BOARD OF COUNTY COMMISSIONERS

PINELLAS COUNTY, FLORIDA

DEPARTMENT OF SOLID WASTE MANAGEMENT

2800 110TH AVENUE NORTH
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February 28, 1994

Mr. Douglas Outlaw
Florida Department of
Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Your February 25, 1994 letter to Pinellas County requesting waste-to-energy operating data

Dear Mr. Outlaw:

In accordance with our telephone conversation of this date, we respond to your letter as follows:

a. ESP Design Inlet Temperature is 450° F.

b. ESP Inlet Temperatures average approximately 557° F.

c. Dioxin/Furan Stack Test Data has already been provided Florida DEP and EPA Region IV. Per our telephone conversation, you will attempt to locate this data from either the files of DEP or EPA Region IV, Atlanta. To confirm the specifics of our conversation, this stack test data is described as:

Volume I
Stationary Source Sampling Report
EEI Ref. No. 5286-B
Signal Resco
Pinellas County Resource Recovery Facility
St. Petersburg, Florida

CARB/DER Emissions Testing
Unit 3 Precipitator Inlets and Stack

February and March of 1987.

We trust the above complies with your requirements. If you have questions or require additional information, please contact this office.

Sincerely,

Bob Van Deman

Bob Van Deman, P.E., Director
Solid Waste Management

BVD/rvt

cc: Bill Thomas, DEP
Scott Davis, EPA/Region IV
George Woodward, WES

Florida Department of
Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Lawton Chiles
Governor

Virginia B. Wetherell
Secretary

February 25, 1994

Mr. R. E. Van Deman
Department of Solid Waste
Pinellas County
2800 110th Ave., North
St. Petersburg, FL 33716

Dear Mr. Van Deman:

The Pinellas County Resource Recovery Facility (RRF) is on a priority list from EPA's Office of Air Quality Standards, Emissions Standards Division, for obtaining specific operating information. For the Pinellas County RRF, the following information for each unit, if available, is needed:

a. ESP Design Inlet Temperature

b. ESP Inlet Temperature Operating Data

c. Dioxin/Furan Test Data

Your response must be submitted in writing and is needed by Tuesday, March 1, 1994. The Division of Air Resource Management FAX number is 904/922-6979.

If you have any questions, please call Doug Outlaw or Preston Lewis at 904/488-1344. I have attached a copy of the letter from EPA/Region IV requesting the the Department to provide the ESP and dioxin/furan test data.

Sincerely,

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

attachment

cc: Bill Thomas, DEP/Tampa
Scott Davis, EPA/Region IV

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

FACSIMILE CORRESPONDENCE

DATE: FEB 24 1994

FROM: Scott Davis
Air Enforcement Branch

TO: Preston Lewis
Air Permitting Branch
Florida Department of
Environmental Protection

The following list of municipal waste combustor facilities are on a priority list from EPA's Office of Air Quality Standards, Emissions Standards Division, for obtaining specific operating information. For these sources, the following data is desired:

-ESP Design Inlet Temperature

-ESP Inlet Temperature Operating Data

-Dioxin/Furan Test Data

As a minimum, the information on ESP Inlet Temperatures (both Design and Operating Data) must be submitted in writing to EPA Region IV from these sources:

1. Hillsborough County Resource Recovery Facility (3 units)
2. Pinellas County Resource Recovery Facility (3 units)
3. Tampa municipal waste combustor (4 units)
4. Bay County Waste to Energy (2 units)

Further information will be relayed to you by telephone, and your questions and comments can be discussed at that time. Thank you for your assistance in this matter.

FAX TRANSMITTAL ▸ 1

Preston Lewis	Scott Davis
FLORIDA DEP	404-347-5014
904-922-6979	404-347-3059

GENERAL SERVICES ADMINISTRATION

GEOHYDROLOGIC INVESTIGATIONS AT THE RESOURCE RECOVERY FACILITY PINELLAS COUNTY

Prepared for:

PINELLAS COUNTY BOARD OF COUNTY COMMISSIONERS

HENNINGSON, DURHAM AND RICHARDSON
St. Petersburg, Florida

Prepared by:

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

February 1984

ESE No. 83-405-402

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1.0 INTRODUCTION

The Pinellas County Resource Recovery Facility (RRF) is a refuse-to-energy plant that burns several thousand tons of garbage a day, generating electricity for sale to the Florida Power Corporation (FPC). The RRF is located at an active landfill site where extensive hydrogeologic investigation was previously done by the United States Geological Survey (USGS) (see Section 2.1, Literature Review).

Environmental Science and Engineering, Inc. (ESE) was contracted by Pinellas County to initiate a surface and ground water monitoring plan in September 1983. The objective of the monitoring plan was to characterize the quality of the surface and ground water at the RRF site to the extent that the sources of any contamination present could be identified. The contamination assessment study was divided into phases, as described in Section 2.0.

2.0 PROJECT DESCRIPTION

2.1 PHASE I--LITERATURE REVIEW

USGS conducted an investigation of the Pinellas County landfill site from May 1975 to October 1977, to determine the effects of land disposal of solid waste on the quality of ground and surface water in a coastal area with a shallow, near-surface water table. The report covered the actual process of landfilling, installation of a water monitoring network, geology and hydrogeology of the site, horizontal and vertical ground water movement, and the effects of leachate on local water quality.

The USGS investigation consisted of initial establishment of a ground water monitoring network, which was used to obtain the lithologic samples to determine physical properties of the geologic units, to gather hydrologic data from which water table characteristics were determined, and water quality data to monitor the landfill operation. The monitor wells were completed using 2-inch polyvinyl chloride (PVC) casing to the depth of 5 to 31 feet (ft), with screen length ranging from 2.5 to 10 ft. Seven clusters, consisting of six wells 5 to 25 ft deep, were installed to determine the vertical migration of water in the surficial aquifer. Well placement provided thorough coverage of the site to determine background water quality and migration of the leachate material.

Analysis of well log data by USGS determined three major geohydrologic units underlying the landfill site:

1. A shallow aquifer composed of shell material and fine sands approximately 19 ft thick,
2. A confining bed composed of clay and marl about 35 ft thick, and
3. The upper section of the Floridan Aquifer composed of limestone about 200 ft thick.

The USGS report found elevations at the landfill site to range from 8 to 12 ft above mean sea level; average ground water levels in the surficial aquifer were from 5 to 8 ft above mean sea level depending on seasonal variations. Activity at the landfill site (such as dewatering of excavated trenches and elevated landfill mounds) had altered local ground water levels. Filled trenches and dewatering operations created a series of water table mounds and a cone of depression within the landfill boundaries.

USGS determined the general regional flow direction of ground water movement in the shallow aquifer to be toward the northeast with horizontal movement at about 1.2 feet per year (ft/yr). At this rate, USGS determined a period of 11,000 years would be needed for ground water to travel from the landfill into open water of Tampa Bay. With the rate of downward vertical migration through the confining bed at about 0.005 ft/yr, USGS figured a period of 3,000 to 7,000 years would be needed for ground water to flow through the entire confining bed into the Floridan Aquifer.

Ground water and surface water quality were defined by USGS using one physical property (specific conductance) and four chemical parameters (chloride, organic nitrogen, ammonia nitrogen, and chemical oxygen demand). USGS compared a well open to the Floridan Aquifer within the landfill site to uncontaminated background wells and determined that downward migration along the well annulus or through the confining bed has not occurred. Surface water analyzed was also found to be well within the range of background concentrations and unaltered by the landfill operation.

Analysis of ground water from the shallow aquifer wells showed peak values well above the established background. Data indicate leachate movement away from the major landfill site in the northern section of the property into the private landfill to the southeast. This movement corresponds to the water table contour map of the landfill, with flow

moving from the high elevation areas (filled trenches) into the low water table areas (borrow pit). USGS also stated that fluctuation in leachate concentration may indicate the possibility of intermittent release of leachate from the landfill and that trace metals in the shallow aquifer fall within the values found in background conditions. Trace metals are believed to be absorbed by clays in the sands as water moves through the surficial aquifer.

The overall conclusion reached by USGS was that the effect of the Pinellas County landfill on the quality of water in the surficial aquifer currently is confined to within the landfill or the immediate area. Based on the rate of lateral migration of ground water (approximately 1.2 ft/yr), the predicted effect of the landfill on the quality of ground water outside the immediate area is negligible.

USGS monitor wells installed in the 1975-77 study were all found to be unusable in the ESE ground water monitoring plan.

2.2 PHASE II--GEOPHYSICAL SURVEY

The second phase of the RRF site investigation was a geophysical electromagnetic (EM) survey using a Geonics EM-31 non-contact terrain conductivity meter. The purpose of this survey was to determine the existence and extent of any subsurface contaminant plume. Parallel transects, 25 ft apart, were run and EM readings were taken and recorded at 25-ft intervals along each transect.

The average ambient readings in the area were 30 to 35 millimhos/meter as measured in the field east of 28th Street North. Onsite conductivity was generally ambient or slightly higher over most of the area surveyed. Several areas did, however, show higher-than-background readings.

Readings south of the active landfill (Bridgeway II) fluctuated greatly and often were completely off scale. There was no trend in these data to indicate the presence of a plume, and a quick survey of the area with

a magnetometer revealed the presence of large amounts of buried ferrous metals. A line of higher readings was recorded on the north side of the road between Well Clusters 3 and 5. These readings were much higher than those recorded along the parallel transect, which was 25 ft closer to the landfill, ruling out a plume originating at the landfill. Instead, the readings were the result of a chain link fence which paralleled the road at the site. The readings dropped off sharply at the gate in the fence and at the ends of the fence. A culvert passes under the driveway which leads to the maintenance area of the plant office building, and a large culvert and chain link fence also parallel the road which runs north-south between Bridgeway I and the plant site. The highest readings in the survey were recorded on the north-south transect between 28th Street North and the aeration/oxidation ponds. In discussions with the plant engineer, it was discovered that a large steel water main, the plant water feed line, parallels the fence along this area. Readings recorded outside the fence and across 28th Street North were at or near background levels and produced no indication of a plume originating at the ponds. Higher readings were also present in the area south of Bridgeway I and north of the plant in the Resource Recovery Area. Once again, large amounts of metal from the recovery activities prevented study of the area. Isolated high readings, which were recorded near the scalehouse, were attributed to buried power lines leading to light poles.

Water quality data from the wells located in the highly conductive areas were compared to USGS data, and no correlation between areas of high conductivity and elevated levels of different parameters found in the ground water could be made.

2.3 PHASE III--GROUND WATER CONTAMINATION ASSESSMENT

Beginning in October 1983, a ground water quality monitoring system was installed at the Pinellas County RRF site. This system consisted of 15 wells installed by Clayton Davis Drilling Company under direct supervision of an ESE geologist.

2.3.1 Well Installation

Well locations (shown in Figure 2-1) were based on preliminary investigations, which indicated the onsite ground water movement from west to east. Eight locations were chosen to montior the ground water quality as well as identify any possible sources of contamination. Seven undisturbed samples were taken from location borings using a Shelby tube and analyzed for permeability at ESE's Gainesville, Florida laboratory. Results are presented in Section 2.4 of this report.

All wells were drilled using a 6-inch water rotary drill. Bentonite was used as a drilling additive to keep the drilled holes open.

Similar materials were encountered in all wells, beginning with fine brown sand at the surface, grading into medium fine brown sand with shells, and a moderately plastic dark brown silty-sandy clay before reaching the Hawthorn Formation (a light to dark green clay with varying amounts of phosphate, which divides the aquifers) at 20 ft. Forty to 50 feet of the Hawthorn Formation was encountered in the deep wells before reaching the Tampa Limestone bedrock. A generalized geologic cross section and monitor well construction appears in Figure 2-2. Drilling logs compiled during the drilling phase appear in Appendix A. A cross section of Wells 4, 3, 8, and 7 is shown in Figure 2-3.

Two wells (one shallow and one deep) were installed at seven locations, and a single shallow well was installed at one location (Well 6S). The shallow well was drilled to 140 ft without encountering competent rock. Overnight cave-in reduced the depth to approximately 65 ft; therefore, a deep well at this location was not installed.

The first well nest (1S and 1D) was constructed at the southwest corner of the site to establish background water quality conditions. Well Nests 3, 4, and 5, which were constructed around the Bridgeway II Landfill, will directly monitor the possible effects of this landfill on the ground water. The height of the landfill is expected to produce a

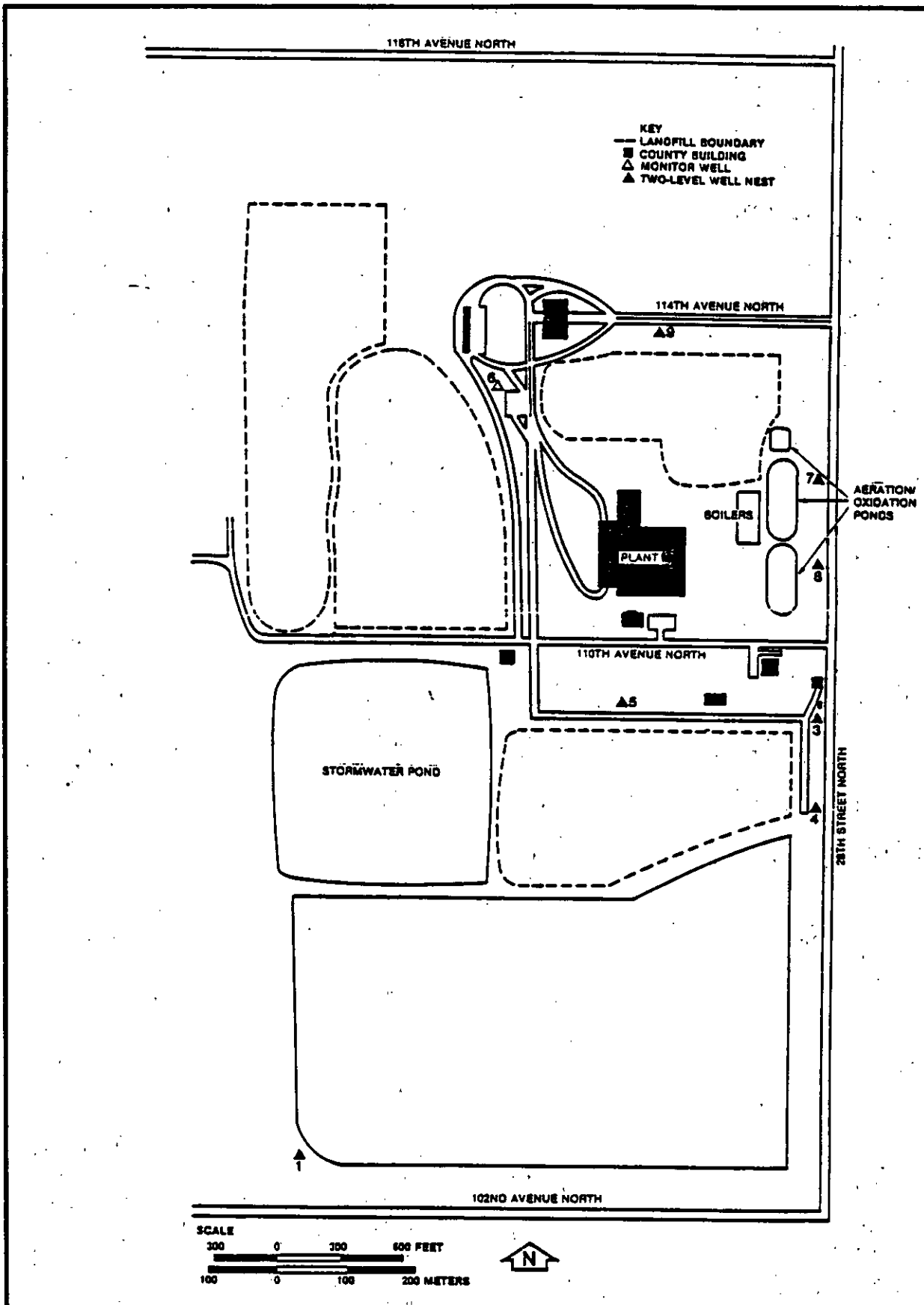

Figure 2-1
WELL LOCATIONS

SOURCE: ESE, 1984.

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PINELLAS COUNTY, FLORIDA

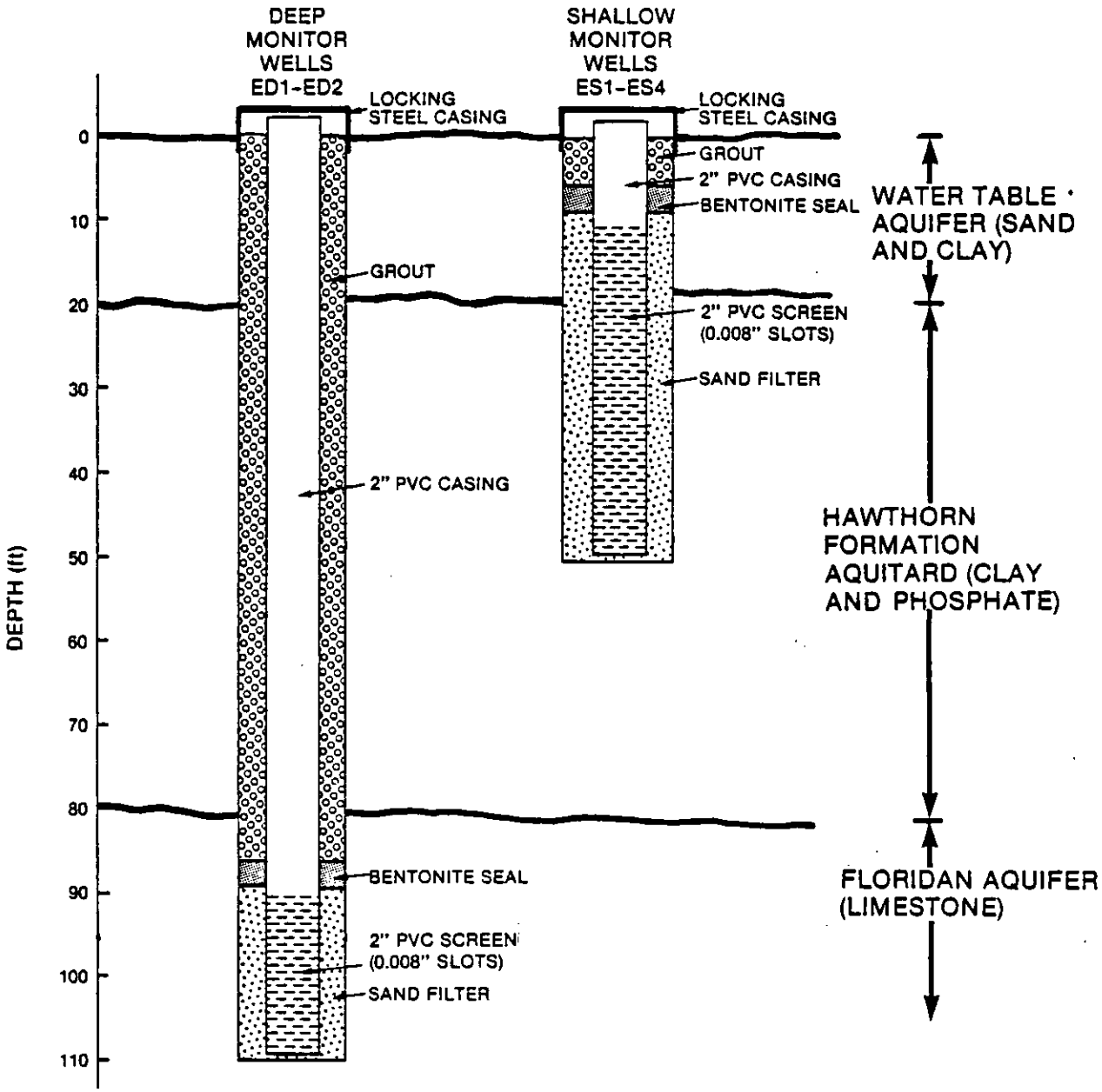

Figure 2-2
GENERALIZED GEOLOGIC CROSS SECTION AND MONITOR WELL CONSTRUCTION

SOURCE: ESE, 1984.

