✓

03.15-9/1/92-00345

GROUNDWATER CHARACTERIZATION STUDY FOR

CAMP LEJEUNE SANITARY LANDFILL ONSLOW COUNTY, NORTH CAROLINA

MCON PROJECT P-948, LANDFILL

DEPARTMENT OF THE NAVY
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

SEPTEMBER, 1992

DEWBERRY & DAVIS
8601 SIX FORKS ROAD
SUITE 400
RALEIGH, NORTH CAROLINA 27615
(919) 847-0418
FAX: (919) 847-3723

ARCHITECTS-ENGINEERS-PLANNERS-SURVEYORS

GROUNDWATER CHARACTERIZATION STUDY
FOR
PROPOSED CAMP LEJEUNE LANDFILL
SITE "G"
ONSLOW COUNTY, NORTH CAROLINA

Prepared for:

Dewberry and Davis
8601 Six Forks Road
Suite 400
Raleigh, North Carolina, 27615

Prepared By:

S&ME Inc.
3109 Spring Forest Road (27604)
Post Office Box 58069
Raleigh North Carolina 27658-8069
S&ME Project No. 1054-92-003

August 1992

S&ME

August 17, 1992

Dewberry and Davis
8601 Six Forks Road
Suite 400
Raleigh, North Carolina 27615

Attention: Mr. Frank Stephenson

Reference: Groundwater Characterization Report
Camp Lejeune Landfill Site "G"
Camp Lejeune, North Carolina
S&ME Project No: 1054-92-003

Dear Mr. Stephenson:

S&ME Inc. has completed the groundwater characterization of the proposed Camp Lejeune landfill site "G". Attached please find the report describing groundwater conditions in the vicinity of the site. We appreciate the opportunity to assist you with this phase of this project. Please call us at 919-872-2660 if you have any questions regarding the information contained within this report or if we can be of service.

Very truly yours,

S&ME INC.

Walter J. Beckwith, P.G.
NC Registration No. 584

Ann M. Borden, P.G.
NC Registration No. 307

WB/WS/AB/wb/rp92-003.102

TABLE OF CONTENTS

SECTION 1 EXECUTIVE SUMMARY 1

SECTION 2 LOCATION AND BACKGROUND 2

2.1 SITE LOCATION 2

2.2 PROJECT BACKGROUND 2

SECTION 3 PURPOSE AND SCOPE 3

3.1 PURPOSE 3

3.2 SCOPE 3

SECTION 4 PREVIOUS ASSESSMENT ACTIVITIES 4

4.1 REVIEW OF PREVIOUS WORK 4

4.1.1 IAS Site 6 4

4.1.2 IAS Site 82 4

4.2 LANDFILL SITE G 5

4.2.1 Preliminary Siting Work 5

4.2.2 Site Characterization 5

SECTION 5 GROUNDWATER 6

5.1 ANALYTICAL ANALYSIS OF GROUNDWATER 6

5.2 FORMER ANALYSIS OF SAMPLES FROM WELLS MW-1 and MW-2 6

5.3 CONFIRMATORY ANALYSIS OF MW-1 and MW-2 6

5.4 LOCALIZED SOURCE ASSESSMENT NEAR MW-1 7

5.5 GROUNDWATER FLOW DIRECTION 7

SECTION 6 CONTAMINANT FATE AND TRANSPORT 8

6.1 PESTICIDE PROPERTIES 8

6.2 SOIL PROPERTIES 8

6.3 HYPOTHESIS OF DECREASING CONCENTRATIONS 8

6.3.1 Water Table Fluctuations 9

6.3.2 Pesticide Adsorption to Suspended Soil Particles 9

6.4 NOTED VARIATIONS IN SOIL AND GROUNDWATER PESTICIDE CONTAMINATION ON ADJACENT IAS SITES 9

SECTION 7 SUMMARY 10

7.1 SUMMARY 10

TABLES

TABLE 1 PESTICIDE CONCENTRATIONS IN GROUNDWATER

TABLE 2 SELECTED PESTICIDE PROPERTIES

FIGURES

FIGURE 1 VICINITY MAP

FIGURE 2 SITE MAP

FIGURE 3 Site "G" GROUNDWATER CONTOUR MAP

FIGURE 4 IAS SITE 6 GROUNDWATER CONTOUR MAP

APPENDICES

APPENDIX I SITE CHARACTERIZATION FIELD METHODS

APPENDIX II SUBSURFACE INFORMATION

APPENDIX III GROUNDWATER INFORMATION AND WELL RECORDS

APPENDIX IV LABORATORY ANALYTICAL RESULTS (Soil Samples)

APPENDIX V LABORATORY ANALYTICAL RESULTS (Groundwater)

APPENDIX VI HYDRAULIC CONDUCTIVITY VALUES

SECTION 1
EXECUTIVE SUMMARY

S&ME was retained by Dewberry and Davis in April 1992, to perform a Site Characterization Study of site "G" for final evaluation of the site for use as a landfill. Previous work performed by Westinghouse Environmental and Geotechnical Services (Westinghouse) on this site indicated slight levels of pesticides present in one groundwater sample obtained from one of two monitor wells (MW-1). Additional assessment activities were required to address the regulatory impact of degraded water quality on the proposed landfill construction.

The recently completed Site Characterization revealed no groundwater contamination above quantitation limits from pesticides, PCBs, or Volatile Organic Compounds in the samples analyzed. No significant source was found in the near surface soils at MW-1 that would explain the presence of pesticides in the groundwater samples obtained in 1991. IAS Sites 6 and 82 are located adjacent to (west of) site "G". It is unlikely that the slight groundwater contamination observed at these sites will have any impact on site "G", since groundwater flows from site "G" toward these sites. Based on the recent analysis of nine groundwater samples, the site groundwater meets North Carolina Groundwater Standards (15 NCAC 2L) for class GA groundwater.

SECTION 2
SITE LOCATION AND PROJECT BACKGROUND

2.1 SITE LOCATION

Proposed landfill site "G" is located within the Camp Lejeune Marine Corps Base, in Onslow County, approximately 10 miles southeast of Jacksonville, North Carolina. Site "G" encompasses approximately 170 acres and forms a rough triangle, bounded by Piney Green Road to the west, Wallace Creek to the north, and Shell Rock road to the east. Old Bear Creek Road dissects the northern half of the site, intersecting Piney Green Road at the northwest corner of the site and Shell Rock Road near the northeast extent of the site. Figure 1 shows the project area with respect to the Jacksonville, North Carolina area. Figure 2 shows the site, boring and well locations, and existing structures.

2.2 PROJECT BACKGROUND

Several adjacent sites, described as IAS Site 6 (lots 201 and 203), and IAS Site 82, are located west and northwest of the site, across Piney Green Road. Both sites are reported to have been utilized for storage of hazardous materials, including DDT-containing pesticides, and PCB-containing transformers. Environmental assessment work performed at these sites indicates isolated areas of soil and groundwater contamination.

Four monitor wells have been installed previously within the site "G" bounds. Two wells, 82-MW-30 and 6-GW-2, were installed during study of the IAS sites; and two monitor wells, identified as MW-1 and MW-2, were installed by Westinghouse during the site suitability study in August, 1991. Analysis of two samples obtained from well MW-1 indicted the low levels of pesticide compounds to be present in the samples; MW-2 did not show evidence of any pesticides above quantitation limits for method 8080.

SECTION 3
PURPOSE AND SCOPE

3.1 PURPOSE

The purpose of the groundwater study was to allow characterization of the groundwater quality of the water table aquifer. S&ME would then address the regulatory issues that would apply to the site resulting from surficial aquifer water quality not meeting the current North Carolina (15 NCAC 2L) groundwater quality standards.

3.2 SCOPE

The scope of work included the installation of additional wells, with sampling of groundwater for analysis of pesticides, PCBs and volatile organic compounds (VOCs). A number of soil samples were obtained from the vicinity of well MW-1 in an attempt to locate a potential source of the apparent groundwater contamination. Groundwater conditions adjacent to (west and northwest of) Site "G" were evaluated by review of environmental assessment reports prepared by other consulting firms for IAS Sites 6 and 82.

SECTION 4
PREVIOUS ASSESSMENT ACTIVITIES

4.1 REVIEW OF PREVIOUS WORK

Previous environmental assessment work has been performed at this (Site "G")and adjacent sites (IAS Sites 6 and 82). Several consultant's reports were reviewed, in order to evaluate the groundwater characteristics of the site area.

4.1.1 IAS Site 6

An evaluation of IAS Site 6 was performed by Environmental Science & Engineering, Inc. (ES&S) during the summer 1986. IAS Site 6 includes two parcels of land (Lots 201 and 203) located west of site "G" that have been used for storage of hazardous materials. The work included the installation of monitor wells, soil gas survey, and sampling of the monitor wells and three water supply wells located in the area. Trace levels of Trichloroethene (TCE) and other chlorinated alkenes were detected in water supply wells, HP-651, HP-652, and HP-653. TCE was detected in the soil southwest of well HP-652 by the soil gas survey. No contamination was identified in the monitor wells. TCE and vinyl chloride were found in sediment samples obtained from Wallace Creek. (ES&S, 1990)

4.1.2 IAS Site 82

The presence of VOCs in sediment samples and isolated soil contamination at IAS Site 6, prompted an investigation of surrounding potential source areas. Halliburton NUS performed a field investigation and risk assessment of IAS Site 82, located north of Wallace Creek. The investigation included 6 shallow soil borings and 3 monitor wells. In addition, several wells located in the vicinity of site 6 were resampled. Minimal groundwater contamination was observed. It is our understanding that the risk assessment concluded that as long as the site is not developed for residential land use, neither the soil or groundwater is expected to cause any adverse health effects.

