06	BDL	BDL
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	35.5	35.1	43.3	45.0
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	BDL	BDL
TDS (mg/l)	397	558	256	582
TOC (mg/l)	-	-	-	-
EPA 8260 (ug/l)	BDL	BDL	0.63 (1)	BDL

1 - All EPA 8260 parameters below detection limits except for concentration listed Trichloromethane.

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - Not analyzed or sampled for this parameter.

**TABLE 26 LENA ROAD LANDFILL SEMI-ANNUAL GROUNDWATER SAMPLING**

<b>Deep Monitoring Well: SA-7</b> <b>Total Well Depth: 152.97 ft</b> <b>HALF-YEAR</b>	<b>1994/1995</b> <b>SAMPLING EVENT</b>			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARMETERS**

NGVD - Static Water Level (ft)	10.07	19.71	-	-
Conductivity (umho/cm)	420	370	340	320
pH (S.U.)	7.7	7.6	7.2	8.28
DO (mg/l)	1.4	1.1	0.2	1.2
Turbidity (NTU)	0.3	1.1	-	0.1
Temperature (C)	24.0	24.7	24.0	26.5
Color/Sheen (C.U.)	-	Clear/yellow	-	Clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.21	0.29
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	-	BDL	BDL	BDL
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	56.9	53.8	45.5	54.7
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	0.05	BDL	0.04
Lead (mg/l)	-	BDL	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	35.5	37.6	38.1	39.2
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	BDL	BDL
TDS (mg/l)	313	290	296	245
TOC (mg/l)	9.8	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	1.04 (1)

1 - All EPA 8260 parameters below detection limits except for concentration listed

1,4 - Dichlorobenzene.

BDL - Below Laboratory Detection Limit (variable by 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 HALF-YEAR	1994/1995 SAMPLING EVENT			
	H1-94	H2-94	H1-95	H2-95

**FIELD PARAMETERS**

NGVD - Static Water Level (ft)	11.38	21.98	-	-
Conductivity (umho/cm)	430	1625	335	400
pH (S.U.)	7.9	11.7	7.73	7.26
DO (mg/l)	0	1.3	1.6	17.0
Turbidity (NTU)	0.7	2.8	-	0.43
Temperature (C)	23.0	25.3	24.6	27.2
Color/Sheen (C.U.)	-	Clear	-	Clear

**LABORATORY PARAMETERS**

Total Ammonia as N (mg/l)	-	-	0.22	0.2
Antimony (mg/l)	BDL	BDL	BDL	BDL
Arsenic (mg/l)	BDL	0.005	BDL	0.004
Barium (mg/l)	BDL	BDL	BDL	BDL
Beryllium (mg/l)	BDL	BDL	BDL	BDL
Cadmium (mg/l)	BDL	BDL	BDL	BDL
Chlorides (mg/l)	54.3	44.9	46.7	57.6
Chromium (mg/l)	BDL	BDL	BDL	BDL
Cobalt (mg/l)	BDL	BDL	BDL	BDL
Copper (mg/l)	BDL	BDL	BDL	BDL
Iron (mg/l)	-	0.03	BDL	BDL
Lead (mg/l)	BDL	BDL	BDL	BDL
Mercury (mg/l)	BDL	BDL	BDL	BDL
Nitrate (as N mg/l)	<0.01	<0.01	BDL	BDL
Nickel (mg/l)	BDL	BDL	BDL	BDL
Selenium (mg/l)	BDL	BDL	BDL	BDL
Silver (mg/l)	-	BDL	BDL	BDL
Sodium (mg/l)	42.0	36.1	39.3	40.5
Thallium (mg/l)	BDL	BDL	BDL	BDL
Vanadium (mg/l)	-	BDL	BDL	BDL
Zinc (mg/l)	BDL	BDL	0.011	BDL
TDS (mg/l)	320	429	242	324
TOC (mg/l)	4.6	-	-	-
EPA 8260 (ug/l)	BDL	BDL	BDL	BDL

BDL - Below Laboratory Detection Limit (variable by parameter).

"-" - Not analyzed or sampled for this parameter.