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PINELLAS COUNTY, FLORIDA

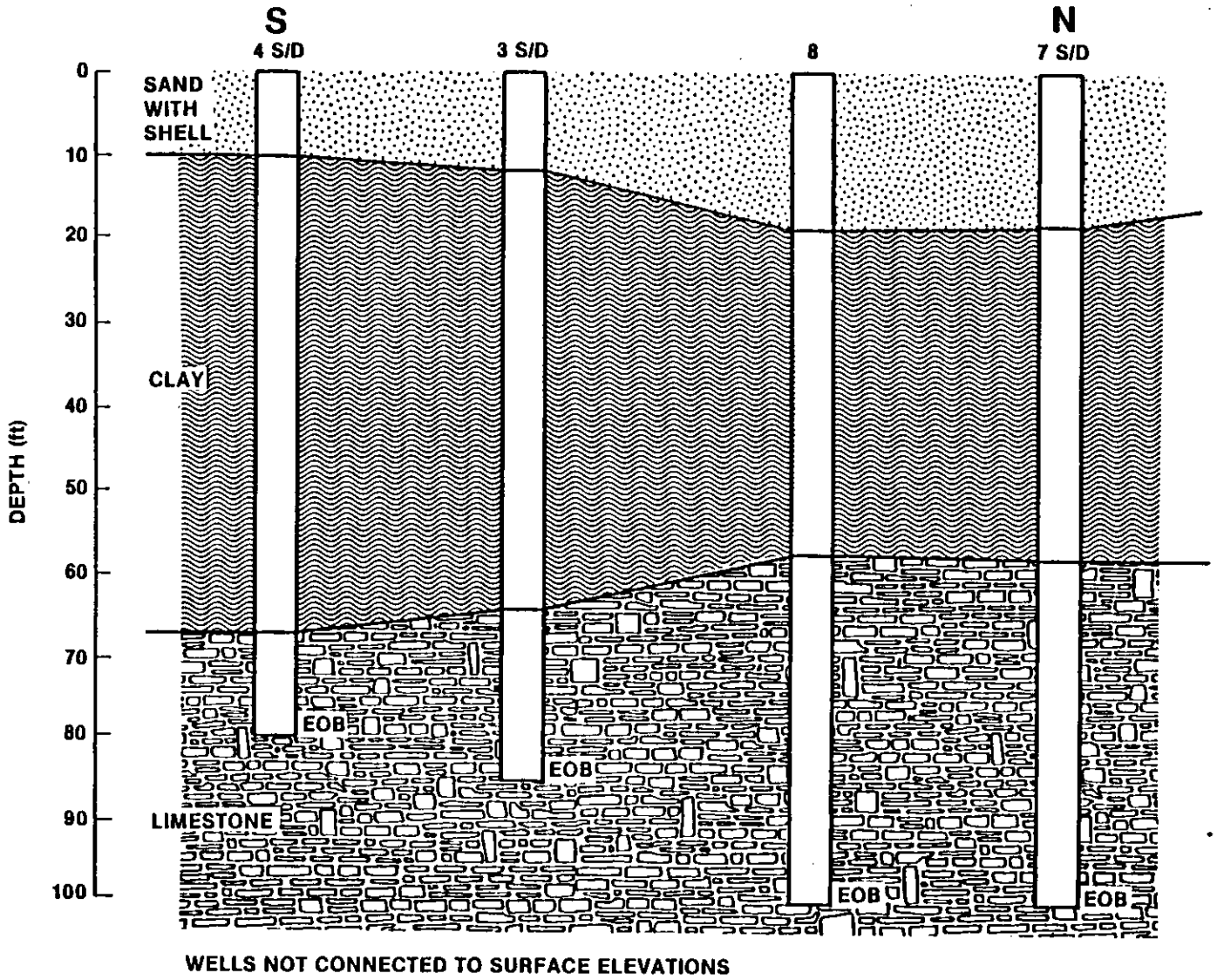

Figure 2-3
CROSS SECTION OF WELLS NUMBER 4, 3, 8, AND 7

SOURCE: ESE, 1983.

RESOURCE RECOVERY FACILITY
PINELLAS COUNTY, FLORIDA

water table mound, with the ground water flowing off the mound in all directions. Well 6S, a single-level shallow well situated along the northeast face of the Bridgeway I Landfill, monitors downgradient water. Both Well Nest 5 and Well 6S monitor nearby landfills and provide water quality data for water entering the plant site.

Well Nests 7 and 8 are located east of the two oxidation ponds. An onsite survey of the USGS wells in this area indicates that those remaining wells are not suitable for the monitoring purposes proposed.

Well Nest 9, which is located along the north face of the smaller Bridgeway I Landfill, monitors this fill. Well Nests 7, 8, and 9 also provide water quality data for water moving off the site. Well Nest 2 was deleted from the monitoring program since future expansion of Bridgeway II Landfill would void monitoring capabilities of the well.

The eight shallow wells were constructed to a depth of 35 to 64 ft, with all but the top 5 ft screened. The wells were completed at the top of the Hawthorn Formation, which is a low permeability clay layer forming the base of the shallow water-table aquifer. These wells were designed to assess water quality and to determine flow in the water-table aquifer.

The seven deep wells, which fully penetrate the Hawthorn Formations, were screened 10 ft into the underlying Tampa Limestone. They were designed to assess the water quality in the Upper Floridan Aquifer, to provide data on the nature of the aquitard, and to allow an assessment of the rate and direction of water movement.

The wells were constructed using 2-inch-diameter schedule 40 PVC casing and screen having an 0.008-inch slot size. The area around the screen was packed with 20- to 30-mesh silica sand to a point approximately 2 ft above the top of the screen. One foot of bentonite pellets was placed above the sand pack in the shallow wells to prevent contamination

by downward migration of surface water. Two feet of bentonite pellets was placed above the sand pack in the deep wells. The annular space was then grouted to the surface. All wells, except Well IS, were fitted with a 4-inch protective steel casing with a locking cap. A 12-inch protective steel casing was fitted on Well 1S. Each well was developed by pumping until the water ran clear.

On November 11, 1983, the wells were leveled to a survey reference marker using a builders level and a stadia rod. Well elevations, along with other well information, are provided in Table 2-1.

2.3.2 Aquifer Testing

A series of single-well aquifer tests (slug tests) was conducted to determine the hydraulic conductivity of the soils underlying the site. These tests were performed on all monitor wells installed as of November 4, 1983. In a slug test, a volume of water is instantaneously added to or removed from the well; as the well returns to equilibrium, its water level is monitored and recorded. The data gathered during the test are analyzed by comparison with a theoretical response. The response functions are solutions to the differential equation of ground water flow. Instead of actually adding or removing water from the wells, an aluminum slug was used during this series of tests to displace the water to provide an immediate increase or decrease in the water level in the well.

The aquifer testing was performed on November 3 and 4, 1983, by ESE geologists. At each test location, a pressure probe was installed in the bottom of the well and connected to an Envirolab data logger, which recorded both time and pressure on paper tape at selected time intervals. The system provided rapid and accurate data recovery, especially at the critical early stages of the test when recovery within the well is the quickest.

Table 2-1. Monitor Well Data

Well Number	Depth (feet)	Screen Length (feet)	Relative Elevation Ground Surface	Date Completed	Water Level (feet below land surface)	Date
1S	42	35	8.45	11/03/83	2.18 2.30	11/04/83 11/17/83
1D	80	10	8.35	11/03/83	2.58 2.10	11/04/83 11/17/83
3S	40	35	7.39	10/11/83	2.02 2.56	11/03/83 11/15/83
3D	81	10	7.69	10/10/83	4.25 3.55	11/03/83 11/15/83
4S	40	35	8.68	10/12/83	4.01 3.71	11/03/83 11/16/83
4D	80	10	8.64	10/12/83	5.03 4.69	11/03/83 11/16/83
5S	45	40	10.16	10/10/83	2.84 3.59	11/03/83 11/16/83
5D	120	10	10.64	10/20/83	3.55 4.01	11/03/83 11/16/83
6S	64	55	9.32	10/06/83	2.18 2.28	11/03/83 11/16/83
7S	35	30	7.18	10/17/83	2.17 2.38	11/03/83 11/15/83
7D	80	10	7.27	10/12/83	3.34 3.14	11/03/83 11/15/83
8S	35	30	6.83	10/17/83	1.10 1.43	11/04/83 11/15/83
8D	100	10	6.99	10/17/83	2.99 2.88	11/04/83 11/15/83
9S	45	40	7.52	10/05/83	1.23 1.35	11/03/83 11/17/83
9D	85	10	7.66	10/05/83	3.63 3.68	11/03/83 11/17/83

Source: ESE, 1984.

Once the probe was in place and the static water level recorded, the slug was placed in the water column. Data were recorded at 0.5-second intervals during the early phase of recovery while the change in water level was rapid. As the water level approached equilibrium, the rate of data recovery was slowed as pressure changes were less rapid. When the water level had stabilized near the static water level measured at the start of the test, the slug was removed from the well and the recovery data were recorded.

Upon completion of the testing, the data were entered into ESE's computer and analyzed by methods developed by Hvorslev (1951) and Bouwer and Rice (1976). Hydraulic conductivity obtained from the slug tests as well as overall average hydraulic conductivities determined for both the shallow and deep aquifer are presented in Table 2-2. Water-level data gathered during the sampling program indicate a potentiometric gradient from west to east in the shallow aquifer and Floridan Aquifer. The water-level difference in shallow Wells 4S and 6S (two wells exhibiting the greatest differences) average 2.27 ft. The water-level difference in deep Wells 3D and 5D averaged 3.57 ft. Hydraulic conductivities in the shallow aquifer, as measured during the slug tests, averaged 0.3126 x 10^{-4} foot per second (ft/sec). Hydraulic conductivity in the Floridan Aquifer averaged 0.1079 x 10^{-3} ft/sec. Figures 2-4 and 2-5 are potentiometric maps showing direction of flow in the two aquifers.

By using Darcy's Law and the data obtained during the study, an average flow rate of 2.9 feet per year (ft/yr) to the east can be expected in the shallow aquifer and an average flow rate of about 40 ft/yr to the east in the Floridan Aquifer.

2.3.3 Water Quality Sampling

On November 14, 1983, ESE began the water quality quarterly sampling program at RRF, taking samples from all monitor wells, the aeration pond, and the two oxidation ponds.

Table 2-2. Hydraulic Conductivity (ft/sec) Obtained from Slug Tests

Well Number		Method: Bouwer and Rice (1976)	Method: Hvorslev (1951)
1S	Slug in	0.1367×10^{-3}	0.1968×10^{-3}
	Slug out	0.7283×10^{-5}	0.4552×10^{-4}
1D	Slug in	0.2270×10^{-6}	0.3124×10^{-6}
	Slug out	0.6332×10^{-6}	0.7811×10^{-6}
3S	Slug in	0.6249×10^{-4}	0.8258×10^{-4}
	Slug out	0.1908×10^{-4}	0.1968×10^{-3}
3D	Slug in	0.2509×10^{-4}	0.3771×10^{-4}
	Slug out	0.1810×10^{-4}	0.3160×10^{-4}
4S	Slug in	0.1172×10^{-3}	0.1680×10^{-3}
	Slug out	0.1527×10^{-4}	0.8967×10^{-4}
4D	Slug in	0.3452×10^{-5}	0.5489×10^{-5}
	Slug out	0.5913×10^{-6}	0.1067×10^{-5}
5S	Slug in	0.4842×10^{-4}	0.1206×10^{-3}
	Slug out	0.2724×10^{-4}	0.5380×10^{-4}
5D	Slug in	0.4177×10^{-5}	0.4487×10^{-5}
	Slug out	0.2675×10^{-5}	0.2897×10^{-5}
6S	Slug in	0.2189×10^{-4}	0.4304×10^{-4}
	Slug out	0.1101×10^{-4}	0.2146×10^{-4}
7S	Slug in	0.4847×10^{-4}	0.2305×10^{-3}
	Slug out	0.6420×10^{-4}	0.1221×10^{-3}
7D	Slug in	0.4263×10^{-3}	0.3980×10^{-3}
	Slug out	0.5808×10^{-3}	0.8069×10^{-3}
8D	Slug in	0.1458×10^{-3}	0.1750×10^{-3}
	Slug out	0.2836×10^{-3}	0.2880×10^{-3}
9S	Slug in	0.3337×10^{-4}	0.7672×10^{-4}
	Slug out	0.3902×10^{-4}	0.7081×10^{-4}
9D	Slug in	0.9510×10^{-5}	0.1300×10^{-4}
	Slug out	0.9626×10^{-5}	0.1313×10^{-4}

Table 2-2. Hydraulic Conductivity (ft/sec) Obtained from Slug Tests (Continued, Page 2 of 2)

Well Number		Method: Bouwer and Rice (1976)	Method: Hvorslev (1951)
Shallow Wells			
	Average slug in	0.3687×10^{-4}	0.1197×10^{-3}
	Average slug out	0.2565×10^{-4}	0.7906×10^{-4}
	Average all	0.3126×10^{-4}	0.9938×10^{-4}
Deep Wells			
	Average slug in	0.8779×10^{-4}	0.9057×10^{-4}
	Average slug out	0.1280×10^{-3}	0.1635×10^{-3}
	Average all	0.1079×10^{-3}	0.1270×10^{-3}

Source: ESE, 1984.

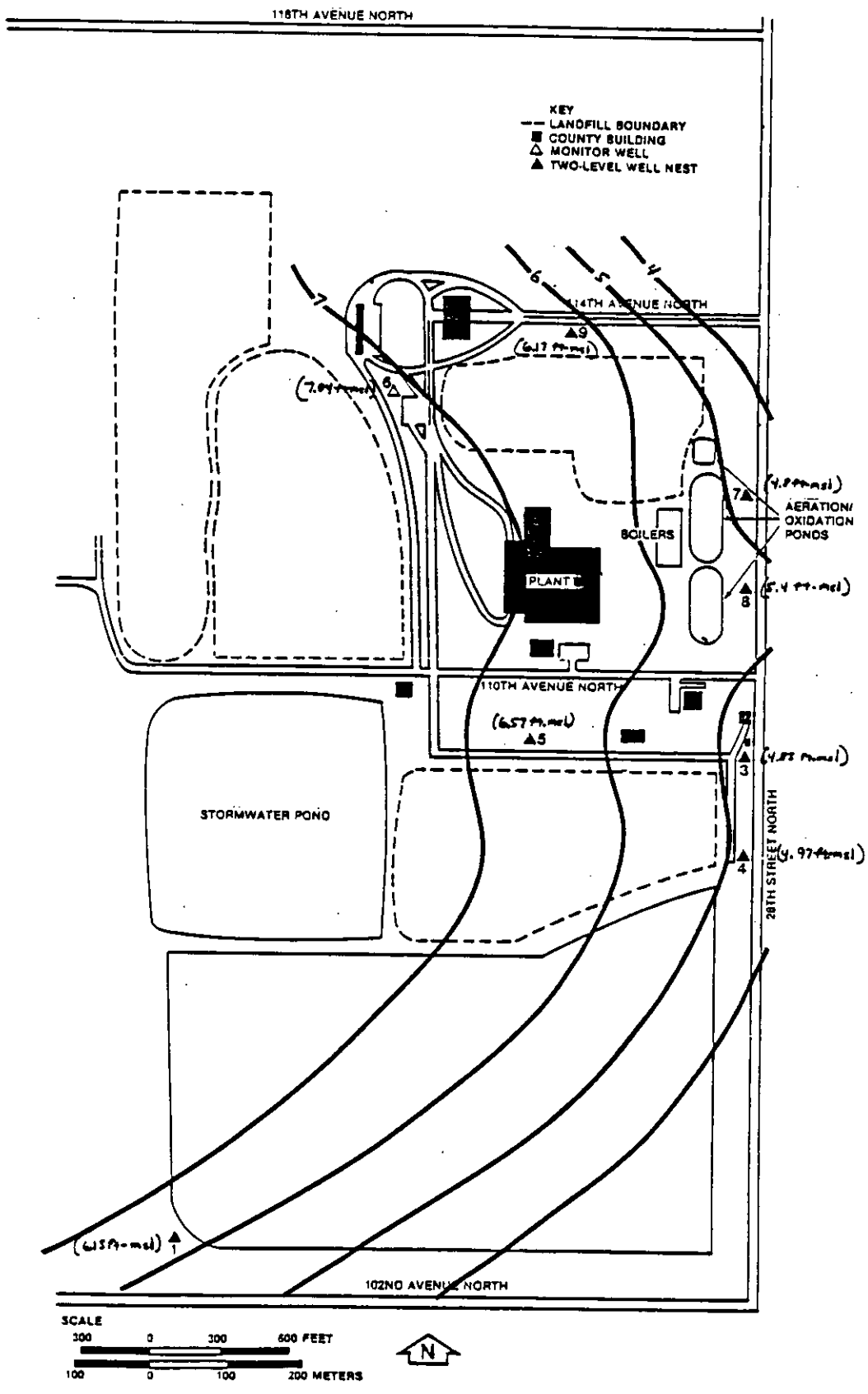

Figure 2-4
POTENTIOMETRIC MAP OF SHALLOW AQUIFER

SOURCE: ESE, 1984.