4.2 LANDFILL SITE "G"

4.2.1 Preliminary siting work

Westinghouse performed a preliminary siting study of site "G" for its suitability for use as a landfill during the summer 1991. Seven soil borings were drilled within the site. Because of potential questions posed by environmental problems that had been observed on the adjacent sites, two monitor wells were installed to evaluate groundwater conditions at site "G". Slight levels of pesticides were found in one of the wells. The wells were resampled approximately two weeks later with similar values of pesticide compounds being observed in the same well. (Westinghouse, 1991)

4.2.2 Site Characterization

S&ME, Inc. performed a Site Characterization Study of site "G" for use as a landfill in the spring 1992, that included the drilling of 11 soil borings, 7 monitor wells, and 2 piezometers. Groundwater conditions were evaluated by obtaining samples from the two existing monitor wells, and the seven new monitor wells. In addition, twelve soil samples were obtained from six locations adjacent to well MW-1 to define a source area for the pesticide compounds noted in MW-1 during the Westinghouse study. Both soil and groundwater were submitted for analysis of pesticides, PCBs and volatile organic compounds (VOC). In addition, the 5 largest non-target VOC peaks, identified by the gas chromatographic analysis were to be identified.

No contamination was identified above the method quantitation limits in either the soil samples or groundwater samples. The results of the characterization is detailed in the S&ME Site Characterization Report. A description of the procedures used during the recent site characterization work, details of the field activities and the various documents generated during the work that are related to groundwater or groundwater quality issues are included in the Appendix sections attached to this report.

SECTION 5
GROUNDWATER

5.1 ANALYTICAL ANALYSIS OF GROUNDWATER

Nine monitor wells were sampled for pesticides, PCBs, and volatile organic compounds by SW-846 Methods 8080 and 8240. In addition, the gas chromatographic peaks were compared with a library of known compounds in order to identify five main non-target volatile organic compounds. The only compound identified by these analyses was found in the sample obtained from well MW-3. Dimethyldisulfide was reported at a concentration of 6μg/L (parts per billion). Dimethyldisulfide is a naturally-occurring bacterial by-product (Handbook of Environmental Data on Organic Chemicals) and is not considered to be a "contaminant". Well MW-3 was the only well to exhibit a distinct hydrogen sulfide odor during purging and sampling. Analytical results indicate no site impact by compounds targeted by SW-846 Methods 8080 and 8240 or associated non-target compounds detected by identification of GC peaks, above method quantitation limits.

5.2 FORMER ANALYSIS OF SAMPLES FROM WELL MW-1 and MW-2

Two monitor wells (MW-1 and MW-2) were installed by Westinghouse during the initial site study of site "G" in 1991. Analysis of the groundwater sample obtained from well MW-1 indicated slight levels of 6 pesticide or pesticide derivative compounds to be present in the groundwater. The pesticide concentration levels ranged from .28 μg/l (ppb) for Beta-BHC to .01 μg/l for Heptachlor Epoxide. Table I shows the concentrations detected as compared to the 15 NCAC 2L Standards. No VOCs were detected. Well MW-2 did not indicate any pesticide, PCB or VOC compounds above the method quantitation limits.

5.3 CONFIRMATORY ANALYSIS OF MW-1 and MW-2

Well MW-1 was resampled approximately two weeks after the initial sampling event and showed similar pesticide concentration values. Five of the compounds previously noted, had decreased in concentration. One compound, Beta-BHC increased slightly. 4,4' DDT was detected at the analysis quantitation limit of .05 μg/l. The resampling test results are also shown on Table I.

Resampling of well MW-1 during the recent site characterization, confirms the absence compounds (VOCs) detected by SW 846 Method 8240 analysis, including the identification of 5 peaks in the groundwater at MW-1 (and the other 8 well locations). The recent analysis does not confirm that pesticide compounds

present in the groundwater at the MW-1 location or in samples obtained from the other on-site wells above the method quantitation limits.

5.4 LOCALIZED SOURCE ASSESSMENT NEAR MW-1

The soils in the vicinity of MW-1 were sampled in conjunction with the recent site characterization in an attempt to identify a source area for the pesticide compounds found in the groundwater. Samples were obtained from 6 locations (location map in Appendix IV) around MW-1, from just below the soil surface and at the water table. Sampling of the soil in the vicinity of MW-1 for pesticides and PCBs did not reveal these compounds in the soil at or above the quantitation limits, which ranged from 8 to 160 μg/kg (ppb). Although the quantitation limits for soil are higher than those for the water analyses, they do indicate there is not a significant source of pesticides within the immediate vicinity of MW-1.

5.5 GROUNDWATER FLOW DIRECTION

Groundwater surface elevations were determined by measurement in each of the well. Figure 3 shows a contour map prepared from the depth measurements made on May 5, 1992. The positioning of the contours indicates groundwater flow occurs radially away from the center of the site due to the topographic control provided by Wallace Creek and Bear Head Creek, located north and south of the site. Due to the sandy surficial soils, almost all of the precipitation that falls within the center of the site serves to recharge the groundwater through infiltration, which results in mounding of the groundwater in the center of the site. Figure 4 has been reproduced from the report for the IAS Site #6, and shows good correlation with site groundwater contours. The flow direction makes it unlikely that any potential off site impacts will affect site "G". Groundwater flow direction indicates that the source of pesticides in MW-1 would be from the vicinity of the well.

SECTION 6

CONTAMINANT FATE AND TRANSPORT

6.1 PESTICIDE PROPERTIES

Selected chemical properties for the pesticide compounds originally found in well MW-1 are shown on Table II. This table shows common properties and selected coefficients for these compounds that can be used to explain their behavior in the environment. Most are not very soluble in water and tend to adsorb to organic matter present within the soil.

The pesticide compounds observed previously in the samples from MW-1 have specific gravities greater than water and tend to sink rather than float on the water table surface when present in necessary concentrations. Solubilities in water range from 31.4 mg/l for delta-BHC to .0055 mg/l for 4,4' DDT. The Organic Carbon Partition Coefficient (Kow) indicates the tendency of the compound to bind to organic carbon within the soil. Compounds with high values generally have low solubilities and are relatively immobile in groundwater. All of the chlorinated hydrocarbon pesticides are persistent in the environment.

6.2 SOIL PROPERTIES

The soil conditions in the vicinity of MW-1 are somewhat unique with respect to the other well locations at the site. The soils are classified as Leon series by the Soil Conservation Series (SCS). They are poorly drained and the subsoils consist of a compact zone which has formed through the concentration of humic organic colloids at the water table. According to SCS information, organic contents of these soils range between 0.5 and 5 percent. Because of the organic content of the soils, which is higher than the better drained portions of the site, these soils could be expected to collect chlorinated pesticide compounds through adsorption to the carbon containing compounds, within the organic matter. Sampling of the organic soil zone at the water table, failed to detect the presence of pesticide compounds.

6.3 HYPOTHESIS OF DECREASING CONCENTRATIONS

The variance in pesticide concentrations noted during sampling of well MW-1, and the apparent lack of a near surface source area within the soil around well MW-1 is difficult to explain. These compounds have relatively long half lives and are persistent in the environment, particularly after they have penetrated the ground surface. The decreasing trend observed between sampling events in August and September, 1991 is not likely due to degradation of all of the compounds, but rather due to events associated with fluctuation of the water table or events associated with the well installation and development, or well purging and sampling.

6.3.1 Water Table Fluctuations

Groundwater levels in the vicinity of MW-1 were 1.6 to 2.3 feet higher in 1991 than during April and May 1992. It is reasonable that low levels of pesticides in the near surface soil may undergo increased leaching activity when submerged, as may occur during periods of higher groundwater. Compounds showing the highest concentrations in 1991 also have higher solubilities. Table II shows Beta-BHC has a higher concentration and correspondingly higher solubility than Dieldrin.

6.3.2 Pesticide adsorption to suspended soil particles

The decreasing concentrations may be due to these compounds being adsorbed to fine grained soil particles that have been carried from an upper soil horizon, or another boring location, to the screen interval by the hollow stem auger drilling process. The decreasing values may be due to removing less soil matter from the filter pack or formation through continued well development (by the purging and sampling process).

This explanation assumes the well was not adequately developed after installation. All of the wells installed during the site characterization (MW-3 through MW-9) were developed by over pumping (discussion in appendix I) until the discharge flow was clear. Approximately 100 gallons of water were removed from each of the wells.

6.4 NOTED VARIANCES IN SOIL AND GROUNDWATER PESTICIDE CONCENTRATIONS ON ADJACENT IAS SITES

The ES&S study concluded that none of the groundwater samples contained DDT or its derivatives, although DDT, DDD, and DDE were found in surface soils. "It is possible that the contaminants may be tightly adsorbed to the soil particles and thus are unlikely to reach the groundwater".