**APPENDIX D**

**SHALLOW MONITOR WELL DATA COMPARISON**

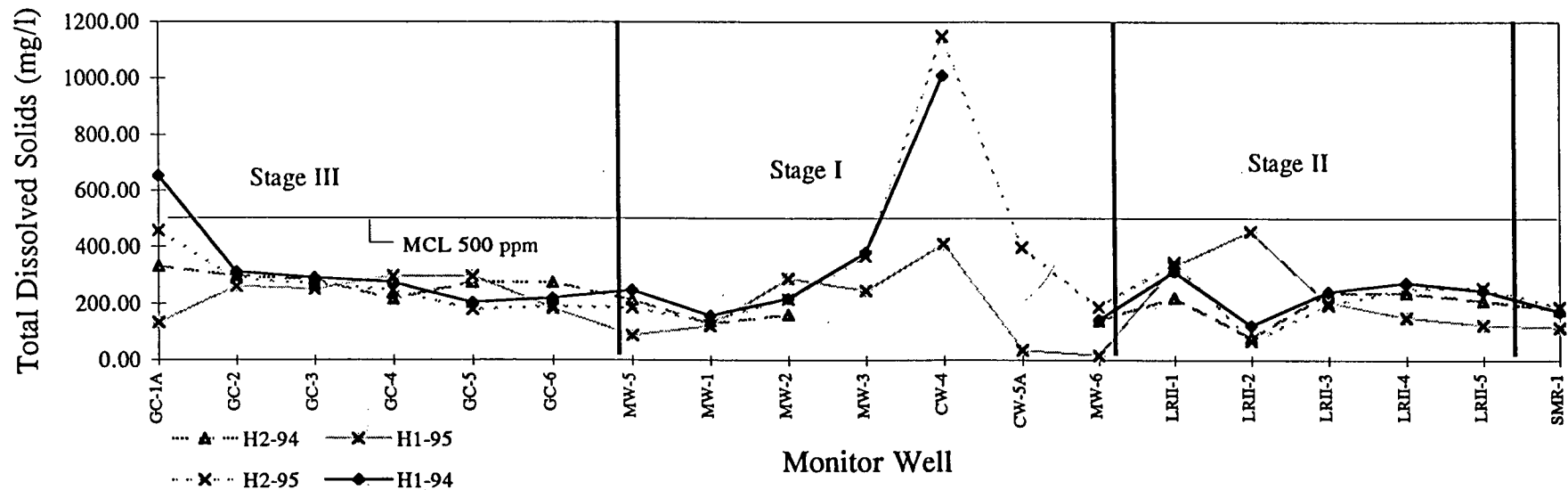
**TABLE and GRAPH 28 LENA ROAD LANDFILL GROUNDWATER PARAMETER TREND ANALYSIS**

*1994/1995 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
H1-94	653	311	290	275	204	219	248	157	217	380	1010	-	142	314	123	242	275	246	170
H2-94	332	296	284	215	275	274	213	129	161	-	-	-	138	219	79	236	237	209	176
H1-95	132	260	250	296	296	184	88	120	288	246	410.0	35	16	332	456	204	150	124	114
H2-95	457	288	268	246	180	190	186	138	216	368	1150	398	188	346	68	194	252	256	188