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PINELLAS COUNTY, FLORIDA

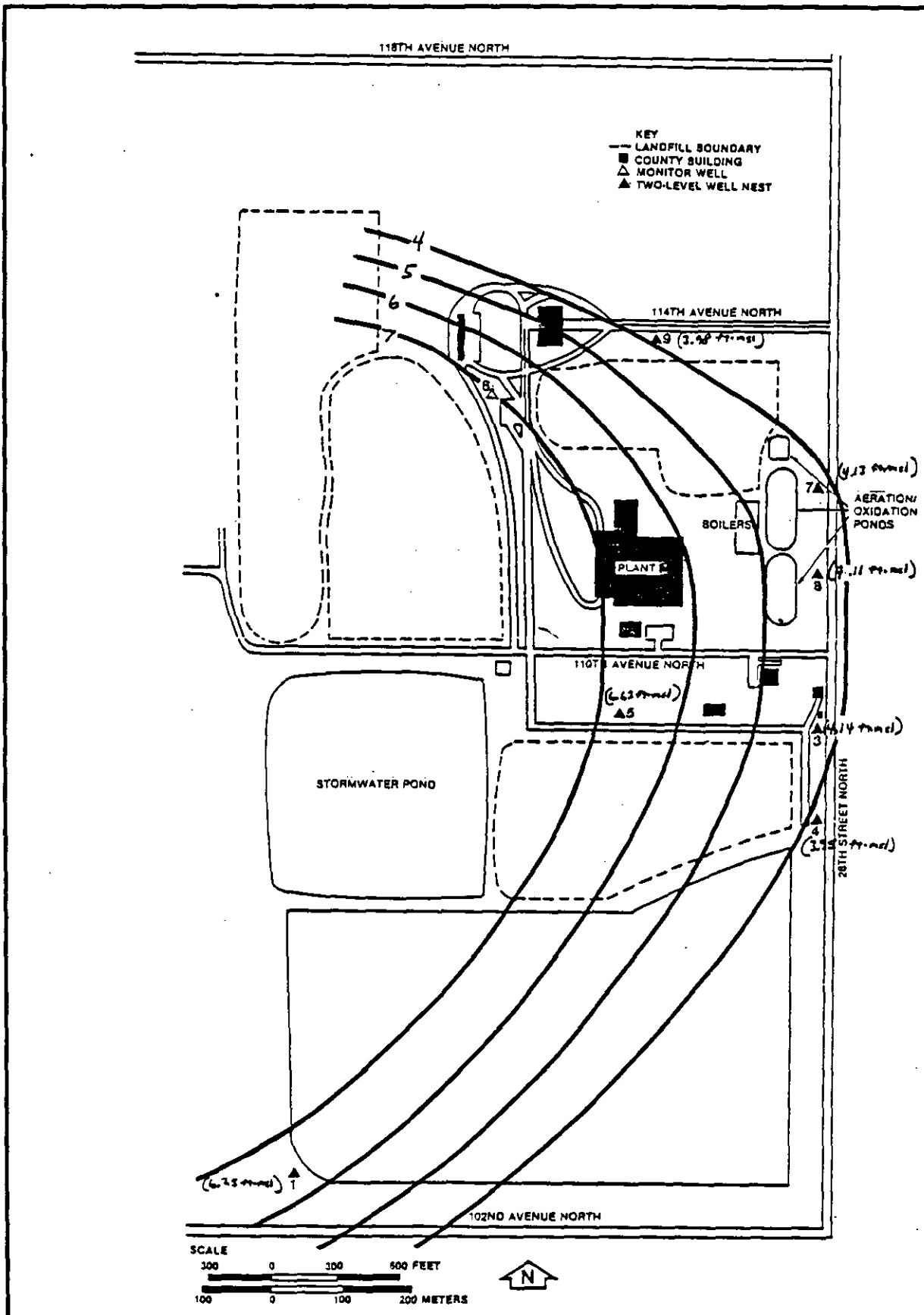


Figure 2-5
POTENTIOMETRIC MAP OF FLORIDAN AQUIFER

SOURCE: ESE, 1984.

RESOURCE RECOVERY FACILITY
PINELLAS COUNTY, FLORIDA

Surface water samples were taken from each pond at 3 equidistant points along the bank, using the grab sample method (locations are shown in Figure 2-6). All samples were then chilled, preserved as appropriate, and transported to ESE for analysis. All samples were analyzed for the parameters listed in Table 2-3.

ESE collected 15 separate ground water samples (one from each well) at RRF. Each well, except Well 1D, was evacuated for a minimum of 3 well volumes before sampling to ensure that water being sampled was representative of ground water in the aquifer. Well 1D had a very slow recovery rate and was evacuated for 1.5 well volumes. Sample water was then drawn from the well using a dedicated 1-inch PVC bailer. Samples were collected in a manner that minimized aeration and prevented oxidation of reduced compounds.

Ground water samples to be tested for microbiological parameters were drawn from all wells (except Well 1D) using a peristaltic pump and vacuum bottle. The sample from Well 1D could not be obtained because of lack of recharge.

2.3.4 Laboratory Analysis

Water quality samples were preserved onsite, chilled under ice, and delivered to ESE's Gainesville laboratory for analysis. Specific conductivity, pH, and water temperature were measured in the field using portable instruments. All other parameters were measured in the laboratory using the methods listed in Table 2-3. All samples to be analyzed for metals were acidified in the field and were not filtered [per Department of Environmental Regulation (DER) instructions].

2.3.5 Water Quality

A complete listing of the results of the chemical analyses performed on the ground water and surface water samples is given in Appendix C.

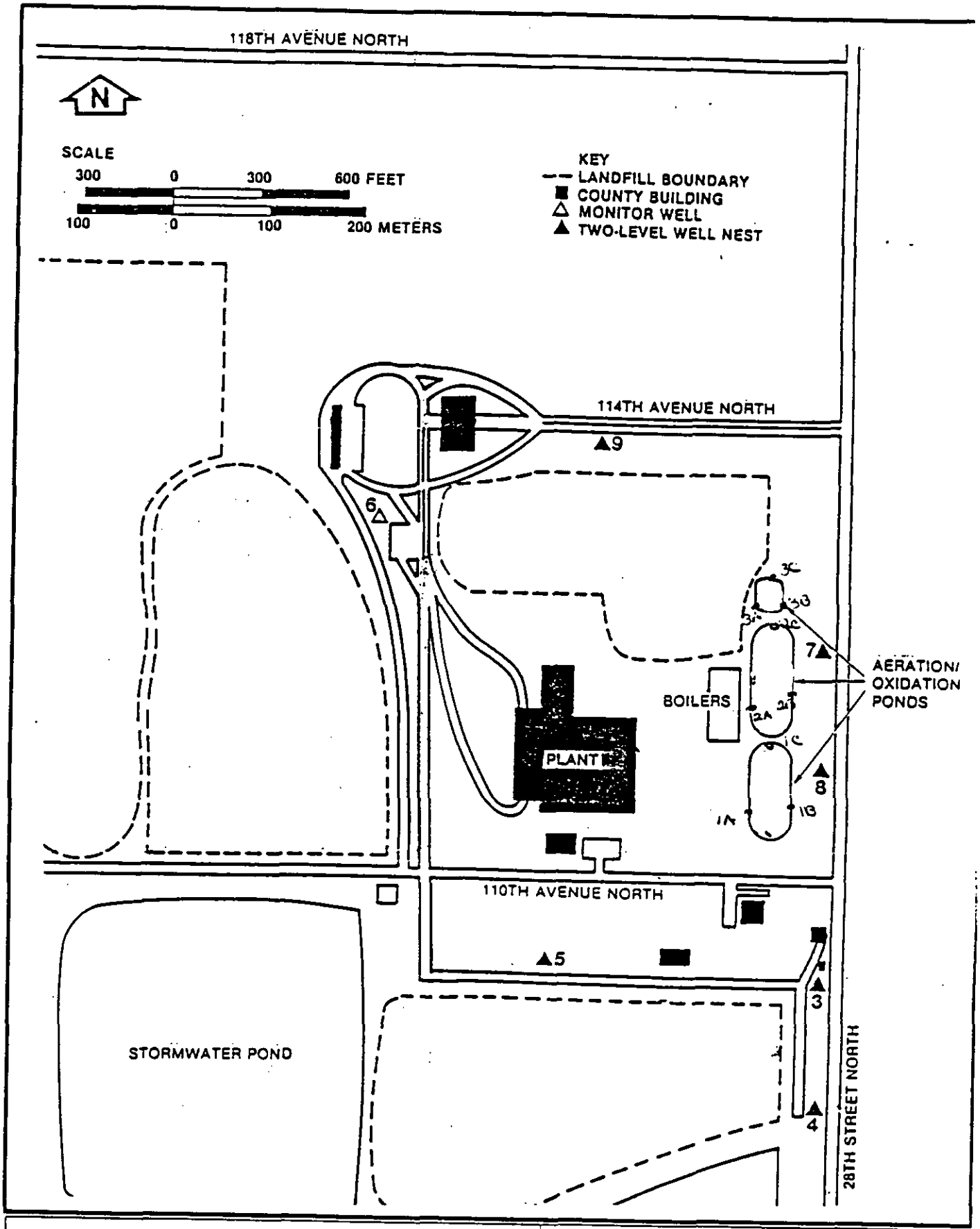


Figure 2-6
LOCATIONS OF SURFACE WATER SAMPLES

SOURCE: ESE, 1984.

RESOURCE RECOVERY FACILITY
PINELLAS COUNTY, FLORIDA

Table 2-3. Laboratory Methods

Parameter	STORET Nos. Water	STORET Nos. Sediment	Method	Reference
pH	400	70310	Glass Electrode	Standard Methods, 1975, p. 461
Specific Conductivity, Field (umhos/cm)	94	—	Conductivity Meter	Standard Methods, 1975, p. 71
Water Temperature (°C)	10	—	Thermistor	Standard Methods, 1975, p. 125
$NO_3 + NO_2$ (mg/L-N)	630	—	Automated Cadmium Reduction	EPA Method 353.2, 1979
NO_2 (mg/L-N)	615	—	Automated Diazotization	EPA Method 354.1, 1979
NO_3 (mg/L-N)	620	621	Calculation	EPA Method 353.2, 1979
Cadmium, Total (ug/L)	1027	1028	ICAP*†	FR, 12/3/79, Vol. 44, No. 233
Chromium, Total (ug/L)	1034	1029	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Lead, Total (ug/L)	1051	1052	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Arsenic	1002	1003	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Barium	1007	1008	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Mercury	71900	71921	AAS, Cold Vapor	EPA Method 245.1, 1979
Selenium	1147	1148	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Silver	1077	1078	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Aluminum	1105	1108	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Copper	1042	1043	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Iron	1045	1170	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Nickel	1067	1068	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Zinc	1092	1093	ICAP†	FR, 12/3/79, Vol. 44, No. 233
Chloride	940	99120	Titrimetric, Mercuric Nitrate	EPA Method 325.3, 1979
COD	335	339	Titrimetric	EPA Method 410, 1979
Coliform, Total	31506	31521	Most Probable Number	Standard Methods, 1975, p. 796

* ICAP = Inductively coupled argon plasma.
† Analyzed first by ICAP and then reanalyzed by AAS if lower detection limit was needed.

Source: ESE, 1984.

The data presented in Appendix C indicate that the ground water is moderately to highly mineralized containing iron, aluminum, and specific conductivity levels of 300 to 27,800 micrograms per liter (ug/L), 422 to 59,000 ug/L, and 700 to 2,550 umhos per centimeter (umhos/cm), respectively. The shallow wells, with the exception of Wells 4 and 6, show elevated levels of chromium, aluminum, and iron. The deep wells, with the exception of Well 1D, do not show elevated levels of metals. The deep wells are generally higher in chloride concentrations, while the shallow wells are generally higher in chemical oxygen demand (COD) concentration. Wells 1S and 9S show very high levels of total coliforms.

The surface water data are relatively consistent within each pond but highly variable among the three ponds. The levels of COD, chloride, total coliform, barium, arsenic, aluminum, iron, and nitrates increase between Ponds 1 and 2 and between Ponds 2 and 3. Pond 3 is very highly mineralized and contains elevated concentrations of arsenic, barium, lead, copper, nickel, and zinc, while Pond 1 contains low concentrations of these constituents. Concentrations for Pond 2 generally lie between those of Ponds 1 and 3.

2.4 PHASE IV--SOIL AND SEDIMENT SAMPLING AND TESTING

2.4.1 Soil Sampling

ESE field personnel collected six separate sediment samples from the three onsite aeration and oxidation ponds. Two samples were taken from opposite sides of each pond in sediment depth from 0 to 4 inches, using a Wheaton grab sampler (locations are shown in Figure 2-7). All samples were then chilled and transported to ESE and analyzed for the parameters listed in Table 2-3 (excluding temperature and specific conductivity). Results of the sediment analyses are given in Appendix C. No data were available for some parameters at Station 2A due to sample breakage.

Undisturbed soil samples were taken in Shelby tubes from seven different boring locations at the RRF site. Two undisturbed samples were taken

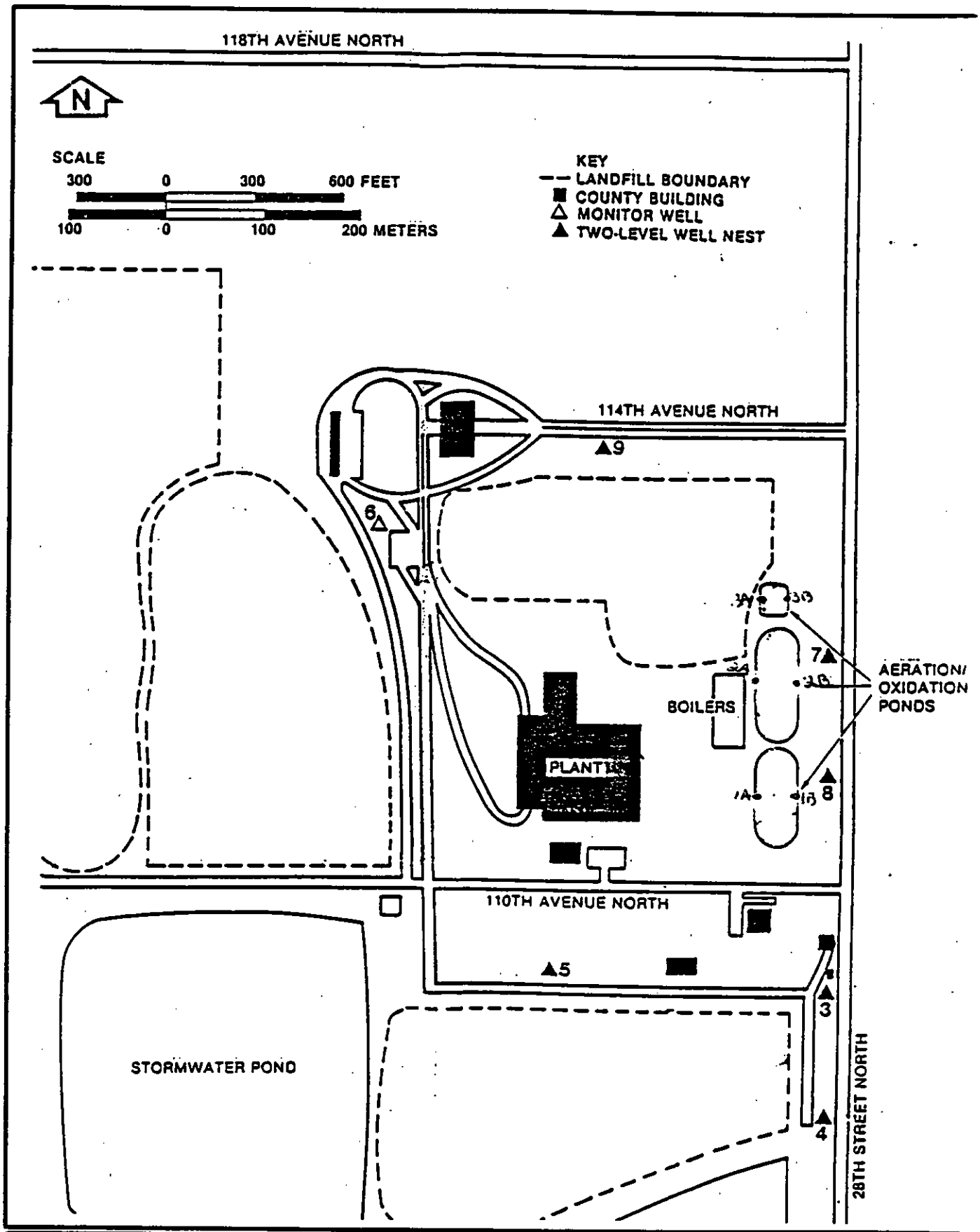


Figure 2-7
LOCATIONS OF SEDIMENT SAMPLES

SOURCE: ESE, 1984.

RESOURCE RECOVERY FACILITY
PINELLAS COUNTY, FLORIDA

from the more permeable zone and five from the confining layer at four of the well nest locations.

2.4.2 Laboratory Analysis

Permeability tests were performed on the seven Shelby tube samples taken from the borings during drilling. The falling-head method, which allows the permeability to be computed as a function of the change of head in a standpipe over measured time, was used. Each Shelby tube was cut into sections using a pipe cutter, and the test was performed on each section containing the soil. By leaving the soil in the Shelby tube, a minimum of disturbance was ensured. Before the test, deaired water was used to saturate each sample to prevent formation of air bubbles. Each sample was tested three times, and the arithmetic mean of these three tests was reported as the average permeability (see Table 2-4).