The Halliburton-NUS study found Gamma-BHC and Aroclor 1260 in the groundwater sample in one well. Neither of these chemicals were detected in the soil tested from the well location. The report concluded that the presence of these compounds in the unfiltered samples was related to suspended sediment in the groundwater samples that originated in the surrounding soil.

SECTION 7
SUMMARY

7.1 SUMMARY

In summary, the recent groundwater sampling event indicates that the groundwater quality of the water table aquifer within the areas served by the nine monitor wells (the site "G" area) is within the 15 NCAC 2L guidelines. As groundwater flow occurs radially away from the center of the site, contamination observed within the groundwater, west of site "G", on IAS Sites 6 and 82, will not impact this site. The variance in pesticide levels noted during sampling of well MW-1 cannot be easily explained and several theories are presented in this report. Significant contamination is not evidenced in the surficial soil, and no contamination was detected in the analyses performed on samples from other wells located downgradient of well MW-1. It is probable that the pesticide levels found previously in MW-1 are related to regional application of pesticides in the past, and not due to point sources.

TABLE 1

PESTICIDE COMPOUNDS
DETECTED IN GROUNDWATER SAMPLES
OBTAINED FROM WELL MW-1

PESTICIDE COMPOUND	CONCENTRATION ON 8-25-91 (1)	CONCENTRATION ON 8-10-91 (1)	CONCENTRATION ON 5-5-92 (2)	N.C. GROUNDWATER 15-NCAC-2L STANDARDS
Beta-BHC	0.28	0.73	BQL	ND
Delta-BHC	0.05	BQL	BQL	ND
Aldrin	0.17	BQL	BQL	ND
Heptachlor Epoxide	0.26	0.01	BQL	.038
Dieldrin	0.08	0.02	BQL	ND
Endrin	0.09	BQL	BQL	0.20
4,4'DDT	BQL	0.05	BQL	ND

All concentrations are shown in μg/L (parts per billion)
All other compounds detected by SW-846-Method 8080 were BQL

(1) Westinghouse - site suitability study 1991.

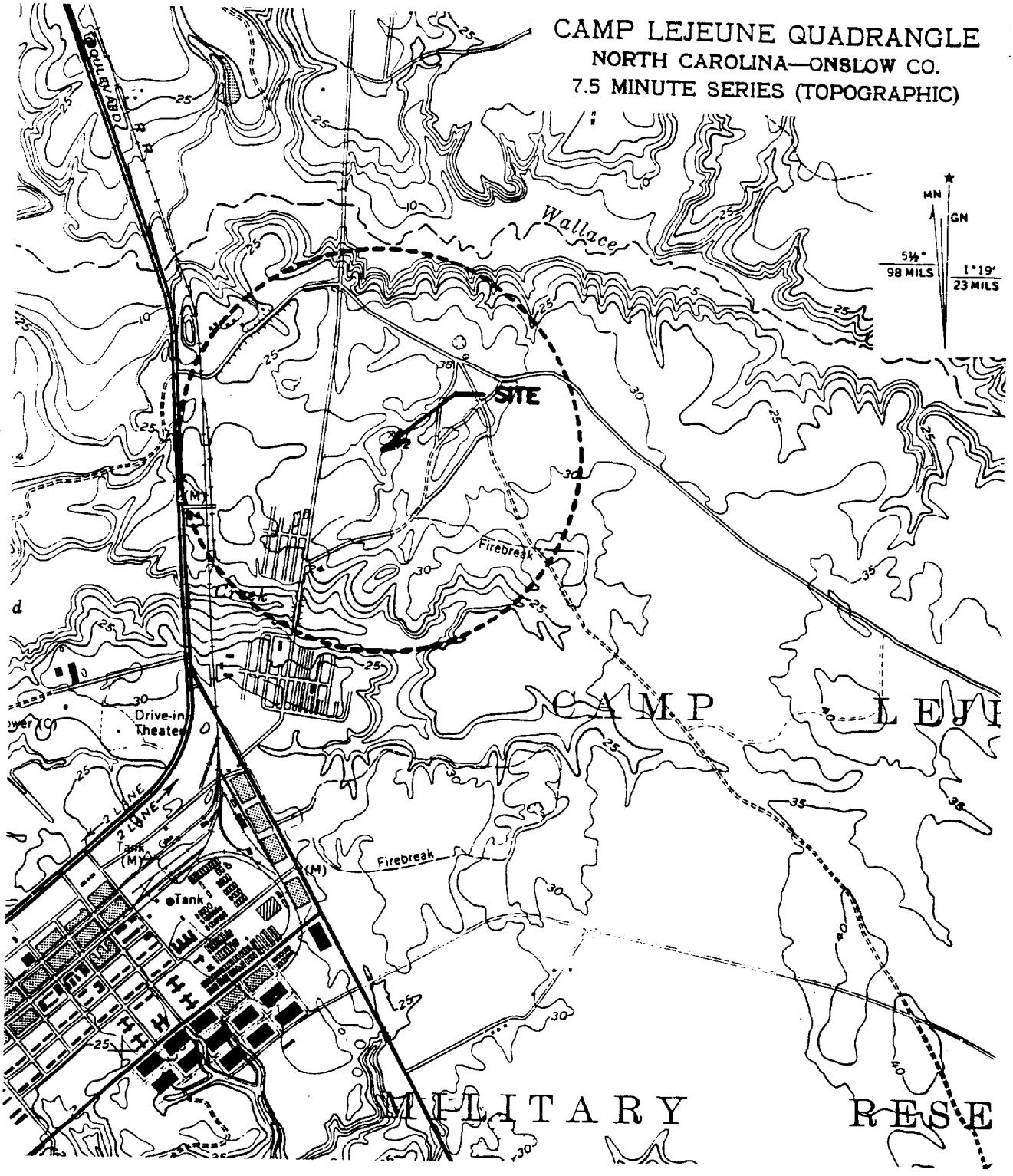
(2) S&ME - site characterization study 1992.

TABLE 2
SELECTED PROPERTIES OF
PESTICIDE COMPOUNDS [1]

PESTICIDE COMPOUND	SPECIFIC GRAVITY	SOLUBILITY IN WATER (Mg/L)	ORGANIC CARBON PARTITION COEFFICENT (koc)
Beta-BHC	N/A	0.24	3.8×10^3
Delta-BHC	N/A	31.4	6.6×10^3
Aldrin	1.6	.018	9.6×10^4
Heptachlor Epoxide			
Dieldrin	1.75	.0195	1.7×10^3
Endrin			
4,4' DDT	N/A	.0055	3.9×10^6

[1] Source: Halliburton - NUS, 1991

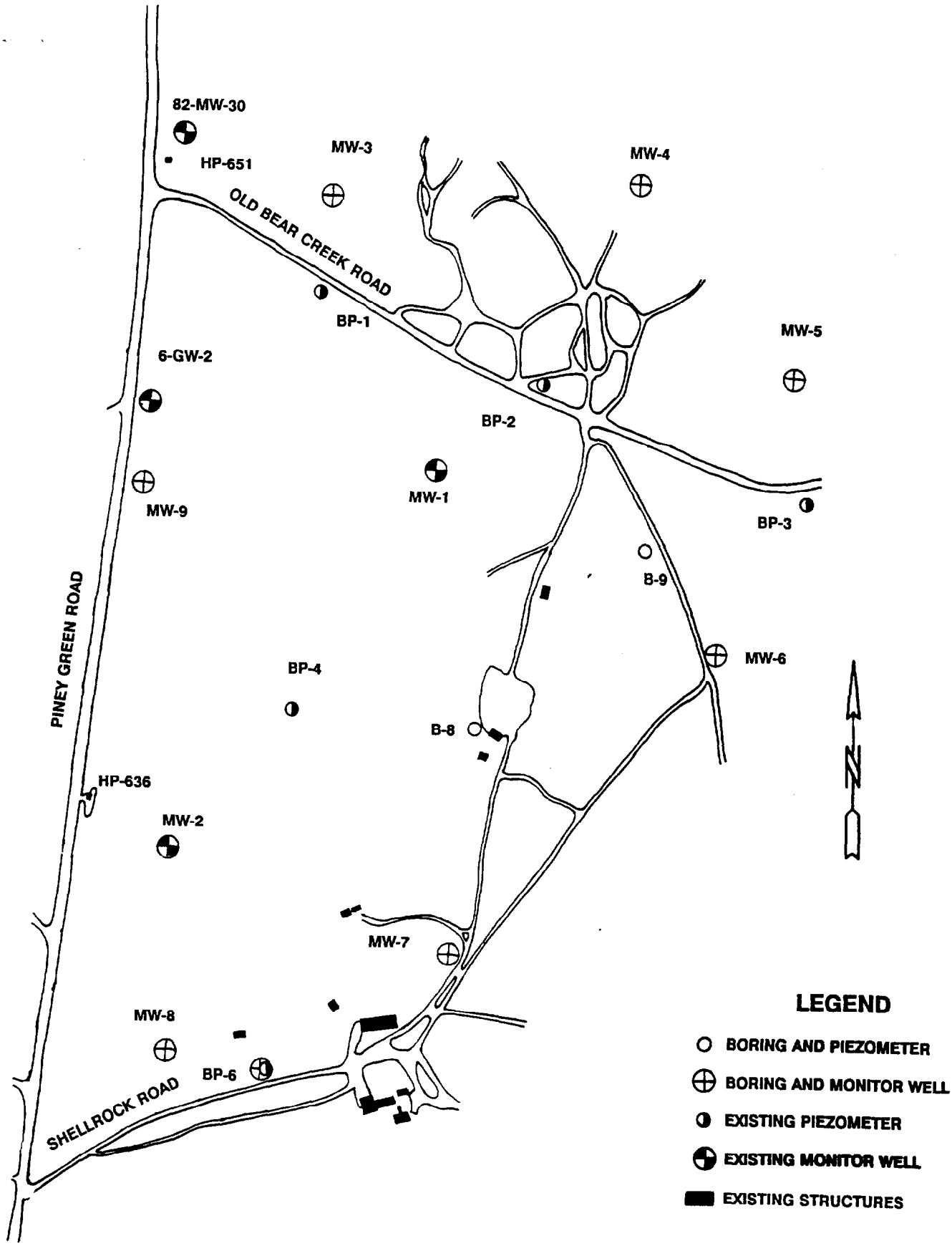
VICINITY MAP



CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE 1
SCALE: 1" = 2000'
1054-92-003