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





# TABLE and GRAPH 29 LENA ROAD LANDFILL GROUNDWATER PARAMETER TREND ANALYSIS

1994/1995 Semi-Annual Sampling Results Grouped by Landfill Stage

Location: Shallow Monitor Wells

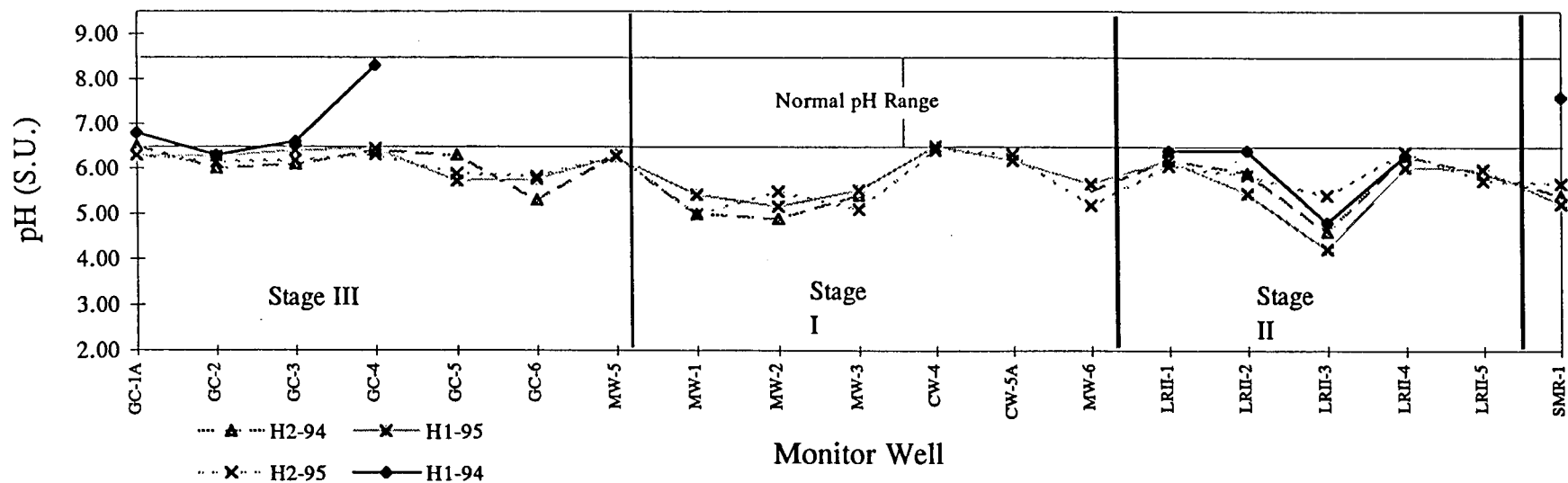
Depth: 10 - 25 feet

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
H1-94	6.8	6.3	6.6	8.3	-	-	-	-	-	-	-	-	-	6.4	6.4	4.8	6.3	-	7.6
H2-94	6.5	6.0	6.1	6.4	6.3	5.3	6.3	5.0	4.9	5.4	-	-	5.5	6.2	5.9	4.6	6.3	5.9	5.4
H1-95	6.3	6.27	6.4	6.45	5.73	5.76	6.27	5.42	5.16	5.52	6.5	6.18	5.66	6.19	5.45	4.22	6.03	5.99	5.23
H2-95	6.3	6.14	6.19	6.31	5.89	5.83	6.28	4.99	5.5	5.1	6.41	6.32	5.19	6.05	5.85	5.4	6.37	5.74	5.67