Table 2-4. Permeability Values

Sample Number	Trial Number 1	2	3	Average
HDR ID 45-47'	No flow	No flow	No flow	No flow*
HDR 5S 15-17'	2.33×10^{-4}	2.39×10^{-4}	2.42×10^{-4}	2.38×10^{-4}†
HDR 5S 40-40.75'	5.4×10^{-6}	5.5×10^{-6}	5.4×10^{-6}	5.43×10^{-6}
HDR 7S 16-18'	1.0×10^{-6}	1.0×10^{-6}	9.0×10^{-6}	9.5×10^{-7}
HDR 7D 33-35'	2.0×10^{-6}	1.7×10^{-6}	1.8×10^{-6}	1.83×10^{-6}
HDR 9S 32-33'	1.82×10^{-5}	2.45×10^{-5}	2.51×10^{-5}	2.26×10^{-5}
HDR 9D 48-49.5'	5.0×10^{-7}	5.0×10^{-7}	5.0×10^{-7}	5.0×10^{-7}

Note: Falling head permeability test used unless otherwise indicated.

* No flow through sample in 24 hours.
† Constant head permeability test used.

Source: ESE, 1984.

3.0 CONCLUSIONS

1. The shallow wells, with the exception of Wells 4 and 6, show elevated levels of chromium, aluminum, and iron.
2. The deep wells, with the exception of Well 1D, do not show elevated levels of metals.
3. Two wells, Wells 1S and 9S, showed very high levels of coliforms.
4. Elevated metals detected in some samples may be due to turbid samples.

4.0 RECOMMENDATIONS

1. Continue quarterly monitoring of water quality at the RRF site.
2. Add turbidity and total suspended particulates (TSP) to the parameter list to address the possibility that elevated metals levels may be due to turbid samples.

APPENDIX A

WELL CONSTRUCTION DATA AND WELL LOGS

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS CO. LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 1S Date 11/3/83 Sheet ___ of

Type of Boring WATER ROTARY Rig FAILING 1500

Casing used ___ Size ___ Drilling mud used ___

Boring begun 1430 Boring completed 1630

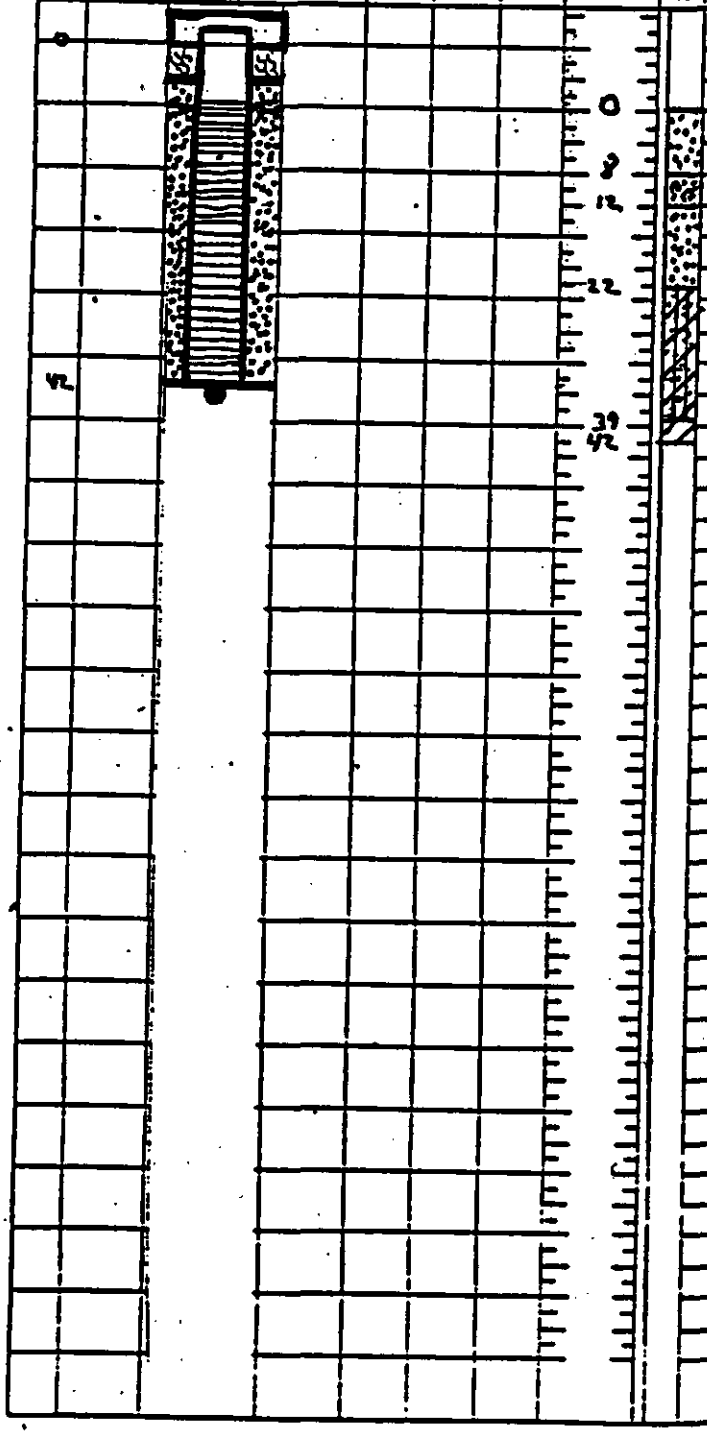
Ground Elevation ___ referred to ___

___ Da

Field Party: MONTGOMERY - DAVIS DRILLING

Depth of Casing, ft.	Sample No.		DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
			0		FINE BROWN SAND
			9		FINE BROWN SAND + SHELLS
			12		FINE BROWN SAND
			22		GRAY SANDY-SILTY CLAY
WL			39 1/2		GREEN CEMENTED CLAY
					E.O.H.
					35' SCREEN
					9' PVC

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.



A-1

Geologist RLK-M

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS CO. LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 1D Date 11/3/83 Sheet ___ of ___

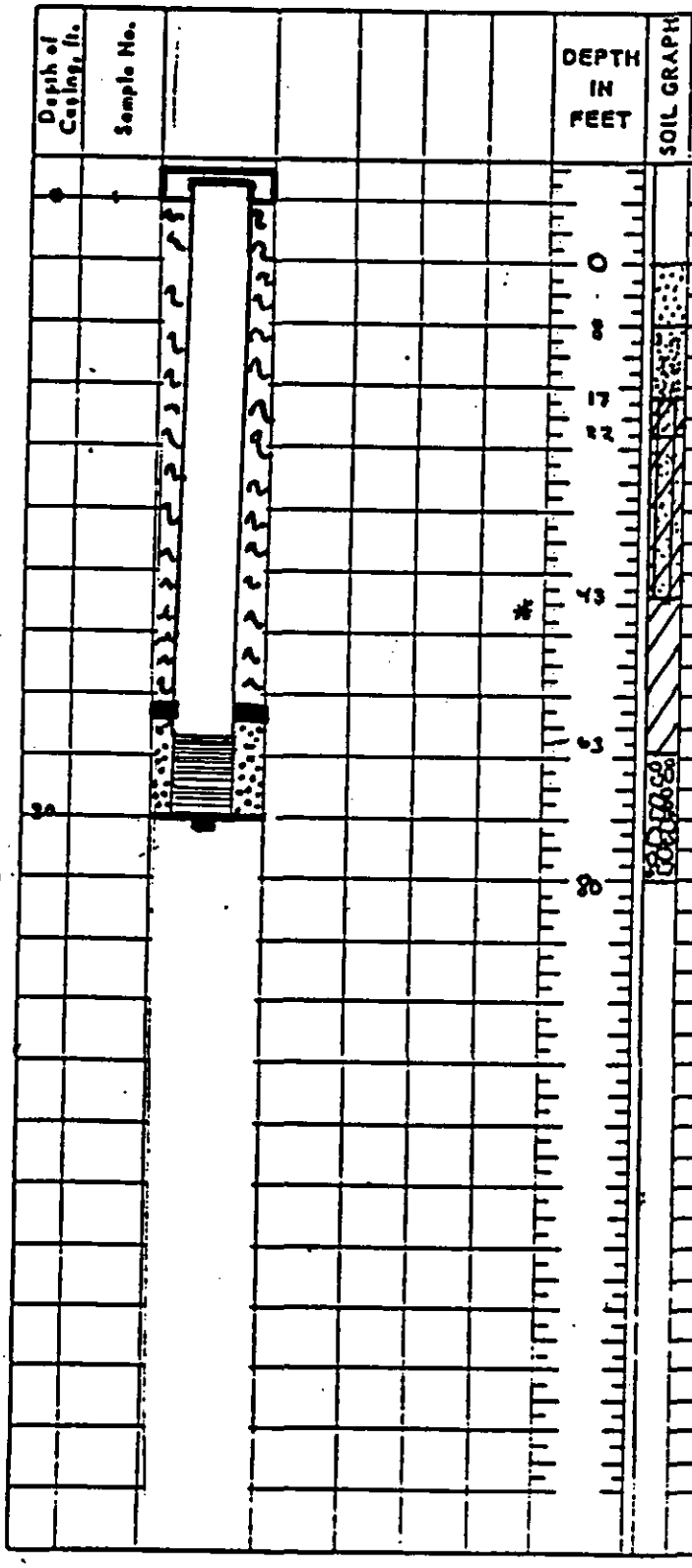
Type of Boring ROTARY Rig PAKING 1500

Casing used ___ Size ___ Drilling mud used ___

Boring begun 0900 Boring completed 1230

Ground Elevation ___ referred to ___ Da

Field Party: HOMBERGER - DAVIS DRILLING CO.



DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

FINE BROWN SAND

FINE BROWN SAND + SHELLS

DARK BROWN SILTY-SANDY CLAY

GRAY SANDY-SILTY CLAY W/ PHOSPHATES

SOFT + CEMENTED GREEN CLAY LAYERS

SOFT - MED. HARD LIMESTONE

E.O.H.

10' SCREEN
72' PVC

* UNDISTURBED SAMPLE
45.0' - 47.0'

Geologist R.K-M

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 87-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 35 Date 10/11/87 Sheet ___ of ___

Type of Boring WATER ROTARY Rig ___

Casing used ___ Size ___ Drilling mud used ___

Boring begun 1030 Boring completed 1200

Ground Elevation ___ referred to ___

___ Da

Field Party: ___

Depth of Casing, ft.	Sample No.	DEPTH IN FEET	SOIL GRAPH
		0	
		10	
		20	
		30	
		40	

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

FINE BROWN SAND

FINE TAN SAND W/ SHELLS

DARK BROWN SANDY/SILTY CLAY

LIGHT GREEN SILTY CLAY W/ PHOSPHATES

DARK GREEN SANDY CLAY W/ SILT

END OF HOLE

35' SCREEN

7' PVC

DEVEL ½ HR.

Geologist DJK-M

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 3D Date 10/10/83 Sheet ___ of

Type of Boring WATER ROTARY Rig FAILING 1500

Casing used ___ Size ___ Drilling mud used ___

Boring begun 1530 Boring completed 10/11 : 10

Ground Elevation ___ referred to ___

Da

Field Party: ___

Depth of Casing, ft.	Sample No.	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
		0		FINE BROWN SAND
				FINE TAN SAND W/ SHELLS
		20		BROWN SANDY CLAY W/ SILT
				GRAY SANDY CLAY W/SILT
				LIGHT GREEN SILTY CLAY
		40		GREEN SANDY CLAY
				HARD CEMENTED SANDS
				HARD CEMENTED GREEN CLAYS / SAND
		60		HARD CEMENTED SANDY CLAYS
				CEMENTED CLAY + LIMESTONE
				WHITE LIMESTONE (SOFT - MED.)
		81		END OF HOLE
				10' SCREEN
				93' PVC

DEVEL: 3HR

Geologist RJ KAMLER-MORRISON

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 87-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 45 Date 10/12/87 Sheet ___ of ___

Type of Boring WATER ROTARY Rig ___

Casing used ___ Size ___ Drilling mud used ___

Boring begun 0945 Boring completed 1045

Ground Elevation ___ referred to ___

Field Party: ___

Depth of Casing, ft.	Sample No.	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
		0		FINE BROWN SAND
		10		FINE TAN SAND W/SHELLS
		20		DARK BROWN SANDY/SILTY CLAY
				GRAY SANDY/SILTY CLAY W/PHOSPHATES
		30		
		40		GREEN SANDY CLAY
				END OF HOLE
				35' SCREEN
				7' PVC
				DRILL: 1½ HR.

Geologist RJK-M

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 4D Date 10/11/83 Sheet ___ of ___

Type of Boring WATER ROTARY Rig ___

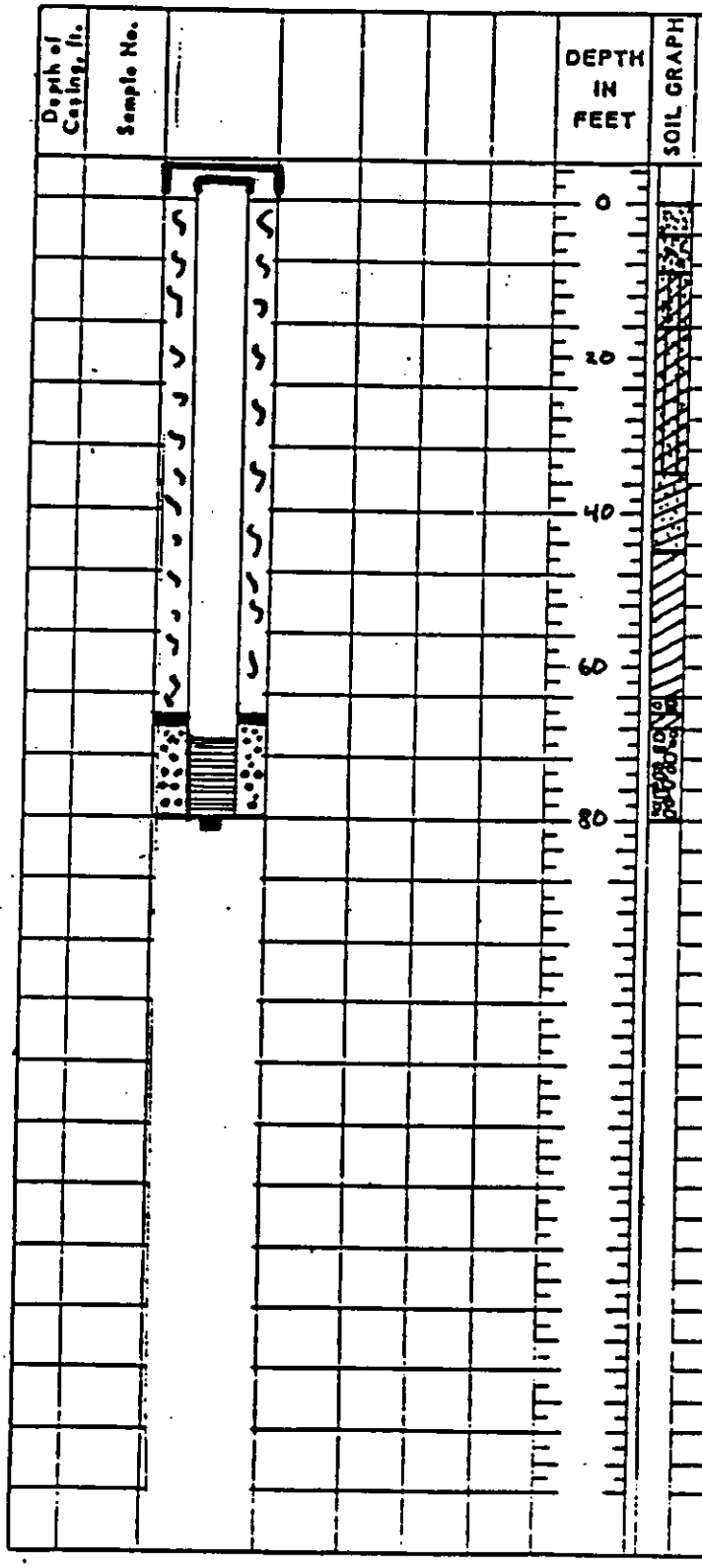
Casing used ___ Size ___ Drilling mud used ___

Boring begun 1200 Boring completed 10/12 : 09

Ground Elevation ___ referred to ___

___ Da

Field Party: ___



DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

FINE BROWN SAND

FINE TAN SAND W/ SHELLS

DARK BROWN SANDY/SILTY CLAY

GRAY SANDY/SILTY CLAY W/ PHOSPHATES

GREEN SANDY CLAY

HARD CEMENTED GRAY-GREEN CLAYS

SOFT WHITE LIMESTONE
HARD CEMENTED GREEN CLAYS

SOFT WHITE LIMESTONE

END OF HOLE

10' SCREEN
72' PVC

DEVEL. 3 HR

Geologist RJKM

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 82-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. S5 Date 10/10/82 Sheet ___ of ___

Type of Boring WATER ROTARY Rig ___

Casing used ___ Size ___ Drilling mud used ___

Boring begun 1215 Boring completed 1430

Ground Elevation ___ referred to ___ Dat

Field Party: ___

Depth of Casing, ft.	Sample No.		DEPTH IN FEET	SOIL GRAPH
			0	
			10	
			20	
			30	
			40	
			45	

DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

FINE TAN SAND.

FINE BROWN SAND W/SHELLS

DARK BROWN SILTY SAND

GRAY SANDY/SILTY CLAY W/ PHOSPHATES

LT. GREEN SILTY CLAY W/ SAND

STIFF GREEN CLAY (LESS SILTY)

END OF HOLE

40' SCREEN
2" PVC

* 15'-17' UNDISTURBED SAMPLE
* 40'-40.75' UNDISTURBED SAMPLE

DEVEL. 1½ HR

A-7

Geologist RJK

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 5D Date 10/20/83 Sheet 1 of 1

Type of Boring WATER ROTARY Rig

Casing used Size Drilling mud used

Boring begun 0900 Boring completed 1115

Ground Elevation referred to

Field Party:

Depth of Casing, ft.	Sample No.	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
		0		FINE BROWN SAND
				FINE TAN SAND W/ SHELLS
		20		DARK BROWN SILTY SAND W/ ORGANICS
				DARK BROWN-GRAY SANDY/SILTY CLAY W/ PHOSPHATES
		40		SOFT LT. GREEN SILTY CLAY W/ SAND
				STIFF GREEN CLAY - LESS SAND
		60		HARD CEMENTED GREEN CLAY
		80		SOFT SANDY/SILTY GREEN CLAY WITH HARD CHERT FRAGMENTS
				ALTERNATING LAYERS/HARD GREEN CLAY + LIMESTO
		100		SOFT WHITE LIMESTONE
		120		END OF HOLE
				10' SCREEN
				112' PVC
				DRIVEN 2 IN.