SITE MAP

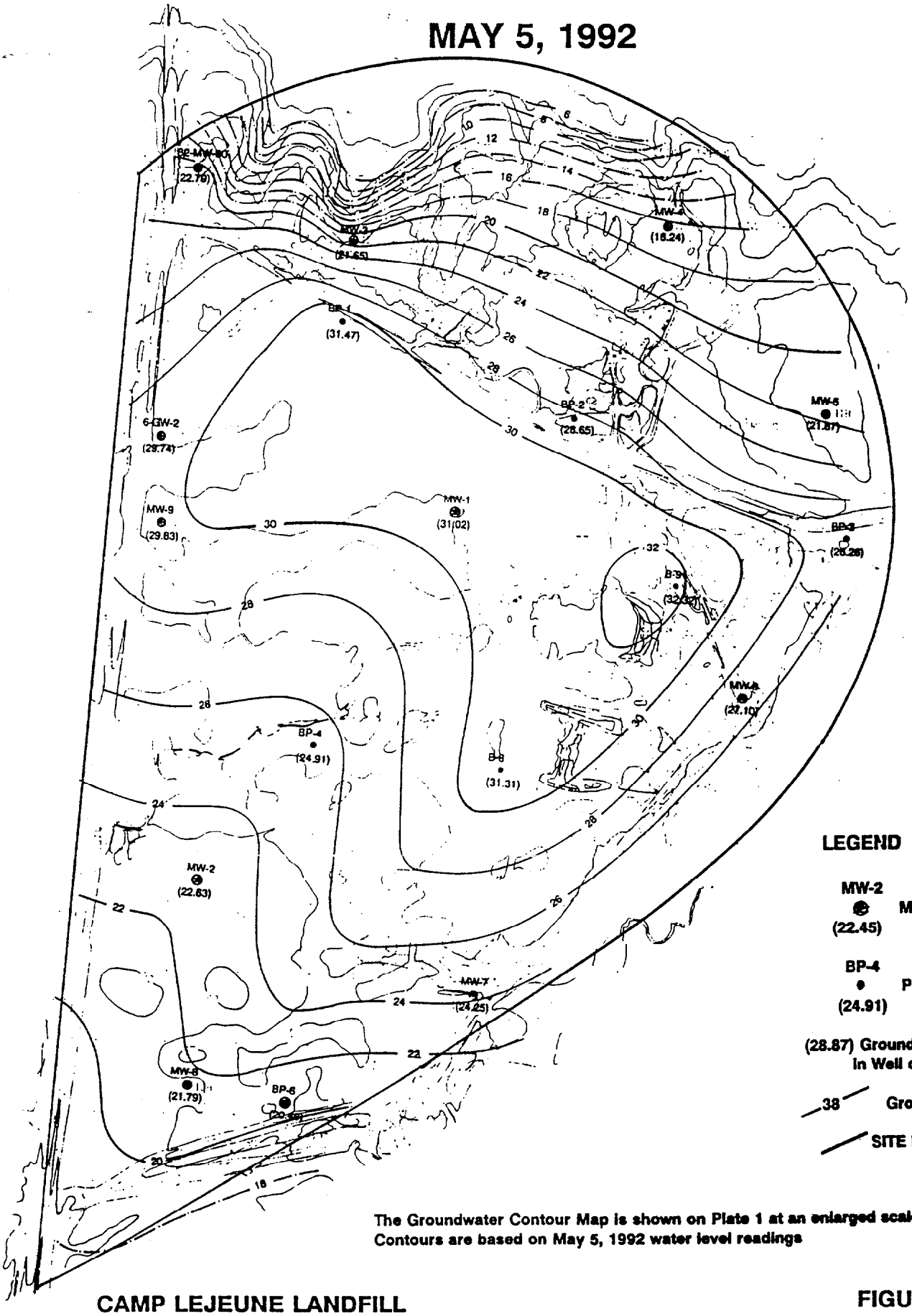


CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE 2
SCALE: 1"=500'
1054-92-003

GROUNDWATER CONTOUR MAP

MAY 5, 1992



LEGEND

MW-2 (22.45) — MONITOR WELL

BP-4 (24.91) — PIEZOMETER

(28.87) Groundwater Elevation in Well or Piezometer

38 — Groundwater Contour

SITE BOUNDARY

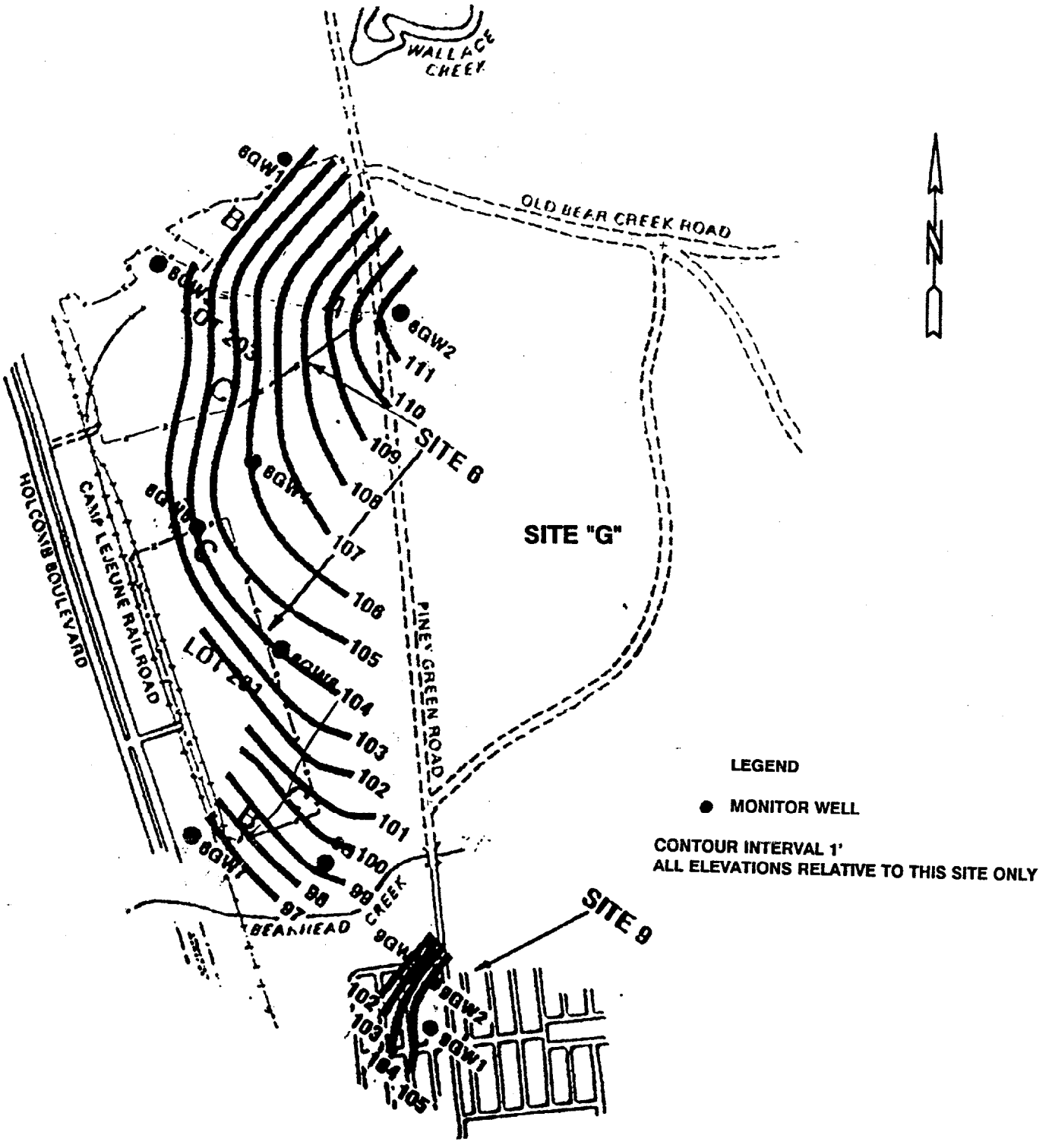
The Groundwater Contour Map is shown on Plate 1 at an enlarged scale of 1"=200'. Contours are based on May 5, 1992 water level readings

CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE 3
SCALE: 1"=500'
1054-92-003

GROUNDWATER CONTOUR MAP

IAS SITES 6 AND 9



GROUNDWATER CONTOUR MAP SHALLOW AQUIFER, SITES 6 AND 9
STORAGE LOTS 201 AND 203 AND FIRE TRAINING PIT

SOURCE: Westinghouse 1991 (Water and Air Research, Inc. 1983; ESE 1987)

CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE 4
SCALE: 1"=875'
1054-92-003

BIBLIOGRAPHY AND REFERENCES

Bouwer H., 1989, The Bouwer and Rice Slug Test - An Update: Ground Water, Volume 27, Number 3, pp. 304-309.