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**

*1994/1995 Semi-Annual Sampling Results Grouped by Landfill Stage*

Location: Shallow Monitor Wells

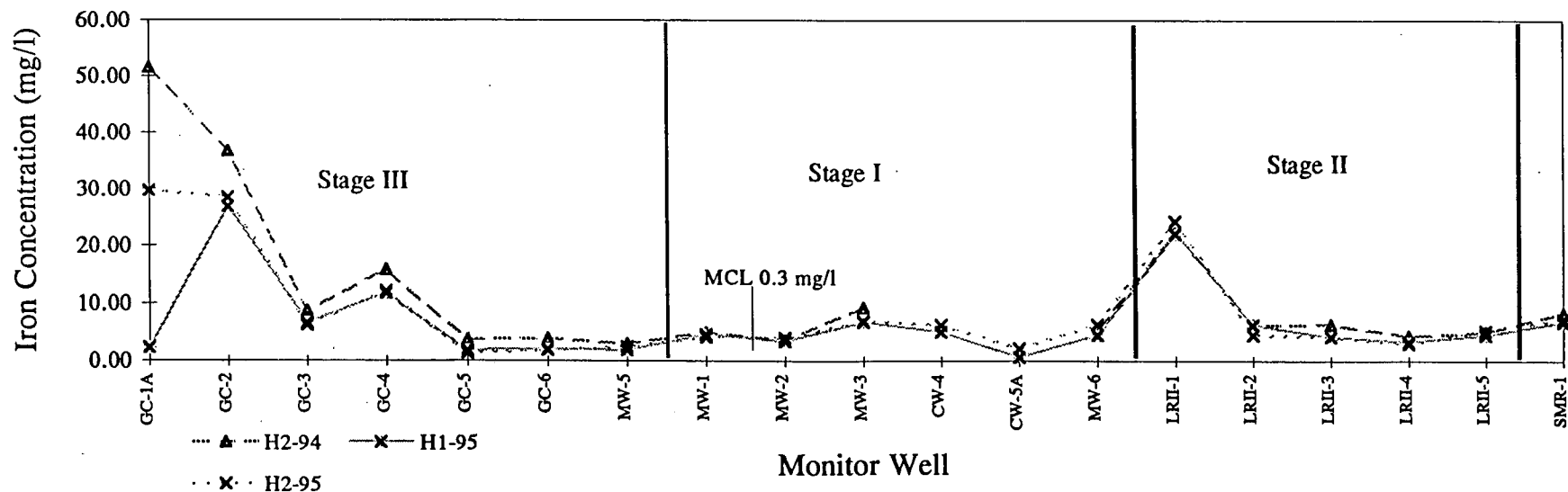
Depth: 10 - 25 feet

Parameter: Iron

Units: mg/l

SAMPLING EVENT	STAGE III							STAGE I						STAGE II					(I)
	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
H1-94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H2-94	51.5	36.7	8.71	15.8	3.71	3.88	2.95	4.9	3.61	9.33	-	9.37	5.42	22.2	6.18	6.28	4.27	5.02	8.25
H1-95	2.2	26.8	6.62	11.7	1.85	2.04	1.87	4.56	3.35	6.75	5.0	0.64	4.53	22	6.18	4.21	3.26	4.45	6.73
H2-95	29.7	28.5	6.17	12.1	1.36	1.81	2.46	4.13	4.0	6.98	6.25	2.19	6.33	24.3	4.49	4.15	2.96	5.17	7.25

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



**APPENDIX E**

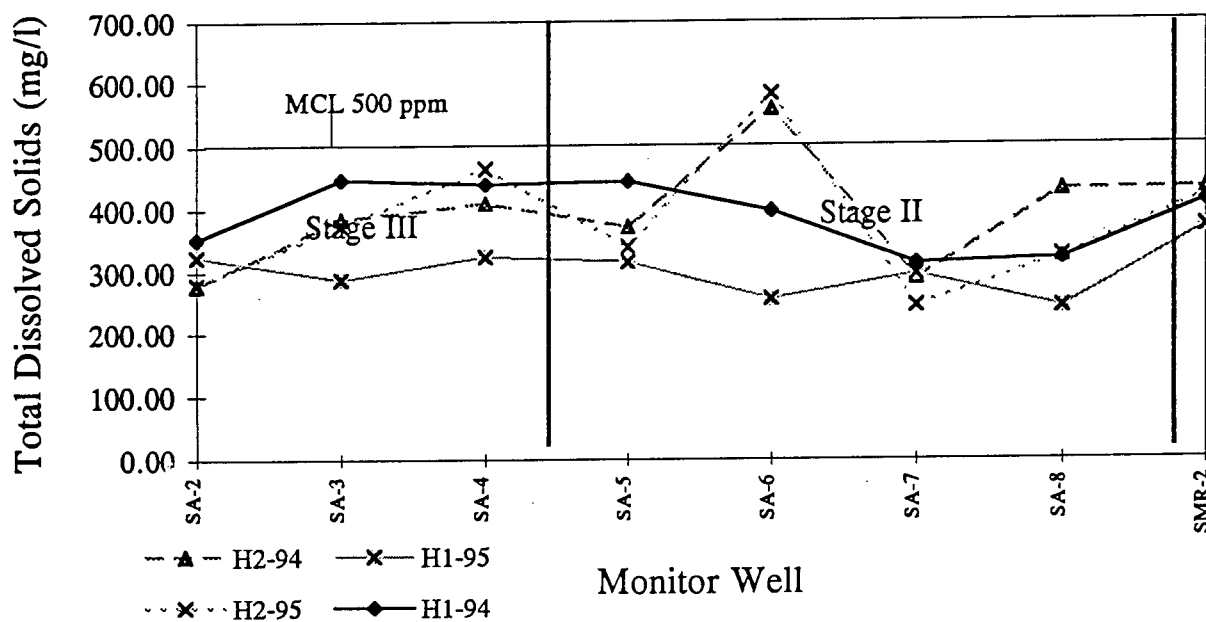
**DEEP MONITOR WELL DATA COMPARISON**

**TABLE and GRAPH 31 LENA ROAD LANDFILL GROUNDWATER  
PARAMETER TREND ANALYSIS**  
*1994/1995 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
H1-94	353	447	440	444	397	313	320	411
H2-94	278	384	409	371	558	290	429	431
H1-95	324	288	324	316	256	296	242	370
H2-95	280	374	464	340	582	245	324	420