A-8

Geologist RJ Kimm

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 65 Date 10/6/83 Sheet ___ of ___

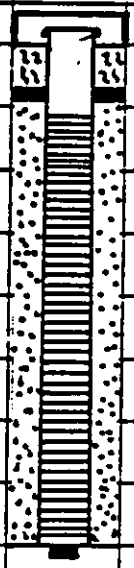
Type of Boring ___ Rig ___

Casing used ___ Size ___ Drilling mud used ___

Boring begun ___ Boring completed ___

Ground Elevation ___ referred to ___ Datum

Field Party: GEDEN - DAVIS DRILLING CO.



Depth of Casing, ft.	Sample No.	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
		0		FINE TAN SAND
				FINE BROWN SAND W/ SHELLS
				FINE-MED BROWN SAND W/ SHELLS
		20		
				GRAY SILTY SAND W/ SHELLS
		40		FINE BROWN SAND W/ CLAY LENSES
				SANDY GREEN CLAY/CLAYEY SAND
		60		
		* E.O.H.		SILTY CLAY W/ TRACE SAND
				STIFF GREEN CLAY (CL)
		80		
				SOFT SANDY/SILTY CLAY
				HARD WELL CEMENTED GREEN CLAY
		100		
				LIMESTONE
				HARD, WELL-CEMENTED GREEN CLAY
		120		LAYERS HARD GREEN CLAY/SOFT WHITE LIMESTONE
				SOFT WHITE LIMESTONE
		140		
				* HOLE CAVED IN OVERNIGHT TO 64'
				SET WELL TO 64' W/ 55' SCREEN

Geologist Geden

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 75 Date 10/17/83 Sheet ___

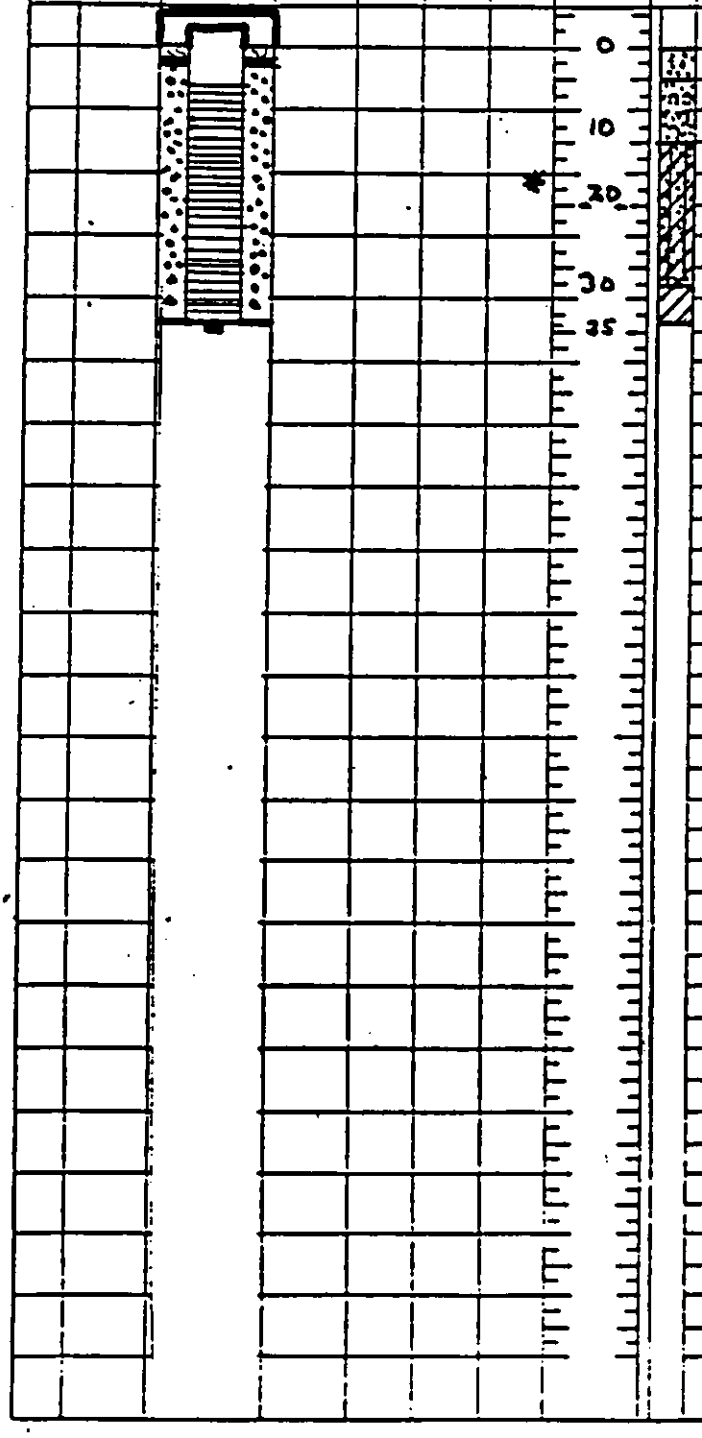
Type of Boring ___ Rig ___

Casing used ___ Size ___ Drilling mud used ___

Boring begun 0820 Boring completed 0830

Ground Elevation ___ referred to ___

Field Party: ___



DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

FINE BROWN SAND w/ BOULDERS

FINE BROWN SAND w/ SHELLS

DARK GRAY SANDY/SILTY CLAY

GRAY SILTY/SANDY CLAY

SOFT GREEN CLAY

E.O.H.

30' SCREEN
7' PVC

* 16'-18' UNDISTURBED SAMPLE

Developed 1 Hr.

Geologist RJK

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project DINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 7D Date 10/12/83 Sheet ___ of ___

Type of Boring ___ Rig ___

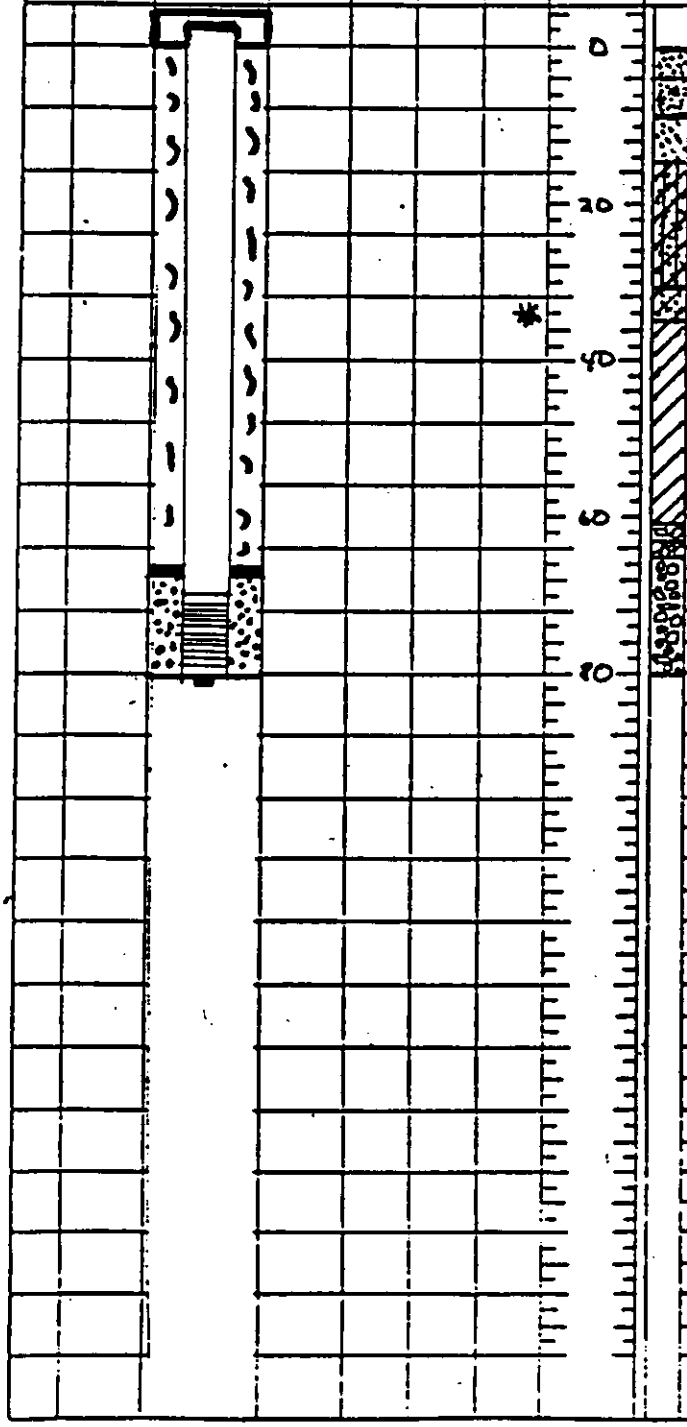
Casing used ___ Size ___ Drilling mud used ___

Boring begun 1200 Boring completed D/H : 157

Ground Elevation ___ referred to ___

___ Dat

Field Party: ___



DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

FINE BROWN SAND w/ BOULDERS
FINE BROWN SAND w/ SHELLS
DARK BROWN SAND

GRAY SILTY CLAY / SANDY CLAY w/ PHOSPHATES

SANDY CLAY

SOFT GREEN CLAY

HARD CEMENTED GRAY-GREEN CLAY

DARK GREEN SOFT CLAY

SOFT WHITE LIMESTONE
DARK GRAY SILTY CLAY

SOFT WHITE LIMESTONE

E.O.H.

10' SCREEN
2" PVC

* 33'-35' UNDISTURBED SAMPLE

DEVEL 1 HR.

A-11

Geologist RJKM

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:

Water Level	
Time	
Date	

Boring No. 85 Date 10/17/83 Sheet ___ of

Type of Boring ___ Rig ___

Casing used ___ Size ___ Drilling mud used ___

Boring begun 1300 Boring completed 1500

Ground Elevation ___ referred to ___

___ Da

Field Party: ___

Depth of Casing, ft.	Sample No.	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
		0		FINE BROWN SAND
		10		FINE BROWN SAND w/SHELLS
		20		DARK BROWN SAND w/SHELLS
		30		LIGHT GRAY-GREEN SILTY CLAY
		35		SOFT GREEN CLAY
				E.O.H.
				30' SCREEN
				7.5' PVC
				DEVEL: ½ HR

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

Geologist RJK-M

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:

Water Level	
Time	
Date	

Boring No. 83 Date 10/17/83 Sheet 1 of 1

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun 1020 Boring completed 1230

Ground Elevation _____ referred to _____

Field Party: _____

Depth of Casing, ft.	Sample No.	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
		0		FINE BROWN SAND
				FINE BROWN SAND W/ SHELLS
				DARK BROWN SAND W/ SHELLS
		20		LT. GREEN-GRAY SILTY CLAY
				HARD CEMENTED CLAY LENS
		40		SOFT GREEN CLAY
				LIMESTONE / CLAY ALTERN:
				SOFT GREEN CLAY
		60		LIMESTONE ALTERNATING W/ SOFT GREEN CLA.
				SOFT - HARD WHITE LIMESTONE
		80		HARD CEMENTED CLAY W/ LIMESTONE
				SOFT-HARD LIMESTONE
		100		E.O.H
				10' SCREEN
				925 PVC
				DEVEL: 1 HR.

Geologist ROK-MA

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 95 Date 10/5/83 Sheet ___ of ___

Type of Boring ___ Rig ___

Casing used ___ Size ___ Drilling mud used ___

Boring begun ___ Boring completed ___

Ground Elevation ___ referred to ___ Da.

Field Party: ___

Depth of Casing, ft.	Sample No.	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
		0		FINE BROWN SAND
		10		FINE BROWN SAND W/SHELLS
		20		DARK BROWN SANDY/SILTY CLAY
				GRAY-WHITE CLAY W/SHELLS (CL)
		30		FINE SANDY CLAY : SOME CEMENTED
				STIFFER SANDY CLAY
		40		HARD SANDY CLAY
		45		SOFT SANDY CLAY (CH)
				E.O.H.
				40' SCREEN
				7.5' PVC
				DRILL: 1½ HR.
				* UNDISTURBED SAMPLE 32-33'

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

Geological GARDEN

ESE ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Job No. 83-405-402

Client HDR

Project PINELLAS COUNTY LANDFILL

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 9D Date 10/5/83 Sheet ___ o

Type of Boring ___ Rig ___

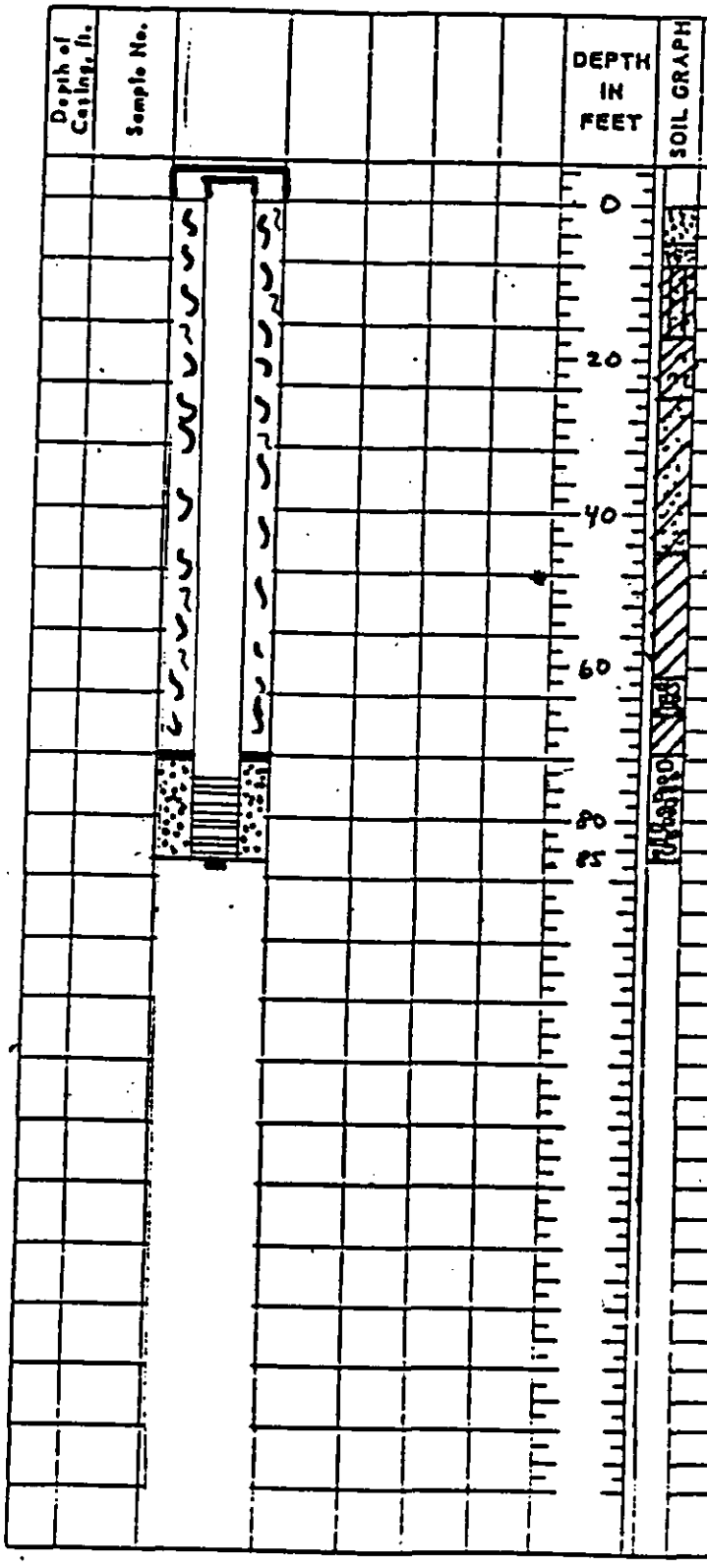
Casing used ___ Size ___ Drilling mud used ___

Boring begun ___ Boring completed ___

Ground Elevation ___ referred to ___

___ D.

Field Party: ___



DESCRIPTION

Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.

FINE BROWN SAND

FINE BROWN SAND W/SHELLS

DARK BROWN SANDY/SILTY CLAY

GRAY-WHITE CLAY W/SHELLS (CL)

FINE SANDY CLAY GREEN/WHITE: SOME CEMENTED STIPPER

HARD SANDY CLAY

SOFT SANDY CLAY (CH)

STIFF GREEN CLAY * UNDISTURBED SAMPLE

SOFT-HARD LIMESTONE

CLAY LAYER

HARD LIMESTONE / LAYER OF SOFTER ROCK

E.O.H

10' SCREEN
77.5' PVC

DEVEL: 2HR.