Coffey, S., Rodds Chemistry of Carbon Compounds: Elsevier Publishing Company, 1965, page 83.

Fetter, C. W., 1988, Applied Hydrogeology: Charles E. Merrill Publishing Co., 592 pages.

Halliburton NUS Environmental Corp., Nov.1991, Preliminary Draft, Site Inspection Report IAS Site 82; Piney Green Road.

S&ME, Inc., June 1992, Site Characterization Study for proposed Camp Lejeune Site "G", Raleigh, North Carolina.

U.S. Geological Survey, 1989, Water Resources Investigations Report 89-4096, Assessment of Hydrologic and Hydrogeologic Data at Camp Lejeune Marine Corps Base, North Carolina.

Verschreren, Karel, Handbook of Environmental Data on Organic Chemicals, Second Edition.

Westinghouse Environmental and Geotechnical Services Inc., Sept. 1991, Preliminary Site Characterization Study for Proposed Camp Lejeune Landfill Site "G".

Windholtz, M., Ed., 1983, The Merck Index, Merck and Company, Rahway, New Jersey.

APPENDIX I
SITE CHARACTERIZATION
FIELD METHODS

ABSTRACT

This appendix contains a description of the procedures utilized for the site characterization. The field procedures included drilling, decontamination, well installation, borehole abandonment, and groundwater sampling.

APPENDIX I

FIELD METHODS

The following attachment describes the field procedures utilized during the recent characterizion of site. These methods have been developed from:

- Guidelines for Remediation of Soil Contaminated by Petroleum, North Carolina Department of Environment, Health, and Natural Resources, Division of Environmental Management, Groundwater Section, August 1990.
- QA/QC and Standard Operation Procedures Manual for Sample Collection, North Carolina Department on Environment, Health, and Natural Resources, Division of Environmental Management, Groundwater Section: Revision No. 6, June 30, 1989.
- North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities, North Carolina Department of Environment, Health and Natural Resources, Solid Waste Management Section, 1987.
- American Society for Testing and Materials, Volume 4.08 Soil and Rock; Building Stones; Geotextiles, 1987.

1.0 SOIL TEST BORINGS

Borings were advanced using a combination of drilling techniques. Continuous flight, hollow stem augers with an inside diameter of 3.25 inches, were used to advance the borehole to a depth of 8.5 feet. At which point mud rotary drilling techniques were used to complete the boring. The augers facilitated drilling above the water table, and during the rotary drilling served as temporary casing sealing the top of the borehole and allowing recirculation of the drilling fluid. The mud rotary drilling technique consisted of advancing the drill rod under rotation using a 3 inch diameter bit while pumping the drilling fluid through the center of the drill rod, and displacing the cuttings up to the top of the borehole and into a settling tank.

1.1 Standard Penetration Test (ASTM D-1586)

Formation samples were obtained during the drilling at selected intervals using a Split Spoon Sampler. The sampler consists of a 1.375- inch ID, 2-inch OD, longitudinal, split tube. The tube or sampler is driven into the formation just below the borehole bottom using a 140 lb. hammer falling 30 inches. The sampler is driven 3 six-inch increments and the number a blows required by the hammer to drive the sample each increment are recorded. The number of blows for the last two increments are combined and designated as the Standard Penetration Resistance in blows per foot (bpf). When properly evaluated, these

numbers can be used as an index of soil strength and relative density. Each of the samples were visually examined to determine the soil classification according to the Unified Soil Classification System by the visual- manual methods described in ASTM D-2488.

1.2 Shelby Tube Sampling (ASTM D1587)

Undisturbed samples were obtained from selected locations to perform permeability and consolidation testing on the site soils to determine insitu conditions. The Shelby tube consists of a 3 inch thin wall tube that has a sharp cutting edge. The tube is forced into the soil, rotated to shear the sample at the bottom of the tube and withdrawn. The ends of the tube are sealed to prevent moisture and sample disturbances, and the tube is transported to the laboratory in an upright position.

1.3 Organic Vapor Analyzer (OVA)

A portion of the recovered Split Spoon sample was placed in a resealable plastic bag. The sample was gently kneaded while in the sealed bag to aid in volatilization of any organic volatile compounds that may be present in the soil. After approximately 15 minutes the headspace within the sealed bag was sampled with the OVA, by piercing the bag with the tip of the probe and reading the corresponding value on the readout.

The OVA is essentially a flame ionization detector that detects the presence of organic compounds with a sensitivity to measure in the parts per million range. Field screening of samples for organic compounds is a useful means of identifying areas of contamination within subsurface areas defining both vertical and horizontal extent based on apparent concentrations. Readings are displayed on a linearly scaled readout.

1.4 Decontamination

Decontamination procedures were performed prior to the initiation of drilling at each boring or well, and at the completion of site activities. The drill rig and all tools used for drilling (drill rod, bits, samplers, wrenches, etc.) were cleaned. Coarse residual material was removed by scraping or brushing, followed by cleaning with a high pressure steam wash, followed by air drying. Smaller field sampling equipment like the hand augers used in sampling around MW-1 were initially cleaned by scraping or brushing. They were then washed in a non-phosphate detergent solution, rinsed with tap water and allowed to air dry. After drying they were wrapped in plastic or aluminum foil. The decontamination was performed in the south central portion of the site where a source of potable water was available.

1.5 Borehole Abandonment

The soil borings were abandoned by grouting with a cement-bentonite grout at the completion of drilling. The grout was mixed and pumped into the borehole using a Chemgrout grout mixer. The grout mix was apportioned by mixing 1 bag of type I portland cement to approximately 6 gallons of water. Powdered Bentonite was added to the grout mixture to reduce shrinkage of the grout upon hydration and to improve sealing of the borehole.

2.0 MONITOR WELL CONSTRUCTION

2.1 Well installation

The monitor wells were constructed of 2-inch schedule 40 Polyvinyl Chloride (PVC) piping. The screen was constructed using a 10 foot section of pipe that had 0.010" slots cut in the pipe at close intervals. The screen was attached to the riser pipe using square cut flush threads. The screen and riser were placed inside 4.25" I.D. hollow stem augers which had been advanced to approximately 25 feet, positioned so that the bottom of the screen was 25 feet below the existing land surface.

Fine filter sand was poured in the auger as it was withdrawn, filling the annular space between the outside of the screen and the borehole left by the augers. The filter sand serves to prevent fine grained (clay and silt) formation materials from being drawn into the well during sampling. The location of the top of the sand with respect to the screen was monitored by measuring the top of the sand with a measuring tape. The filter sand was extended approximately 2 feet above the top of the screen and sealed with one to two feet of Bentonite pellets.

The pellets were slowly poured into the augers. A weighted rod was used to determine the top of the pellets, to assure that the pellets had not become bridged above the seal, and to lightly tamp the pellets to compact them. The bentonite was allowed to hydrate, forming a tight seal between the walls of the borehole and the well casing. As construction of the bentonite seal was below the water table, additional water was not added for bentonite hydration.

The remaining portion of the borehole was sealed with neat cement grout. the grout was mixed with a paddle type grout mixer (Chemgrout) according to 5.5 gallons of potable water per bag of type I cement. The grout was introduced into the borehole under pressure using a tremie pipe. The grout was pumped

into the well annulus until it reached the ground surface, at which point the grouting was stopped and the tremie pipe was removed.

A steel protective casing consisting of 4-inch square steel tubing with a lockable hinged cover was inserted around the riser pipe into the fresh grout and braced in a vertical position until the grout had reached initial set. A 24-inch square concrete pad was later constructed at the ground surface to prevent infiltration of surface water into the well. The auger cuttings, generated during drilling were leveled around the pad to divert local drainage away from the well. Final completion of the well included the installation of three concrete filled guard posts, painting, and attachment of the well identification tag.

2.2 Well development

The wells were developed by over pumping. By withdrawing water from the well at a high rate the sand filter is agitated (by the high velocities around the screen openings) to allow removal of any entrained silt or clay present in the filter pack. The pumping was continued until no increase in water clarity was noted. Approximately 100 gallons were removed from each of the wells.

3.0 GROUND WATER SAMPLING

2.2.1 Well Purging

The wells were measured on May 5, 1992 in preparation for sampling. Measurements were obtained of the depth to groundwater using an electric water level indicator. The indicator detects the top of the water surface by the change in electrical resistance, at which point, the corresponding depth is determined from markings on the outside of the cable. The depth to water is subtracted from the elevation of the top of the well casing to determine groundwater surface elevation. The depth to water is also used to determine the volume of water to be purged from the well.