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

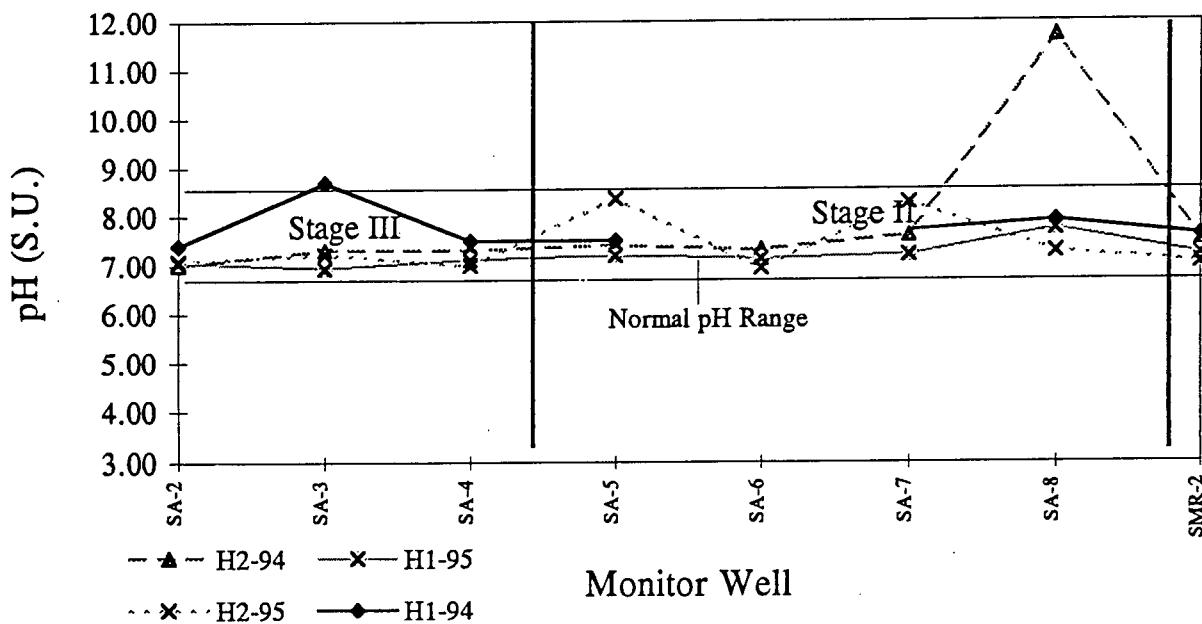


**TABLE and GRAPH 32 LENA ROAD LANDFILL GROUNDWATER  
PARAMETER TREND ANALYSIS**  
*1994/1995 Semi-Annual Sampling Results  
Grouped Relative to Landfill Stages*

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

SAMPLING EVENT	STAGE III			STAGE II				(1) SMR-2
	SA-2	SA-3	SA-4	SA-5	SA-6	SA-7	SA-8	
H1-94	7.4	8.7	7.5	7.5	-	7.7	7.9	7.6
H2-94	7.0	7.3	7.3	7.4	7.3	7.6	11.7	7.5
H1-95	7.05	6.92	7.1	7.18	7.11	7.2	8	7.21
H2-95	7.07	7.21	6.98	8.36	6.93	8.28	7.26	7.03