* UNDISTURBED SAMPLE 42-42.5'

Geologist CEDEN

APPENDIX B

AQUIFER TEST DATA

Table B-1. Well 3D Aquifer Test Data (page 1 of 6)

SLUG TEST

PROJECT #83 405 402
PAGE #01

WELL NUMBER : MW3D
CASING LENGTH : 82.34 FEET
CASING DIAMETER : 2.00 INCHES
CASING STICK-UP : 1.34 FEET
SCREEN LENGTH : 10.00 FEET
GRAVEL PACK DIAMETER : 6.00 INCHES
GRAVEL PACK POROSITY : 0.3000
AQUIFER THICKNESS : 200.00 FEET
DEPTH TO WATER : 6. FEET
STATIC PRESSURE : 7.9200 PSI

TEST METHOD : SLUG IN
TEST STARTING DATE : NOV 03, 1983 TIME = 11:00:00

TIME	ELAPSED TIME T (MINUTES)	PRESSURE (PSI)	CHANGE IN PRESSURE (PSI)	CHANGE IN HEAD (FEET)	DH/DH0
(NOV 03, 1983)					
11:00:00	0.000	8.6250	0.7050	1.626	1.0000
11:00:01	0.017	8.4900	0.5700	1.315	0.8085
11:00:02	0.033	8.4750	0.5550	1.280	0.7872
11:00:03	0.050	8.4600	0.5400	1.246	0.7660
11:00:04	0.067	8.4450	0.5250	1.211	0.7447
11:00:05	0.083	8.4300	0.5100	1.176	0.7234
11:00:06	0.100	8.4150	0.4950	1.142	0.7021
11:00:08	0.133	8.4000	0.4800	1.107	0.6809
11:00:09	0.150	8.3850	0.4650	1.073	0.6596
11:00:10	0.167	8.3700	0.4500	1.038	0.6383
11:00:12	0.200	8.3550	0.4350	1.003	0.6170
11:00:13	0.217	8.3400	0.4200	0.969	0.5957
11:00:15	0.250	8.3250	0.4050	0.934	0.5745
11:00:16	0.267	8.3100	0.3900	0.900	0.5532
11:00:18	0.300	8.2950	0.3750	0.865	0.5319
11:00:19	0.317	8.2800	0.3600	0.830	0.5106
11:00:21	0.350	8.2650	0.3450	0.796	0.4894
11:00:23	0.383	8.2500	0.3300	0.761	0.4681
11:00:25	0.417	8.2350	0.3150	0.727	0.4468
11:00:28	0.467	8.2200	0.3000	0.692	0.4255
11:00:29	0.483	8.2050	0.2850	0.657	0.4043
11:00:32	0.533	8.1900	0.2700	0.623	0.3830
11:00:34	0.567	8.1750	0.2550	0.588	0.3617
11:00:36	0.600	8.1600	0.2400	0.554	0.3404
11:00:40	0.667	8.1450	0.2250	0.519	0.3191
11:00:42	0.700	8.1300	0.2100	0.484	0.2979
11:00:45	0.750	8.1150	0.1950	0.450	0.2766
11:00:49	0.817	8.1000	0.1800	0.415	0.2553
11:00:53	0.883	8.0850	0.1650	0.381	0.2340

Table B-1. Well 3D Aquifer Test Data (Continued, page 2 of 6)

SLUG TEST

PROJECT #83 405 402
PAGE #02

WELL NUMBER : MW3D

CASING LENGTH	:	82.34 FEET
CASING DIAMETER	:	2.00 INCHES
CASING STICK-UP	:	1.34 FEET
SCREEN LENGTH	:	10.00 FEET
GRAVEL PACK DIAMETER	:	6.00 INCHES
GRAVEL PACK POROSITY	:	0.3000
AQUIFER THICKNESS	:	200.00 FEET
DEPTH TO WATER	:	6. FEET
STATIC PRESSURE	:	7.9200 PSI

TEST METHOD : SLUG IN
TEST STARTING DATE : NOV 03, 1983 TIME = 11:00:00

TIME	ELAPSED TIME T (MINUTES)	PRESSURE (PSI)	CHANGE IN PRESSURE (PSI)	CHANGE IN HEAD (FEET)	DH/DH0
(NOV 03, 1983)					
11:00:57	0.950	8.0700	0.1500	0.346	0.2128
11:01:02	1.033	8.0550	0.1350	0.311	0.1915
11:01:10	1.167	8.0400	0.1200	0.277	0.1702
11:01:15	1.250	8.0250	0.1050	0.242	0.1489
11:01:25	1.417	8.0100	0.0900	0.208	0.1277
11:01:30	1.500	7.9950	0.0750	0.173	0.1064
11:01:40	1.667	7.9800	0.0600	0.138	0.0851
11:01:50	1.833	7.9650	0.0450	0.104	0.0638
11:02:05	2.083	7.9500	0.0300	0.069	0.0426
11:02:25	2.417	7.9350	0.0150	0.035	0.0213
11:02:50	2.833	7.9350	0.0150	0.035	0.0213
11:03:20	3.333	7.9200	0.0000	0.000	0.0000

Table B-1. Well 3D Aquifer Test Data (Continued, page 3 of 6)

SLUG TEST

PROJECT #83 405 402
PAGE #03

WELL NUMBER	: MW3D	
CASING LENGTH	:	82.34 FEET
CASING DIAMETER	:	2.00 INCHES
CASING STICK-UP	:	1.34 FEET
SCREEN LENGTH	:	10.00 FEET
GRAVEL PACK DIAMETER	:	6.00 INCHES
GRAVEL PACK POROSITY	:	0.3000
AQUIFER THICKNESS	:	200.00 FEET
DEPTH TO WATER	:	6. FEET
STATIC PRESSURE	:	7.9200 PSI

TEST METHOD : SLUG IN
TEST STARTING DATE : NOV 03, 1983 TIME = 11:00:00

HYDRAULIC CONDUCTIVITY COMPUTATION

BOUWER & RICE (1976) METHOD

K = RC**2/2L*LN(RE/RW)*(1/T)*LN(Y0/YT)

HYDRAULIC CONDUCTIVITY = 0.2509E-04 FEET/SEC
95% CONFIDENCE LIMIT : 0.2452E-04 --- 0.2567E-04 FEET/SEC

HVORSLEV (1951) METHOD

K = RC**2/2L*(1/T)*LN(DH0/DH)

HYDRAULIC CONDUCTIVITY = 0.3771E-04 FEET/SEC
95% CONFIDENCE LIMIT : 0.3558E-04 --- 0.4001E-04 FEET/SEC

Table B-1. Well 3D Aquifer Test Data (Continued, page 4 of 6)

SLUG TEST

PROJECT #83 405 402
PAGE #01

WELL NUMBER : MW3D
CASING LENGTH : 83.00 FEET
CASING DIAMETER : 2.00 INCHES
CASING STICK-UP : 2.00 FEET
SCREEN LENGTH : 10.00 FEET
GRAVEL PACK DIAMETER : 6.00 INCHES
GRAVEL PACK POROSITY : 0.3000
AQUIFER THICKNESS : 200.00 FEET
DEPTH TO WATER : 6. FEET
STATIC PRESSURE : 7.9350 PSI

TEST METHOD : SLUG OUT
TEST STARTING DATE : NOV 03, 1983 TIME = 11:45:00

TIME	ELAPSED TIME T (MINUTES)	PRESSURE (PSI)	CHANGE IN PRESSURE (PSI)	CHANGE IN HEAD (FEET)	DH/DH0
(NOV 03, 1983)					
11:45:00	0.000	7.2750	0.6600	1.522	1.0000
11:45:01	0.017	7.2900	0.6450	1.488	0.9773
11:45:02	0.033	7.3200	0.6150	1.419	0.9318
11:45:03	0.050	7.3500	0.5850	1.349	0.8864
11:45:05	0.083	7.3800	0.5550	1.280	0.8409
11:45:06	0.100	7.3800	0.5550	1.280	0.8409
11:45:07	0.117	7.4100	0.5250	1.211	0.7955
11:45:08	0.133	7.4250	0.5100	1.176	0.7727
11:45:09	0.150	7.4550	0.4800	1.107	0.7273
11:45:10	0.167	7.4700	0.4650	1.073	0.7045
11:45:11	0.183	7.4850	0.4500	1.038	0.6818
11:45:12	0.200	7.5000	0.4350	1.003	0.6591
11:45:14	0.233	7.5150	0.4200	0.969	0.6364
11:45:15	0.250	7.5300	0.4050	0.934	0.6136
11:45:16	0.267	7.5300	0.4050	0.934	0.6136
11:45:17	0.283	7.5450	0.3900	0.900	0.5909
11:45:19	0.317	7.5600	0.3750	0.865	0.5682
11:45:21	0.350	7.5750	0.3600	0.830	0.5455
11:45:22	0.367	7.5900	0.3450	0.796	0.5227
11:45:23	0.383	7.6050	0.3300	0.761	0.5000
11:45:25	0.417	7.6200	0.3150	0.727	0.4773
11:45:27	0.450	7.6200	0.3150	0.727	0.4773
11:45:28	0.467	7.6350	0.3000	0.692	0.4545
11:45:30	0.500	7.6500	0.2850	0.657	0.4318
11:45:32	0.533	7.6650	0.2700	0.623	0.4091
11:45:34	0.567	7.6800	0.2550	0.588	0.3864
11:45:36	0.600	7.6950	0.2400	0.554	0.3636
11:45:38	0.633	7.6950	0.2400	0.554	0.3636
11:45:39	0.650	7.7100	0.2250	0.519	0.3409

Table B-1. Well 3D Aquifer Test Data (Continued, page 5 of 6)

SLUG TEST

PROJECT #83 405 402
PAGE #02

WELL NUMBER : MW3D

CASING LENGTH	:	83.00 FEET
CASING DIAMETER	:	2.00 INCHES
CASING STICK-UP	:	2.00 FEET
SCREEN LENGTH	:	10.00 FEET
GRAVEL PACK DIAMETER	:	6.00 INCHES
GRAVEL PACK POROSITY	:	0.3000
AQUIFER THICKNESS	:	200.00 FEET
DEPTH TO WATER	:	6. FEET
STATIC PRESSURE	:	7.9350 PSI

TEST METHOD : SLUG OUT
TEST STARTING DATE : NOV 03, 1983 TIME = 11:45:00

TIME	ELAPSED TIME T (MINUTES)	PRESSURE (PSI)	CHANGE IN PRESSURE (PSI)	CHANGE IN HEAD (FEET)	DH/DH0
(NOV 03, 1983)					
11:45:42	0.700	7.7100	0.2250	0.519	0.3409
11:45:43	0.717	7.7250	0.2100	0.484	0.3182
11:45:45	0.750	7.7250	0.2100	0.484	0.3182
11:45:46	0.767	7.7400	0.1950	0.450	0.2955
11:45:47	0.783	7.7400	0.1950	0.450	0.2955
11:45:52	0.867	7.7550	0.1800	0.415	0.2727
11:45:57	0.950	7.7700	0.1650	0.381	0.2500
11:46:02	1.033	7.8000	0.1350	0.311	0.2045
11:46:12	1.200	7.8150	0.1200	0.277	0.1818
11:46:17	1.283	7.8300	0.1050	0.242	0.1591
11:46:22	1.367	7.8450	0.0900	0.208	0.1364
11:46:27	1.450	7.8600	0.0750	0.173	0.1136
11:46:37	1.617	7.8600	0.0750	0.173	0.1136
11:46:42	1.700	7.8750	0.0600	0.138	0.0909
11:46:52	1.867	7.8750	0.0600	0.138	0.0909
11:46:57	1.950	7.8900	0.0450	0.104	0.0682
11:47:07	2.117	7.8900	0.0450	0.104	0.0682
11:47:12	2.200	7.9050	0.0300	0.069	0.0455
11:47:27	2.450	7.9050	0.0300	0.069	0.0455
11:47:42	2.700	7.9050	0.0300	0.069	0.0455
11:48:12	3.200	7.9050	0.0300	0.069	0.0455
11:48:57	3.950	7.9050	0.0300	0.069	0.0455
11:49:07	4.117	7.9200	0.0150	0.035	0.0227
11:49:37	4.617	7.9200	0.0150	0.035	0.0227
11:50:07	5.117	7.9200	0.0150	0.035	0.0227
11:51:07	6.117	7.9200	0.0150	0.035	0.0227
11:51:57	6.950	7.9200	0.0150	0.035	0.0227
11:52:07	7.117	7.9350	-0.0000	-0.000	-0.0000
11:52:27	7.450	7.9350	-0.0000	-0.000	-0.0000

Table B-1. Well 3D Aquifer Test Data (Continued, page 6 of 6)

SLUG TEST

PROJECT #83 405 402
PAGE #03

WELL NUMBER : MW3D

CASING LENGTH	:	83.00 FEET
CASING DIAMETER	:	2.00 INCHES
CASING STICK-UP	:	2.00 FEET
SCREEN LENGTH	:	10.00 FEET
GRAVEL PACK DIAMETER	:	6.00 INCHES
GRAVEL PACK POROSITY	:	0.3000
AQUIFER THICKNESS	:	200.00 FEET
DEPTH TO WATER	:	6. FEET
STATIC PRESSURE	:	7.9350 PSI

TEST METHOD : SLUG OUT
TEST STARTING DATE : NOV 03, 1983 TIME = 11:45:00

HYDRAULIC CONDUCTIVITY COMPUTATION

BOUWER & RICE (1976) METHOD

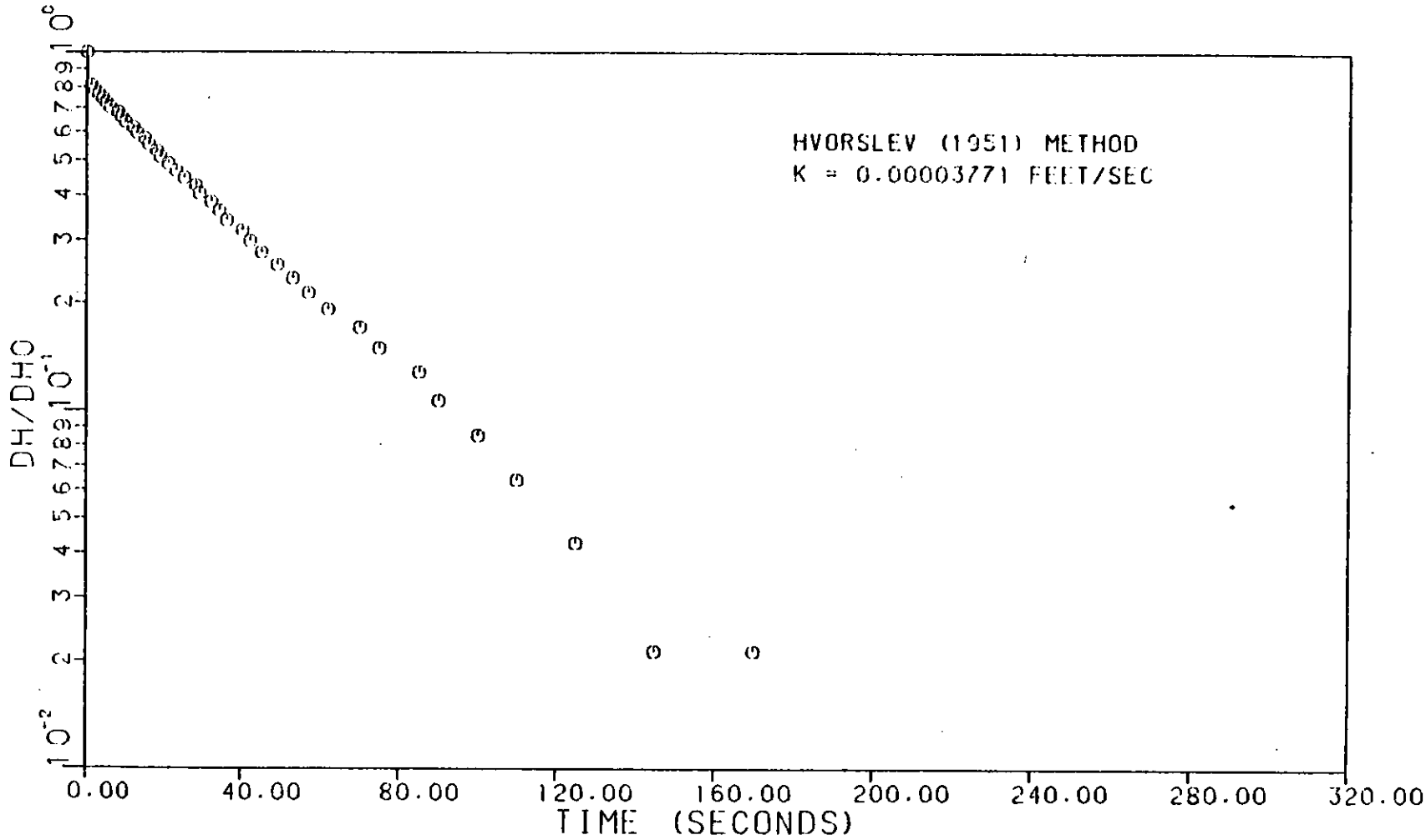
K = RC**2/2L*LN(RE/RW)*(1/T)*LN(Y0/YT)

HYDRAULIC CONDUCTIVITY = 0.1810E-04 FEET/SEC
95% CONFIDENCE LIMIT : 0.1660E-04 --- 0.1960E-04 FEET/SEC

HVORSLEV (1951) METHOD

K = RC**2/2L*(1/T)*LN(DH0/DH)

HYDRAULIC CONDUCTIVITY = 0.3160E-04 FEET/SEC
95% CONFIDENCE LIMIT : 0.2518E-04 --- 0.4032E-04 FEET/SEC

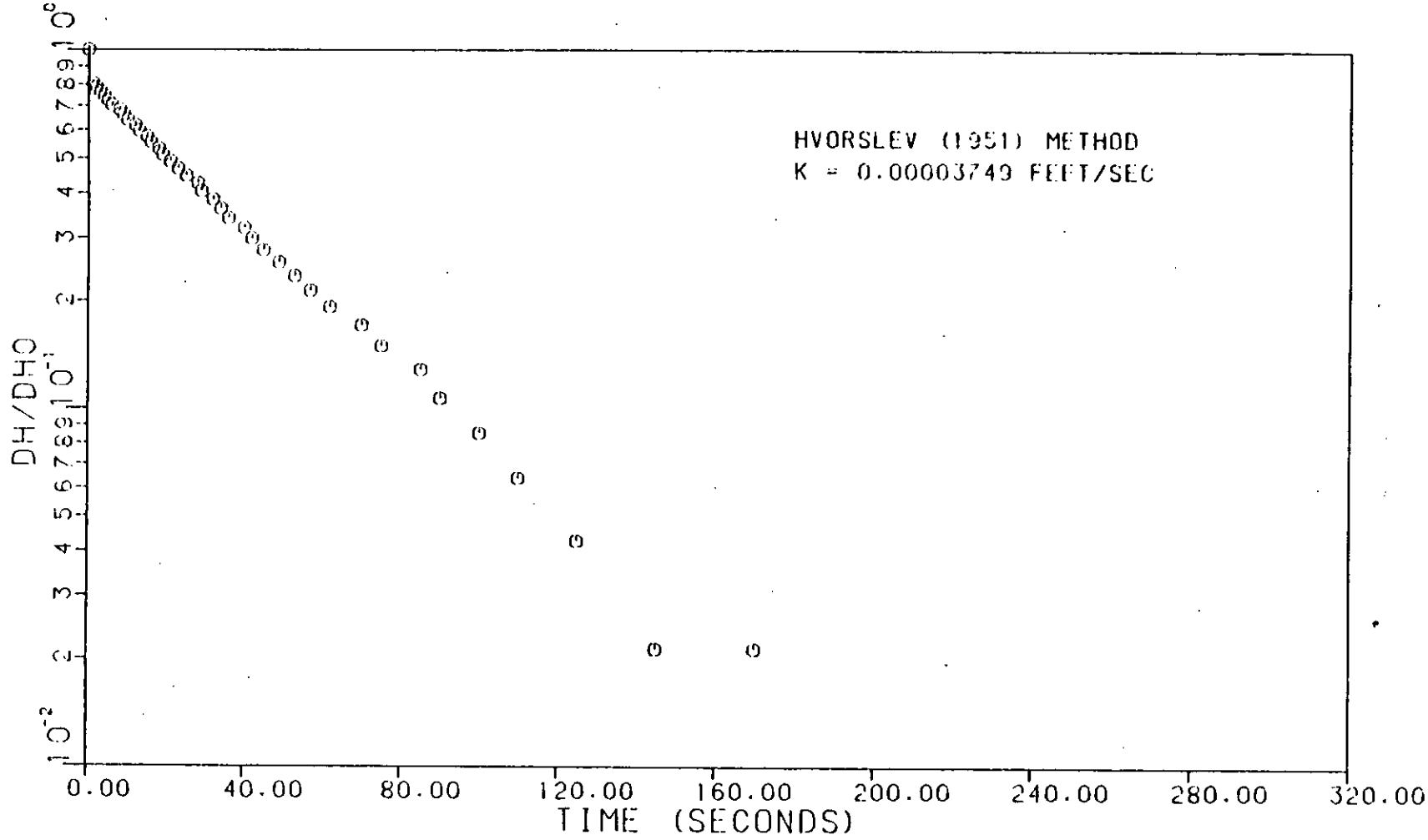


SLUG TEST (SLUG IN)