The wells were purged by removing three well volumes of water, calculated from the quantity of water in the well, using a laboratory decontaminated teflon bailer and new nylon bailer cord. The purge water was containerized and was emptied in the drain at one of the equipment cleaning pads on the Base.

3.2 Well Sampling

3.2 Well Sampling

Following purging, the bailers were suspended in each of the wells, and the wells were allowed recharge. Samples were obtained from the well by carefully lowering the bailer below the water surface and withdrawing a sample. Three 40 ml volatile sample vials were filled first using care to prevent any turbulence when transferring the sample to the vial and completely filling the vial to prevent any headspace.

The other sample containers, two 1 liter bottles for the SW-846 Method 8080 analysis were then filled. All of the containers were chilled on ice and delivered to the testing laboratory using standard chain of custody procedures.

APPENDIX II
SUBSURFACE INFORMATION

ABSTRACT

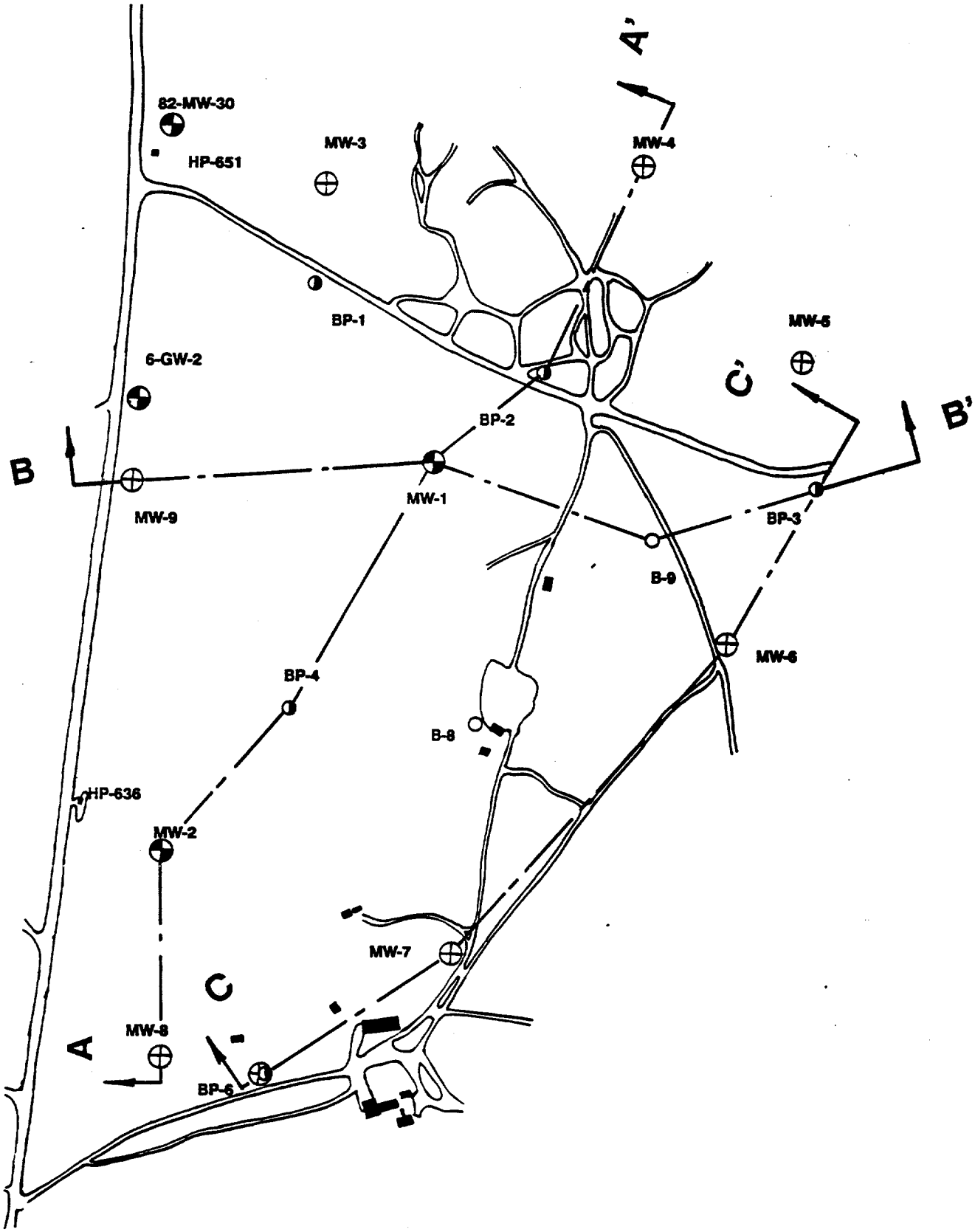
This appendix contains the Test Boring Records for borings MW-3 through MW-9, and B-7 through B-10 and the Geologic Sections developed for the site from the boring information. The location of each of the borings, referenced from the N.C. Plane Coordinate System is shown on Table II-1. The boring and section locations are shown on Figure II-1, the sections are shown on Figures II-2 through II-4. A brief explanation of terms and descriptions used, precedes the Test Boring Records.

Table II-1
Location of Monitor Wells and Piezometers[1]
Camp Lejeune Landfill Site "G"
Camp Lejeune, North Carolina

Well or Piezometer Number	North	East
MW-3	347849.73880	2504347.65360
MW-4	347924.90100	2505460.15520
MW-5	347274.26340	2506033.37480
MW-6	346260.73040	2505757.25740
MW-7	345187.58890	2504832.34280
MW-8	344849.10920	2503832.59490
MW-9	346831.71000	2503698.92790
B-8	345988.76160	2504913.91700
B-9	346651.40870	2505515.51850

(1) Locations are referenced to the North Carolina Plane Coordinate System.

LOCATION OF GEOLOGIC SECTIONS

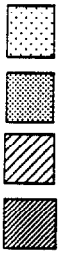


CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE II-1
SCALE: 1'=500'
1054-92-003

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES



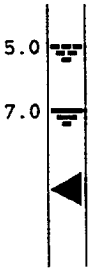
Fine Sand, with little silt or clay (SP)

Silty fine Sand (SM)

Clayey silty fine Sand (SC)

Clay or sandy Clay (CL)

WATER LEVELS



Water at termination of boring

Water at 24 hours after completion of well installation

Loss of water or Drilling Fluid while drilling

ORGANIC VAPOR ANALYZER

2.3 Reading in parts per million (PPM) of organic compounds contained within the headspace of the sample container.

STANDARD PENETRATION RESISTANCE

5-2-3 The number of blows of a 140 lb. hammer falling 30 in. required to drive a 2inch O.D. Split Spoon Sampler 3-six inch (6") intervals. As specified in ASTM D-1586