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

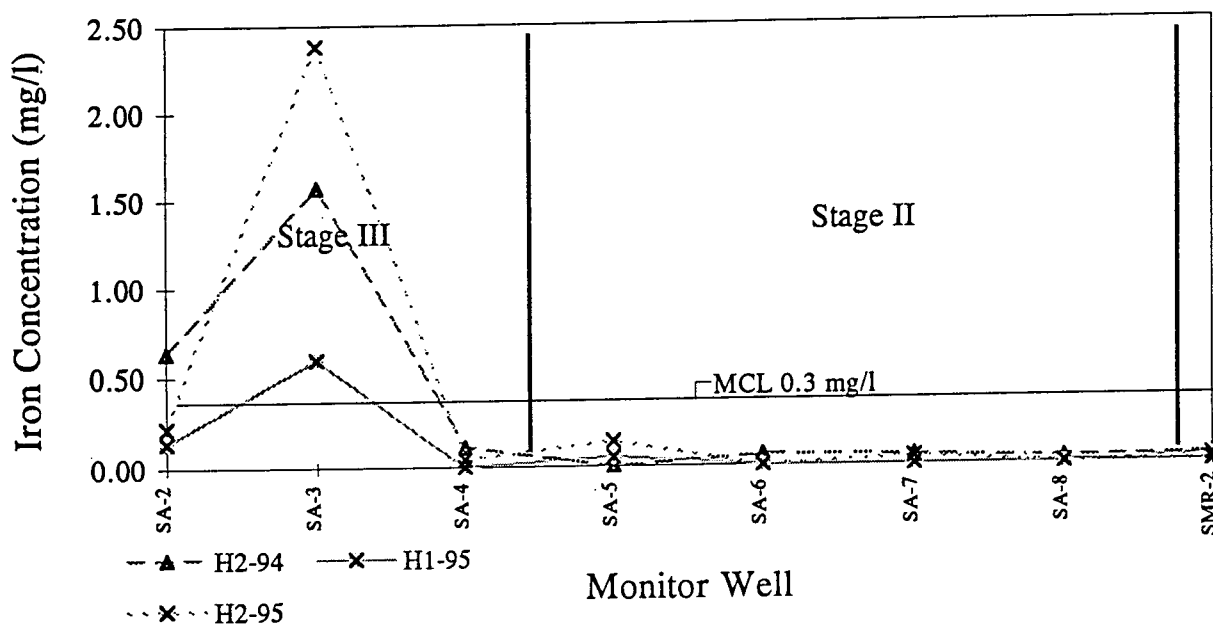


**TABLE and GRAPH 33 LENA ROAD LANDFILL GROUNDWATER  
PARAMETER TREND ANALYSIS**  
*1994/1995 Semi-Annual Sampling Results  
Grouped Relative to Landfill Stages*

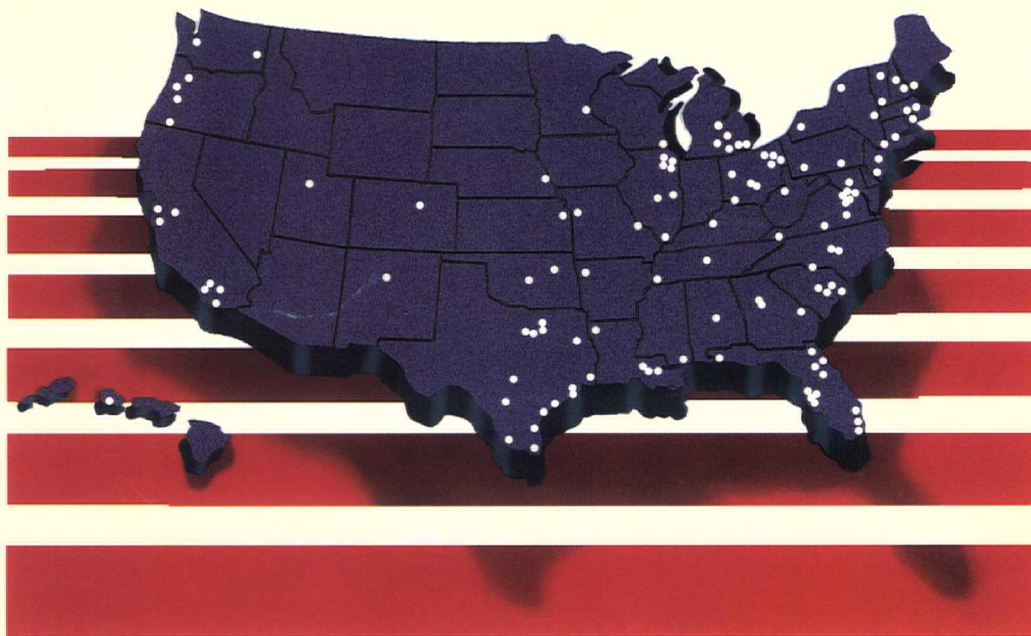
Location: Deep Monitor Wells  
Depth: 143 - 163 feet  
Parameter: Iron  
Units: mg/l

SAMPLING EVENT	STAGE III			STAGE II				(1)
	SA-2	SA-3	SA-4	SA-5	SA-6	SA-7	SA-8	SMR-2
H1-94	-	-	-	-	-	-	-	-
H2-94	0.6	1.6	0.11	0.00	0.06	0.05	0.03	0.04
H1-95	0.14	0.59	0.00	0.05	0.00	0.00	0.00	0.03
H2-95	0.22	2.38	0.04	0.14	0.00	0.04	0.00	0.00

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



Providing information to build on from offices nationwide



**psi** **Environmental  
Geotechnical  
Construction**  
*Consulting • Engineering • Testing*

**1-800-548-7901**

Construction Testing and Quality Control • Dedicated Project Testing and Inspection • Materials Testing and Certification  
Nondestructive Examination and Testing • Roof and Pavement Consulting • Geotechnical Engineering and Drilling Services  
Environmental and Asbestos Consulting • Analytical Services • Training Programs