PROJECT NO : 83 405 402

WELL NUMBER MW3D
CASING DIAMETER : 2.00 INCHES
SCREEN LENGTH : 10.00 FEET
AQUIFER THICKNESS : 200.0 FEET

TEST STARTING DATE/TIME : NOV 03, 1983 / 11:00:00
WATER LEVEL IS 77.41 FEET ABOVE BOTTOM OF SCREEN
GRAVEL PACK DIAMETER : 6.00 INCHES
GRAVEL PACK POROSITY : 0.30

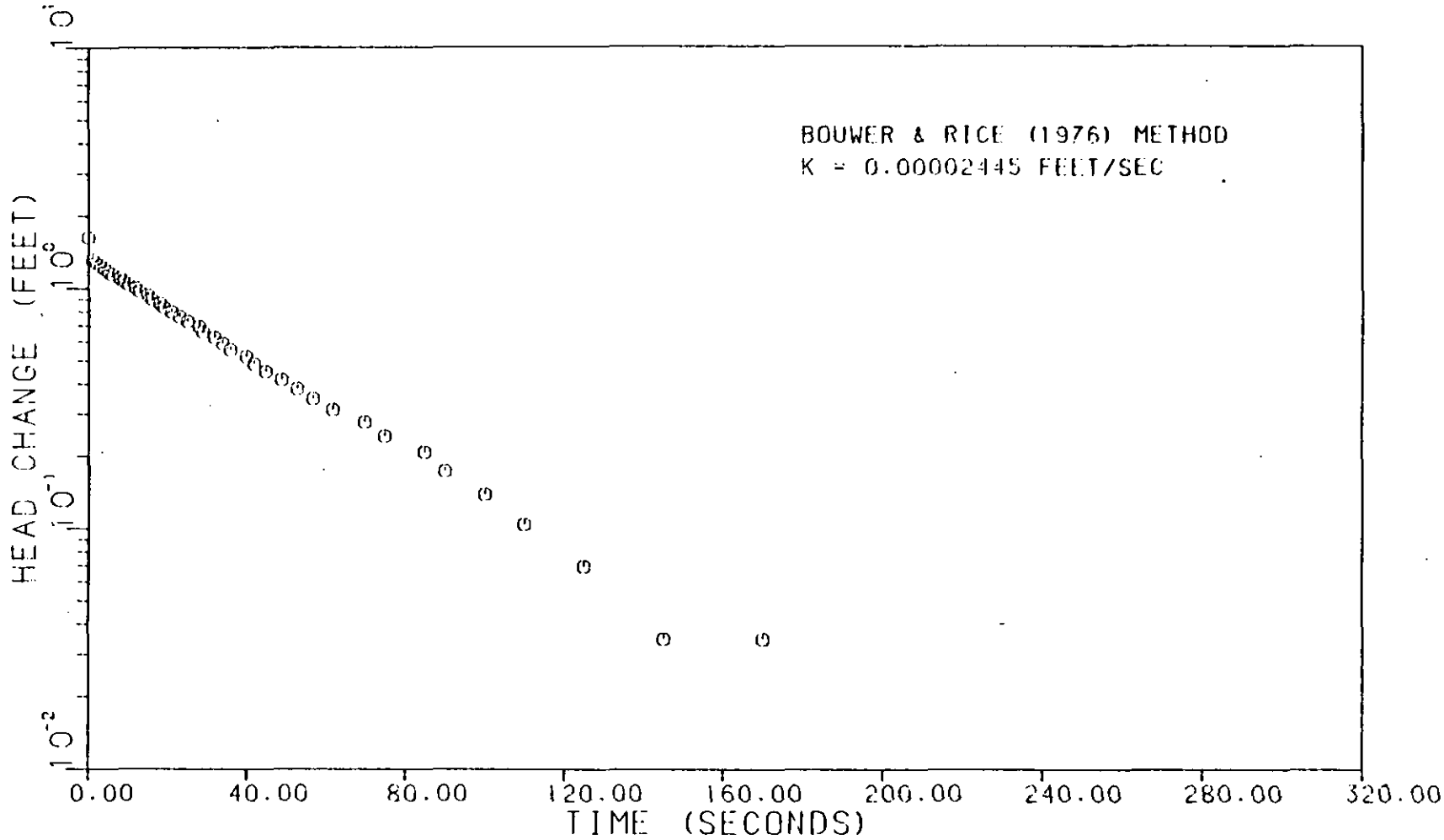


SLUG TEST (SLUG IN)

PROJECT NO : 83 405 402

WELL NUMBER MW3D
CASING DIAMETER : 2.00 INCHES
SCREEN LENGTH : 10.00 FEET
AQUIFER THICKNESS : 200.0 FEET

TEST STARTING DATE/TIME : NOV 03, 1983 / 11:00:00
WATER LEVEL IS 77.41 FEET ABOVE BOTTOM OF SCREEN
GRAVEL PACK DIAMETER : 6.00 INCHES
GRAVEL PACK POROSITY : 0.30

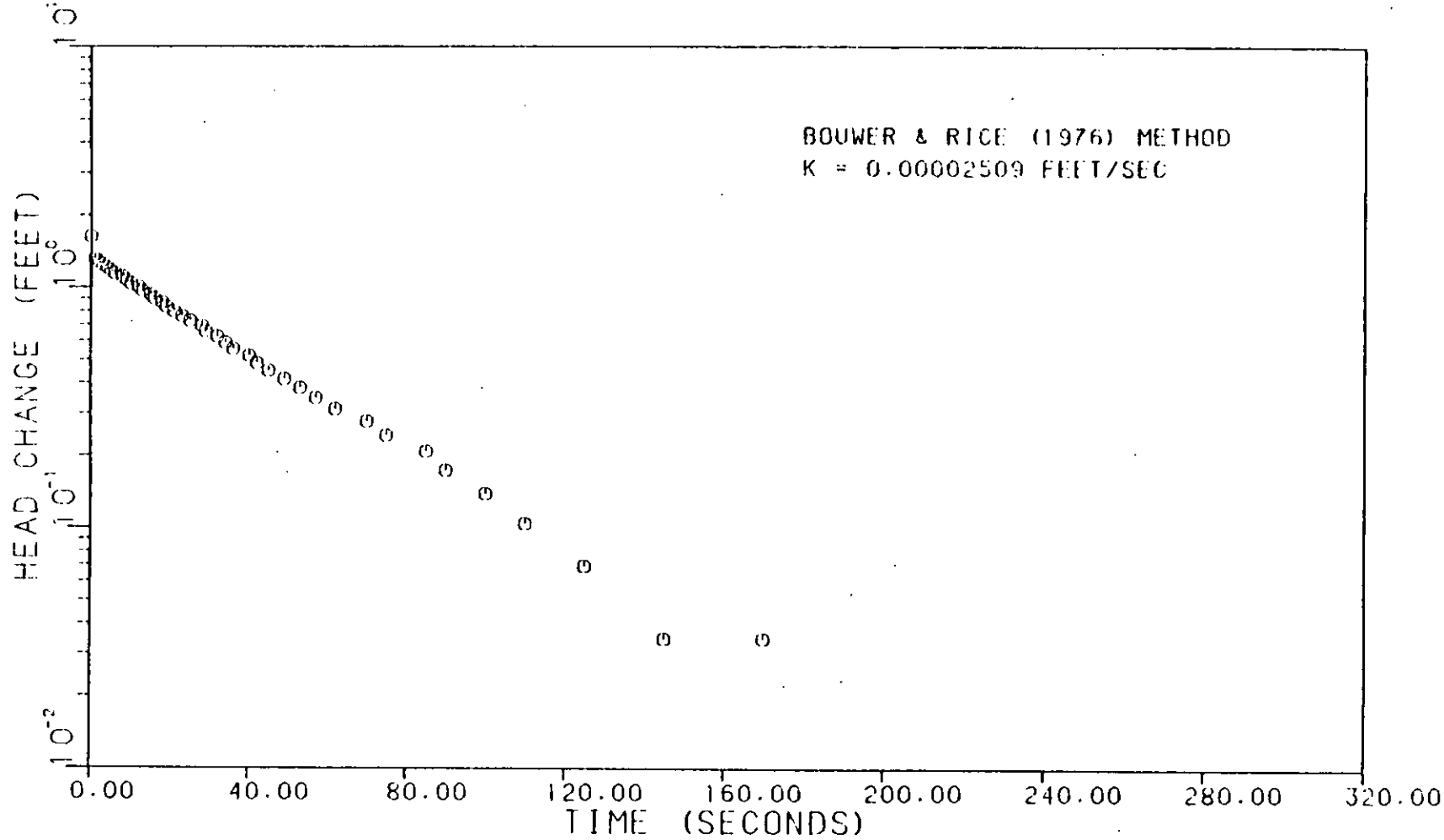


SLUG TEST (SLUG IN)

PROJECT NO : 83 405 402

WELL NUMBER MW3D
CASING DIAMETER : 2.00 INCHES
SCREEN LENGTH : 10.00 FEET
AQUIFER THICKNESS : 200.0 FEET

TEST STARTING DATE/TIME : NOV 03, 1983 / 11:00:00
WATER LEVEL IS 77.41 FEET ABOVE BOTTOM OF SCREEN
GRAVEL PACK DIAMETER : 6.00 INCHES
GRAVEL PACK POROSITY : 0.30

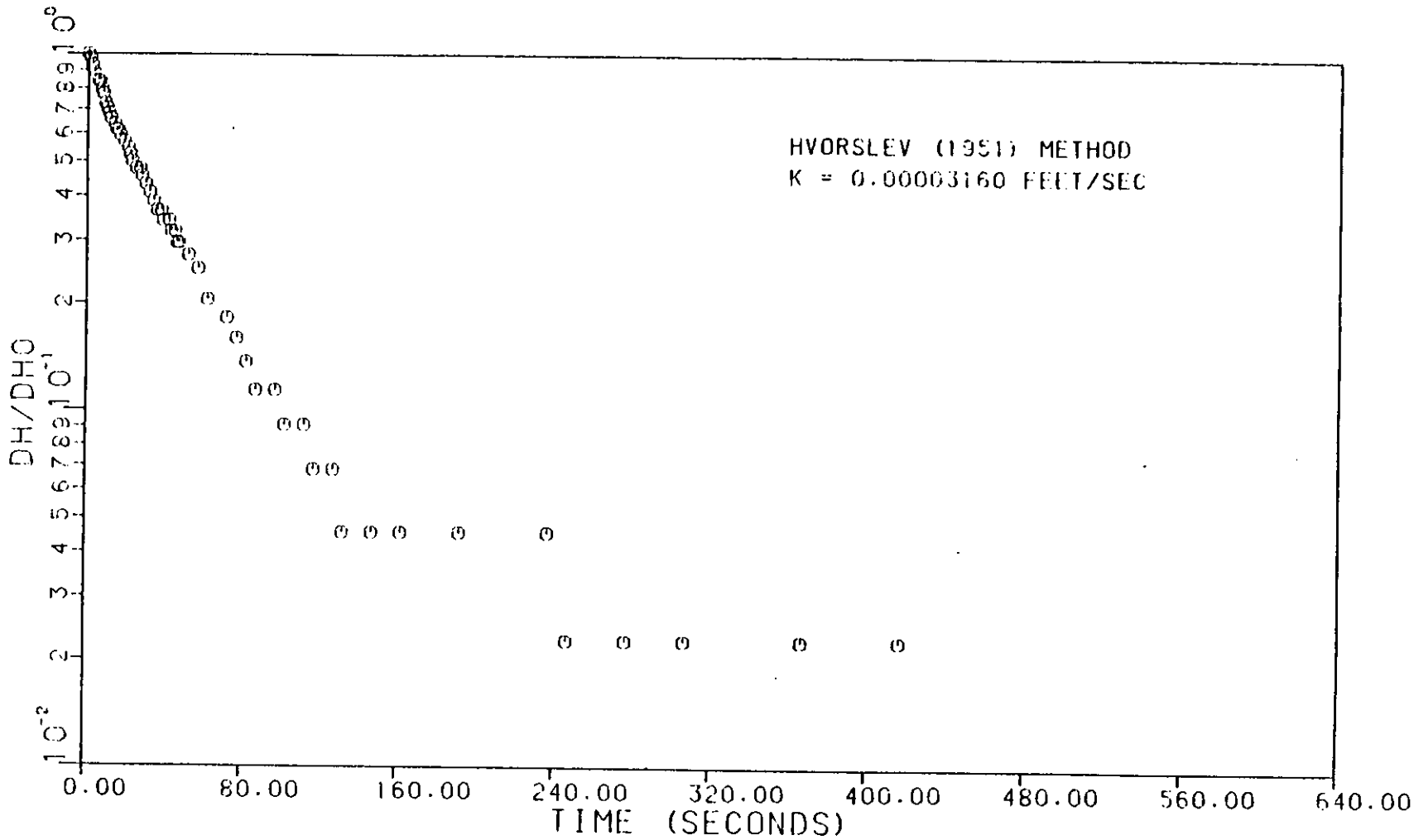


SLUG TEST (SLUG IN)

PROJECT NO : 83 405 402

WELL NUMBER MW3D
CASING DIAMETER : 2.00 INCHES
SCREEN LENGTH : 10.00 FEET
AQUIFER THICKNESS : 200.0 FEET

TEST STARTING DATE/TIME : NOV 03, 1983 / 11:00:00
WATER LEVEL IS 77.41 FEET ABOVE BOTTOM OF SCREEN
GRAVEL PACK DIAMETER : 6.00 INCHES
GRAVEL PACK POROSITY : 0.30

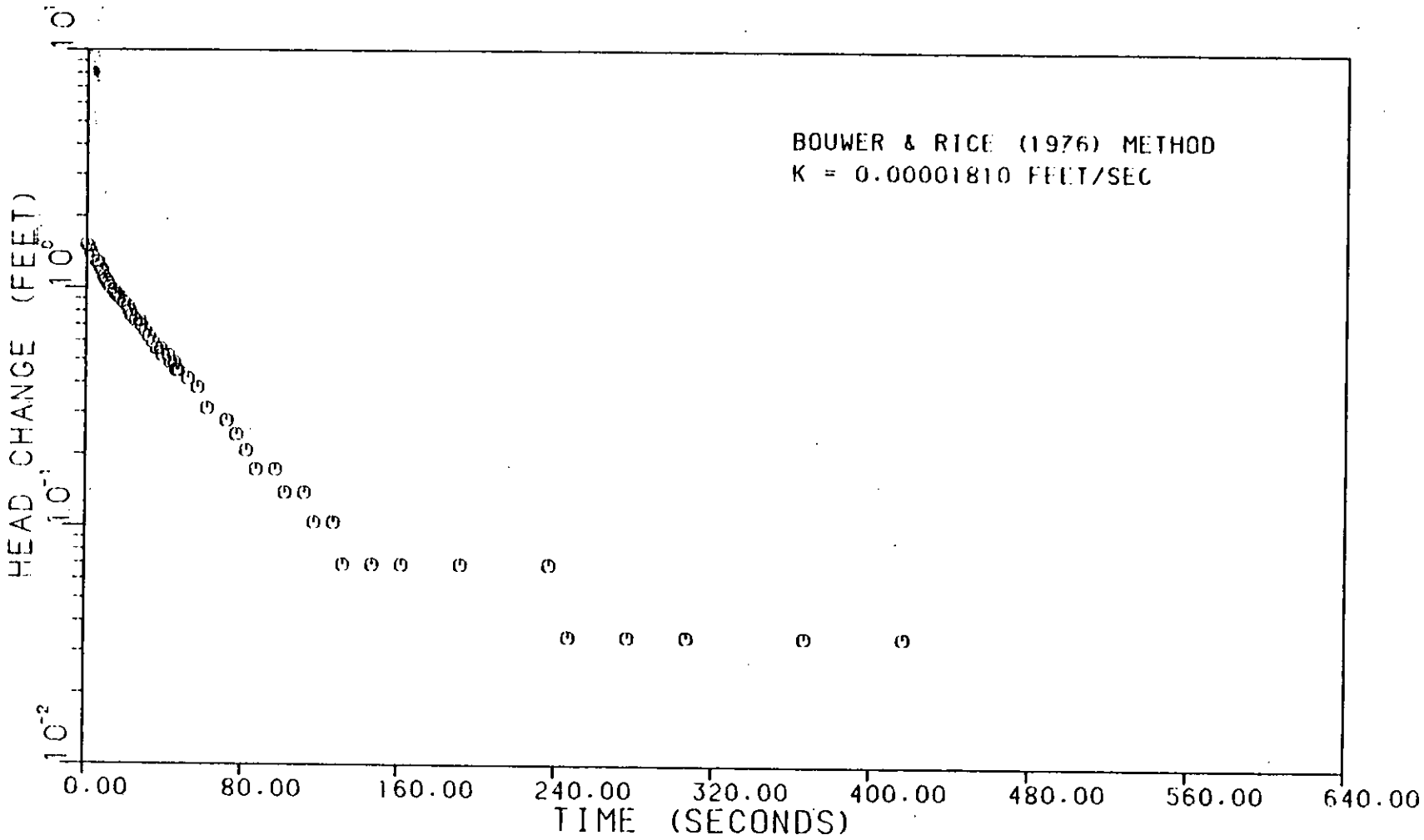


SLUG TEST (SLUG OUT)

PROJECT NO : 83 405 402

WELL NUMBER MW3D
CASING DIAMETER : 2.00 INCHES
SCREEN LENGTH : 10.00 FEET
AQUIFER THICKNESS : 200.0 FEET

TEST STARTING DATE/TIME : NOV 03, 1983 / 11:45:00
WATER LEVEL IS 77.41 FEET ABOVE BOTTOM OF SCREEN
GRAVEL PACK DIAMETER : 6.00 INCHES
GRAVEL PACK POROSITY : 0.30



SLUG TEST (SLUG OUT)

PROJECT NO : 83 405 402

WELL NUMBER MW3D
CASING DIAMETER : 2.00 INCHES
SCREEN LENGTH : 10.00 FEET
AQUIFER THICKNESS : 200.0 FEET

TEST STARTING DATE/TIME : NOV 03, 1983 / 11:45:00
WATER LEVEL IS 77.41 FEET ABOVE BOTTOM OF SCREEN
GRAVEL PACK DIAMETER : 6.00 INCHES
GRAVEL PACK POROSITY : 0.30

APPENDIX C

WATER QUALITY DATA--SEDIMENT, SURFACE WATER, AND GROUND WATER ANALYSES

ENVIRONMENTAL SCIENCE & ENGINEERING 02/15/84 STATUS: FINAL QC

PROJECT NUMBER 83405400 PROJECT NAME FINELLAS CO
FIELD GROUP: PSED1 PROJECT MANAGER: KAREN HATFIELD
PARAMETERS: ALL SAMPLES: ALL FIELD GROUP LEADER: RON ELLIOT

PARAMETERS	STORET # / METHOD #	SAMPLE NUMBERS 1-A 302900	1-B 302901	2-A 302902	2-B 302903	3-A 302904	3-B 302905
DATE		11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/15/83
TIME		0	0	0	0	0	0
ARSENIC,SED (MG/KG-DRY)	1003 0	<5.0	<2.6	NA	<3.3	<8.0	<4.5
BARIUM,SED (MG/KG-DRY)	1008 0	17	3	NA	8	71	54
CADMIUM,SED (MG/KG-DRY)	1028 0	<0.7	<0.4	NA	<0.5	1.5	0.7
CHROMIUM,SED (MG/KG-DRY)	1029 0	8.9	3.3	NA	7.2	76.1	62.1
LEAD,SED (MG/KG-DRY)	1052 0	11.4	2.8	NA	5.9	36.0	30.3
MERCURY,SED(MG/KG-DRY)	71921 0	<2.51	<1.32	NA	<1.65	<3.98	<2.23
SELENIUM,SED (MG/KG-DRY)	1148 0	<4.0	<2.1	NA	<2.6	<6.2	<3.5
SILVER,SED (MG/KG-DRY)	1078 0	<0.7	<0.4	NA	<0.5	<1.1	<0.6
ALUMINUM,SED (MG/KG-DRY)	1108 0	5210	1740	NA	2870	37900	32700
COPPER,SED(MG/KG-DRY)	1043 0	1	<0.2	NA	1	10	6
IRON,SED (MG/KG-DRY)	1170 0	3440	1290	NA	1910	13600	11000
NICKEL,SED (MG/KG-DRY)	1068 0	4	1	NA	1	18	16
NITROG,NO3,SED(MG/KG-DRY)	621 0	0.40	<0.20	NA	<0.20	<0.20	<0.20
CHLORIDE,SED(MG/KG-DRY)	99120 0	1740000	515000	683000	1330000	2380000	3320000
COD,SED(MG/KG-DRY)	339 0	25200	2120	11900	6560	34000	34800
COLIFORM,T.,MPN,SED #/100G-DRY	31521 0	1100	75	1100	460	28	43
MOISTURE(%WET WT)	70320 0	77.0	31.0	48.0	40.0	59.0	56.0
PH,SED(STD.UNITS)	70310 0	8.4	8.9	8.3	8.3	7.8	7.9
NITROG,NO2,SED(MG/KG-DRY)	616 0	<0.2	<0.07	NA	<0.08	0.1	0.1
NITROG,NO2+NO3,SED (MG/KG-DRY	633 0	0.5	0.2	NA	0.2	0.2	0.1

Table C-1. Results of Sediment Analyses (page 1 Of 2)

ENVIRONMENTAL SCIENCE & ENGINEERING 02/15/84 STATUS: FINAL QC

PROJECT NUMBER 83405400
FIELD GROUP: PSED1
PARAMETERS: ALL SAMPLES: ALL

PROJECT NAME PINELLAS CO
PROJECT MANAGER: KAREN HATFIELD
FIELD GROUP LEADER: RON ELLIOT

PARAMETERS	STORET # / METHOD #	SAMPLE NUMBERS 1-A 302900	1-B 302901	2-A 302902	2-B 302903	3-A 302904	3-B 302905
DATE		11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/15/83
TIME		0	0	0	0	0	0
ZINC,SED (MG/KG-DRY)	1093 0	17	2	NA	7	53	44

Table C-1. Results of Sediment Analyses (Continued, page 2 of 2)

ENVIRONMENTAL SCIENCE & ENGINEERING 02/15/84 STATUS: FINAL QC

PROJECT NUMBER 83405400 PROJECT NAME PINELLAS CO
FIELD GROUP: POW-1 PROJECT MANAGER: KAREN HATFIELD
PARAMETERS: ALL SAMPLES: ALL FIELD GROUP LEADER: RON ELLIOT

PARAMETERS	STORET # METHOD #	SAMPLE NUMBERS 1-A 302800	1-B 302801	1-C 302802	2-A 302803	2-B 302804	2-C 302805	3-A 302806	3-B 302807	3-C 302808
DATE		11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/15/83
TIME		1245	1230	1240	1245	1250	1255	1300	1300	1305
ARSENIC,TOTAL(UG/L)	10020	1.5	1.6	1.5	5.3	5.5	4.8	33	30	34
BARIUM,TOTAL(UG/L)	10070	26	27	26	81	77	74	370	365	375
CADMIUM,TOTAL(UG/L)	10270	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
CHROMIUM,TOTAL(UG/L)	10340	<9.0	<9.0	<9.0	<9.0	<9.0	<9.0	160	150	200
LEAD,TOTAL(UG/L)	10510	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	22.8	19.5	20.0
MERCURY,TOTAL(UG/L)	719000	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.6	0.6	0.3
SELENIUM,TOTAL(UG/L)	11470	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.7	7.6	7.9
SILVER,TOTAL(UG/L)	10770	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
ALUMINUM,TOTAL(UG/L)	11050	66	91	93	46	187	37	65800	58900	83100
COPPER,TOTAL(UG/L)	10420	3.0	<3.0	<3.0	3.5	<3.0	<3.0	114	118	110
IRON,TOTAL(UG/L)	10450	158	158	<16	197	163	57	28800	27800	34100
NICKEL,T,(UG/L)	10670	<18	<18	<18	<18	<18	<18	85	72	70
ZINC,TOTAL(UG/L)	10920	<5.0	<5.0	<5.0	<5.0	<5.0	17.0	338.0	334.0	322.0
NITROG,NO2+NO3(MG/L)	6300	<0.010	<0.010	<0.010	0.267	0.324	0.258	0.237	0.234	0.232
NITROGEN,NO2(MG/L)	6150	<0.010	<0.010	<0.010	0.239	0.294	0.232	0.190	0.185	0.185
NITROG,NO3,CAL(MG/L)	6200	<0.010	<0.010	<0.010	0.028	0.030	0.025	0.046	0.049	0.047
CHLORIDE (MG/L)	9400	440	436	436	857	872	853	1940	2070	1800
COD,LOW LEVEL(MG/L)	3350	30	44	44	72	69	107	314	359	284
COLIFORM,T.,MPN (#/100ML)	315060	43	7	4	240	93	150	460	28	>2400

Table C-2. Results of Surface Water Analyses

ENVIRONMENTAL SCIENCE & ENGINEERING 02/15/84 STATUS: FINAL QC

PROJECT NUMBER 83405400
FIELD GROUP: PGW-1
PARAMETERS: ALL SAMPLES: PART

PROJECT NAME PINELLAS CO
PROJECT MANAGER: KAREN HATFIELD
FIELD GROUP LEADER: RON ELLIOT

PARAMETERS	STORET # METHOD #	SAMPLE NUMBERS 7-D 302700	7-S 302701	8-D 302702	8-S 302703	3-D 302704	3-S 302705	4-D 302706	4-S 302707	5-D 302708	5-S 302709
DATE		11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/16/83	11/16/83	11/16/83	11/16/83
TIME		945	1020	1115	1130	1500	1520	1050	1030	1105	1045
ARSENIC,TOTAL(UG/L)	1002 0	3.3	35	1.2	7.8	0.9	19	24	6.4	8.5	17
BARIUM,TOTAL(UG/L)	1007 0	278	73	1370	55	199	95	71	42	48	115
CADMIUM,TOTAL(UG/L)	1027 0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
CHROMIUM,TOTAL(UG/L)	1034 0	<9.0	82	<9.0	46	13	120	<10	<9.0	49	140
LEAD,TOTAL(UG/L)	1051 0	<4.0	5.0	<4.0	4.1	<4.0	19.5	6.8	<4.0	<4.0	15.8
MERCURY,TOTAL(UG/L)	71900 0	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
SELENIUM,TOTAL(UG/L)	1147 0	<1.0	3.6	<1.0	1.2	<1.0	9.9	2.5	2.3	1.0	5.4
SILVER,TOTAL(UG/L)	1077 0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
ALUMINUM,TOTAL(UG/L)	1105 0	493	17500	422	10900	588	29300	32100	5560	8390	45500
COPPER,TOTAL(UG/L)	1042 0	8.5	16.0	5.7	12.0	15.0	24.0	11.0	<3.0	8.2	28.0
IRON,TOTAL(UG/L)	1045 0	455	17000	300	8010	515	15700	14600	5330	4350	17400
NICKEL,T,(UG/L)	1067 0	<18	27	<18	<18	<18	23	40	<18	<18	25
ZINC,TOTAL(UG/L)	1092 0	52.0	43.0	29.0	21.0	29.0	68.0	59.0	39.0	32.0	64.0
NITROG,NO2+NO3(MG/L)	630 0	<0.010	<0.010	0.014	<0.010	0.015	<0.010	<0.010	<0.010	<0.010	<0.010
NITROGEN,NO2(MG/L)	615 0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
NITROG,NO3,CAL(MG/L)	620 0	<0.010	<0.010	0.009	<0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
CHLORIDE (MG/L)	940 0	274	94.0	180	135	79.0	68.0	199	169	172	46.0
COD,LOW LEVEL(MG/L)	335 0	8	66	26	44	17	64	38	49	15	57
COLIFORM,T.,MPN (#/100ML)	31506 0	43	210	<3	9	<3	15	7	<3	<3	3
SP.COND.,FIELD (UMHOS/CM)	94 0	1570	1070	1460	1240	1260	873	1130	1240	773	1020

Table C-3. Results of Ground Water Analyses (Page 1 of 4)

ENVIRONMENTAL SCIENCE & ENGINEERING 02/15/84 STATUS: FINAL QC

PROJECT NUMBER 83405400
FIELD GROUP: PGW-1
PARAMETERS: ALL SAMPLES: PART

PROJECT NAME PINELLAS CO
PROJECT MANAGER: KAREN HATFIELD
FIELD GROUP LEADER: RON ELLIOT

PARAMETERS	STORET # / METHOD #	SAMPLE NUMBERS 7-D 302700	7-S 302701	8-D 302702	8-S 302703	3-D 302704	3-S 302705	4-D 302706	4-S 302707	5-D 302708	5-S 302709
DATE		11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/15/83	11/16/83	11/16/83	11/16/83	11/16/83
TIME		945	1020	1115	1130	1500	1520	1050	1030	1105	1045
PH,(STD UNITS)	400 0	7.20	6.90	7.20	7.00	7.40	7.10	7.10	6.80	7.20	6.70
WATER TEMP (C)	10 0	24.8	27.7	28.5	26.0	28.3	NA	22.3	24.1	22.5	23.0

Table C-3. Results of Ground Water Analyses (Continued, page 2 of 4)

ENVIRONMENTAL SCIENCE & ENGINEERING 02/15/84 STATUS: FINAL QC

PROJECT NUMBER 83405400
FIELD GROUP: PGW-1
PARAMETERS: ALL SAMPLES: PART

PROJECT NAME PINELLAS CO
PROJECT MANAGER: KAREN HATFIELD
FIELD GROUP LEADER: RON ELLIOT

PARAMETERS	STORET # METHOD #	SAMPLE NUMBERS 6-S 302710	1-S 302711	1-D 302712	9-D 302713	9-S 302714
DATE		11/16/83	11/17/83	11/17/83	11/17/83	11/17/83
TIME		1630	1000	1330	1430	1500
ARSENIC,TOTAL(UG/L)	1002 0	4.7	19	14	7.8	10.0
BARIUM,TOTAL(UG/L)	1007 0	47	138	186	229	119
CADMIUM,TOTAL(UG/L)	1027 0	<10.0	<10.0	<10.0	<10.0	<10.0
CHROMIUM,TOTAL(UG/L)	1034 0	<9.0	160	120	18	45
LEAD,TOTAL(UG/L)	1051 0	<4.0	<4.0	<4.0	<4.0	<4.0
MERCURY,TOTAL(UG/L)	71900 0	<0.2	<0.2	<0.2	0.3	<0.2
SELENIUM,TOTAL(UG/L)	1147 0	<1.0	3.8	2.9	<1.0	<1.0
SILVER,TOTAL(UG/L)	1077 0	<6.0	<6.0	<6.0	<6.0	<6.0
ALUMINUM,TOTAL(UG/L)	1105 0	1600	59000	29400	958	9650
COPPER,TOTAL(UG/L)	1042 0	<3.0	23.0	21.0	21.0	11.0
IRON,TOTAL(UG/L)	1045 0	2680	27800	14500	1510	16100
NICKEL,T,(UG/L)	1067 0	<18	50	39	<18	<18
ZINC,TOTAL(UG/L)	1092 0	18.0	87.0	84.0	68.0	37.0
NITROG,NO2+NO3(MG/L)	630 0	<0.010	<0.010	0.093	0.014	<0.010
NITROGEN,NO2(MG/L)	615 0	<0.010	<0.010	0.088	<0.010	<0.010
NITROG,NO3,CAL(MG/L)	620 0	<0.010	<0.010	0.004	0.009	<0.010
CHLORIDE (MG/L)	940 0	75.0	86.0	79.0	105	71.0
COD,LOW LEVEL(MG/L)	335 0	18	85	90	11	26
COLIFORM,T.,MPN (#/100ML)	31506 0	28	>2400	NA	3	>2400
SP.COND.,FIELD (UMHOS/CM)	94 0	787	700	2550	1080	1060

Table C-3. Results of Ground Water Analyses (Continued, page 3 of 4)

ENVIRONMENTAL SCIENCE & ENGINEERING 02/15/84 STATUS: FINAL QC

PROJECT NUMBER 83405400
FIELD GROUP: FGW-1
PARAMETERS: ALL SAMPLES: PART

PROJECT NAME PINELLAS CO
PROJECT MANAGER: KAREN HATFIELD
FIELD GROUP LEADER: RON ELLIOT

PARAMETERS	STORET # / METHOD #	SAMPLE NUMBERS 6-S 302710	1-S 302711	1-D 302712	9-D 302713	9-S 302714
DATE		11/16/83	11/17/83	11/17/83	11/17/83	11/17/83
TIME		1630	1000	1330	1430	1500
PH,(STD UNITS)	400 0	7.50	7.20	11.7	7.70	6.90
WATER TEMP (C)	10 0	22.9	23.3	22.1	24.2	23.4

Table C-3. Results of Ground Water Analyses (Continued, page 4 of 4)

BOARD OF COUNTY COMMISSIONERS

PINELLAS COUNTY, FLORIDA

DEPARTMENT OF SOLID WASTE MANAGEMENT

3095 114TH AVENUE NORTH
ST. PETERSBURG, FLORIDA 33716
PHONE: (813) 464-7565
FAX: (813) 464-7713
P. O. BOX 21623
ST. PETERSBURG, FLORIDA 33742-1623

December 12, 1994

Howard Rhodes, Director
Div. of Air Resources Management
Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Yi
updated in APIS
yh

Howard
12/16

RE: Change of Addressee/Address

Dear Mr. Rhodes:

Effective immediately, please remove the following from your records:

R E Van Deman
Pinellas Co. Dept. of Solid Waste
2800 110th Ave. North
St. Petersburg, FL 33716

Please direct all correspondence to the following:

Michael J. Rudd, Director
Pinellas County Solid Waste Operations
3095 114th Avenue N
St. Petersburg, FL 33716

If you should have any questions, please call (813) 464-7565.

Sincerely,

Sandra K Miller

Sandra K. Miller, Office Asst. II
Pinellas County Solid Waste Operations

swmopns.recept.DEP.

DEP ROUTING AND TRANSMITTAL SLIP

TO: (NAME, OFFICE, LOCATION)

1. Clair Fancy
2. ~~Patty~~

3.
4.
5.

PLEASE PREPARE REPLY FOR:

____ SECRETARY'S SIGNATURE

____ DIV/DIST DIR SIGNATURE

____ MY SIGNATURE

____ YOUR SIGNATURE

____ DUE DATE _____

ACTION/DISPOSITION

____ DISCUSS WITH ME

____ COMMENTS/ADVISE

____ REVIEW AND RETURN

____ SET UP MEETING

____ FOR YOUR INFORMATION

____ HANDLE APPROPRIATELY

____ INITIAL AND FORWARD

____ SHARE WITH STAFF

____ FOR YOUR FILES

COMMENTS:

Kanani -
If we can find that Pinellas County file - this should go in it

Jawad

RECEIVED
JAN 05 1995
Bureau of Air Regulation

FROM: Yi DATE: 1/4/95 PHONE: 1-9558

DEP 15-026 (12/93)