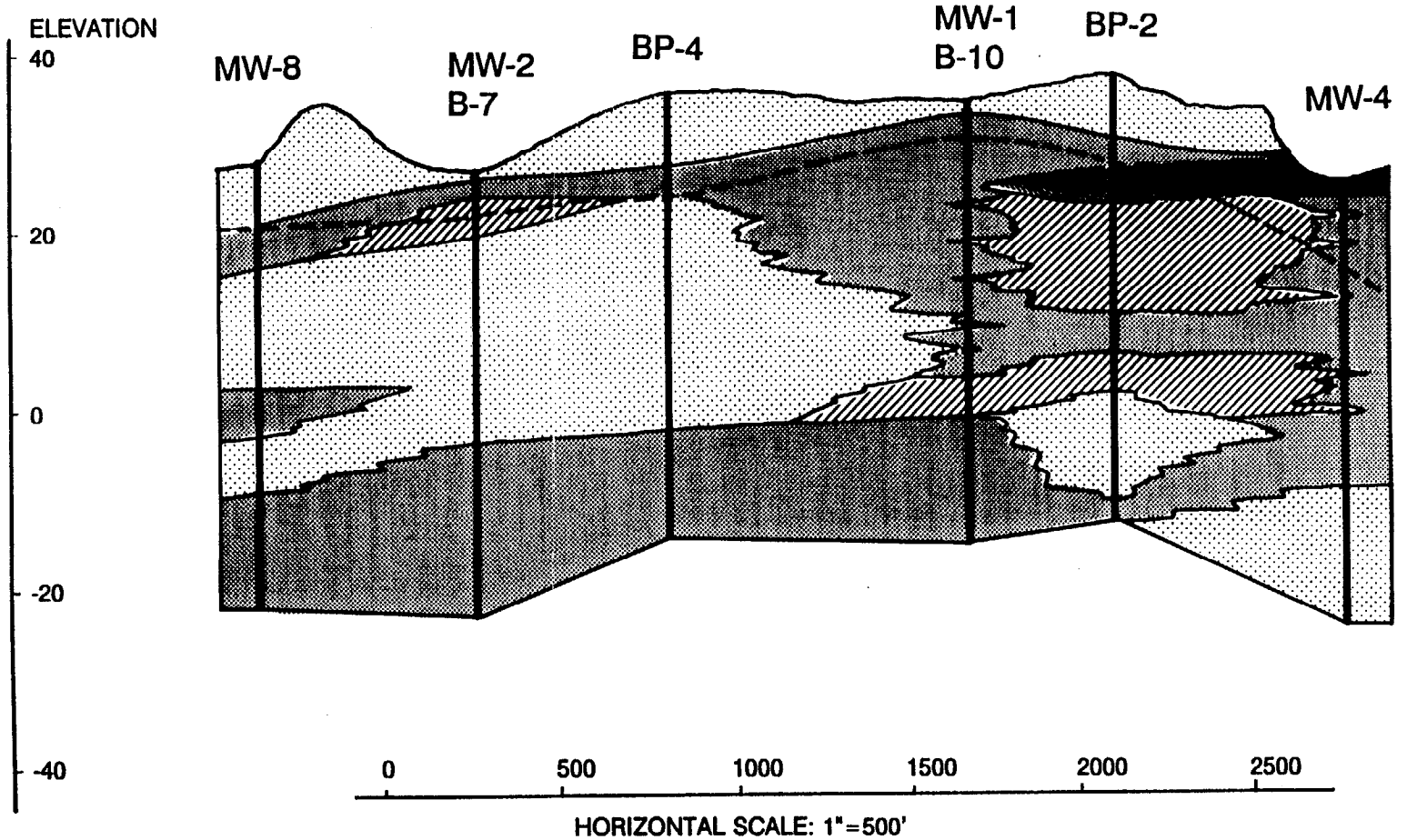
CONSISTENCY OF COHESIVE SOILS

STD. PENETRATION RESISTANCE BLOWS/FOOT	CONSISTENCY
0 to 2	Very Soft
3 to 4	Soft
5 to 8	Firm
9 to 15	Stiff
16 to 30	Very Stiff
31 to 50	Hard
Over 50	Very Hard

RELATIVE DENSITY OF COHESIONLESS SOILS

STD. PENETRATION RESISTENCE BLOWS/FOOT	RELATIVE DENSITY
0 to 4	Very Loose
5 to 10	Loose
11 to 30	Medium Dense
31 to 50	Dense
Over 50	Very Dense

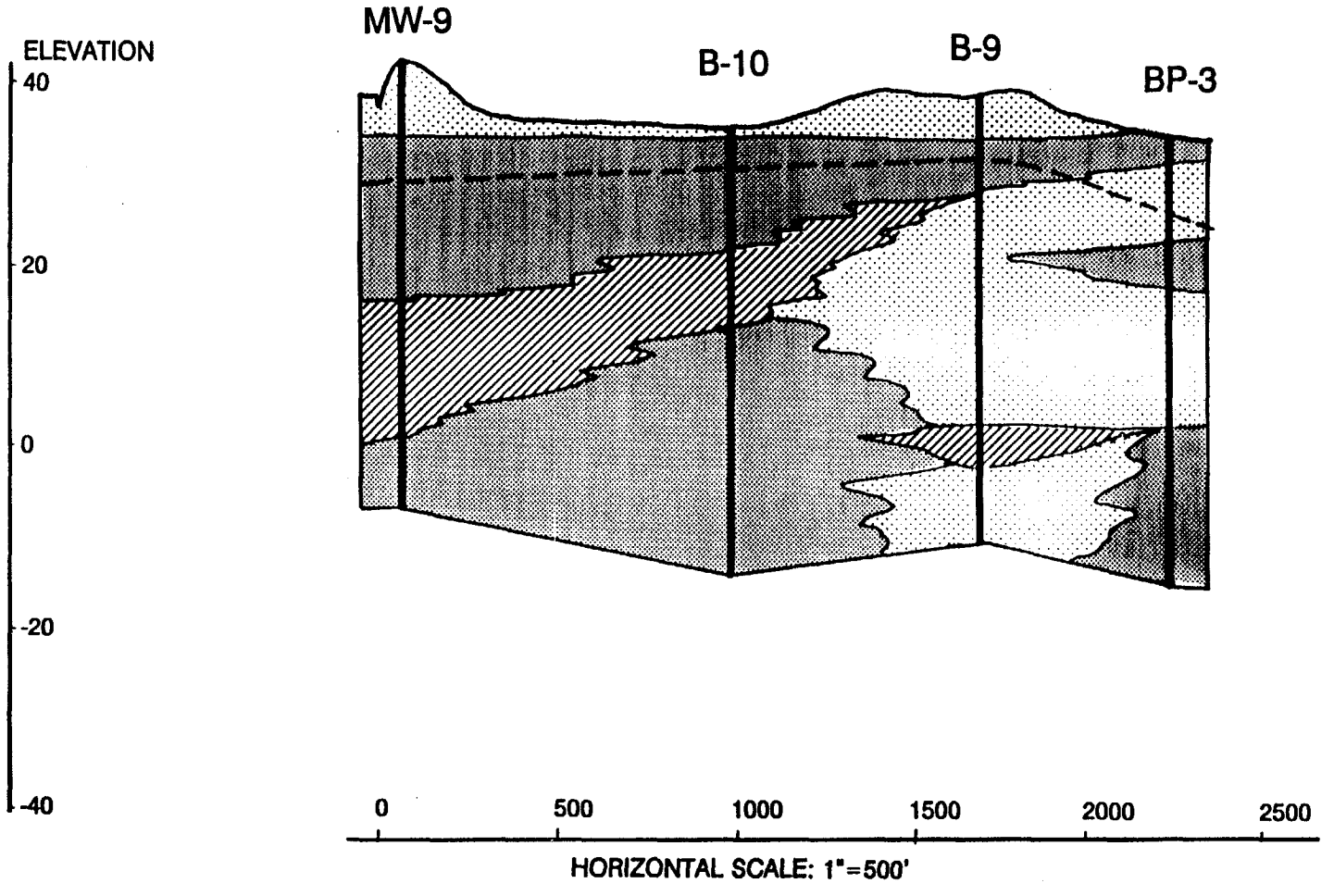
GEOLOGIC SECTION A - A'



CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE II-2
SCALE: AS SHOWN
1054-92-003

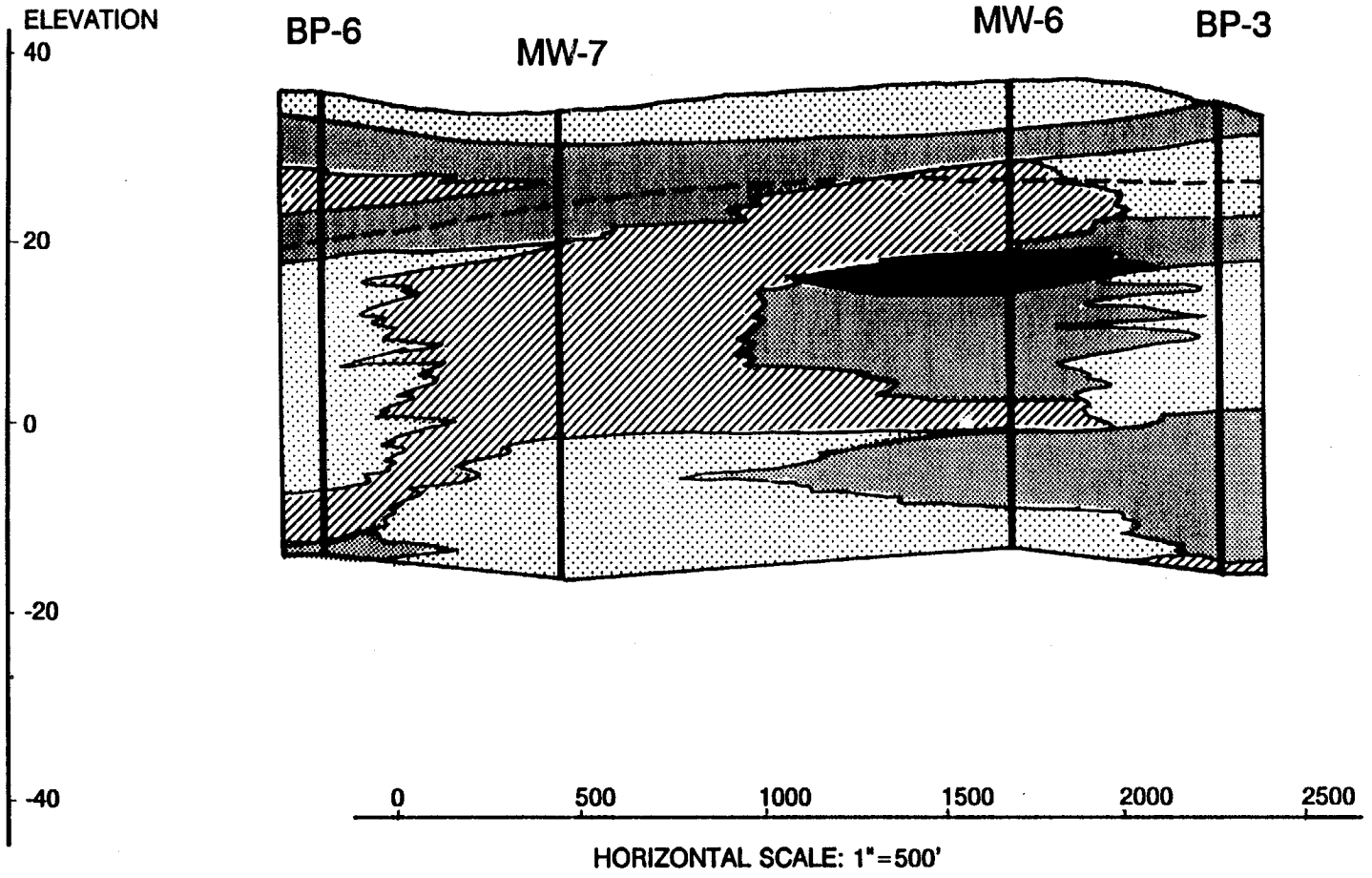
GEOLOGIC SECTION B - B'



CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE II-3
SCALE: AS SHOWN
1054-92-003

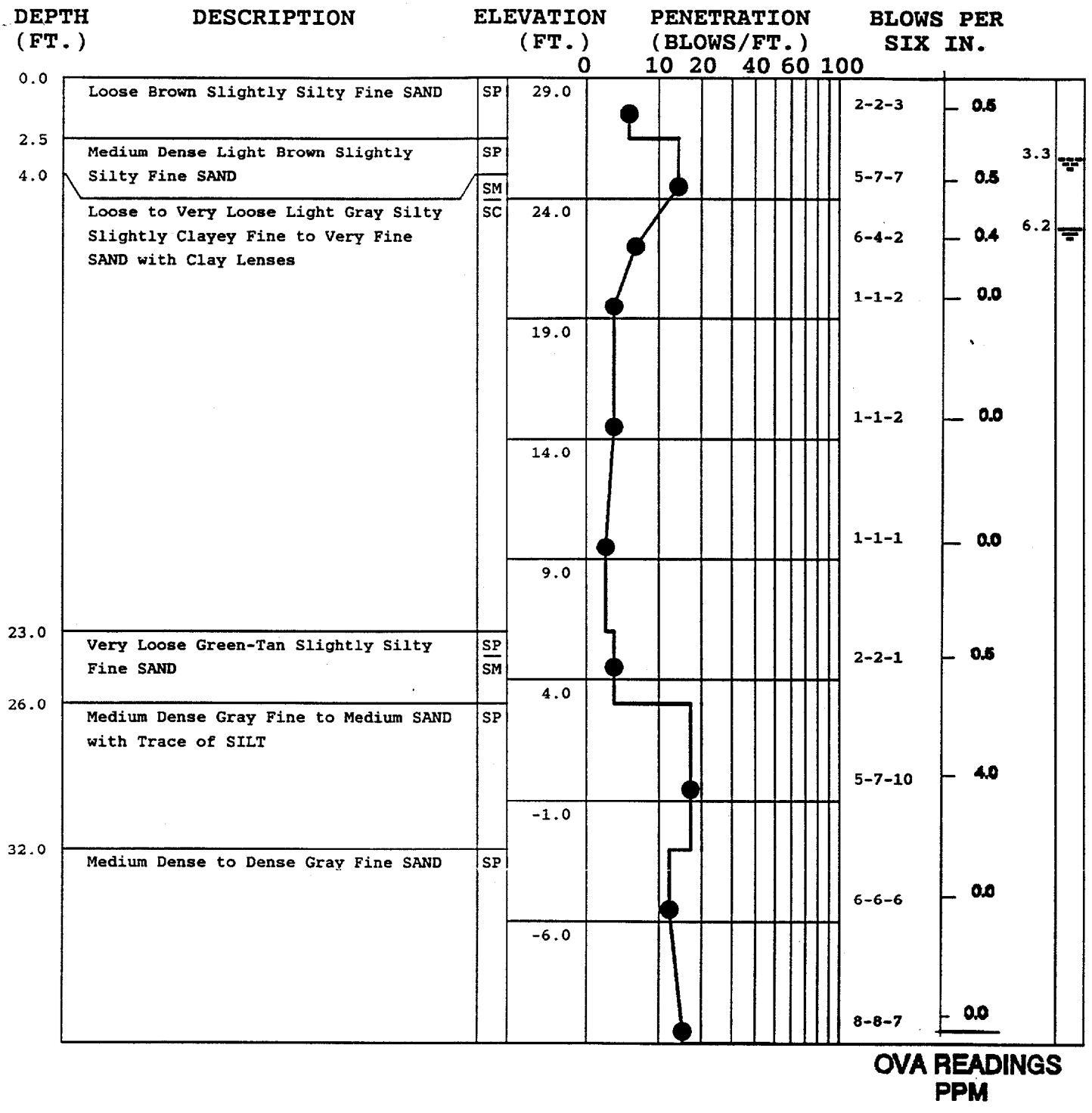
GEOLOGIC SECTION C - C'



CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE II-4
SCALE: AS SHOWN
1054-92-003

TEST BORING RECORD



REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER MW-3
DATE 4-9-92

S&ME

TEST BORING RECORD

DEPTH (FT.)	DESCRIPTION		ELEVATION (FT.)	PENETRATION (BLOWS/FT.) 0 10 20 40 60 100	BLOWS PER SIX IN.	
40.0	Dense to Very Dense Gray Very Fine SAND with some SILT	SP	-14.0		23-29-42	3.0
			-19.0		35-50/0.0'	1.8
49.5	Boring Terminated at 49.5' and Grouted upon completion. Water level from adjacent well (MW-4)		-24.0			

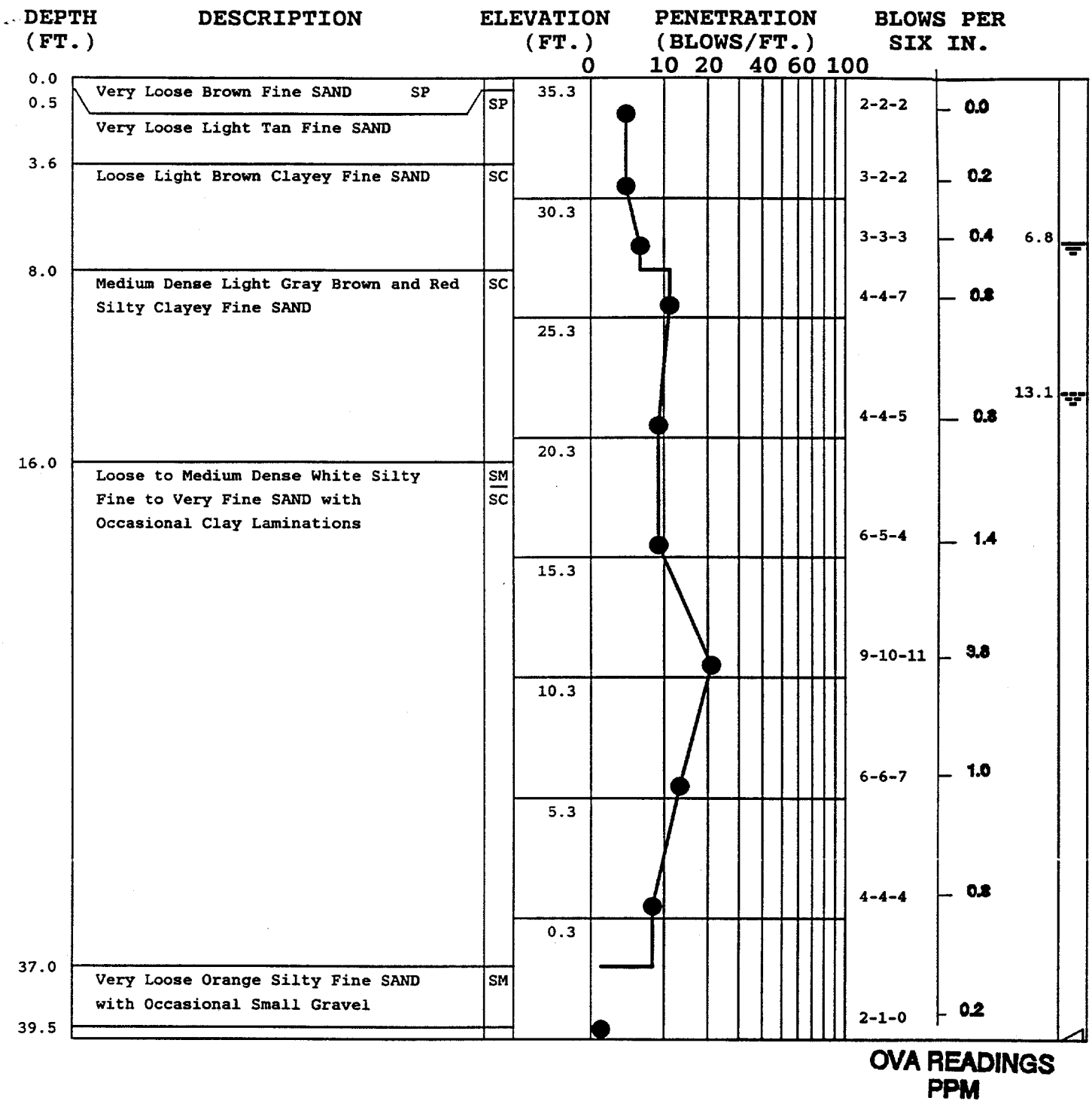
OVA READINGS PPM

REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER MW-4
DATE 4-16-92

S&ME

TEST BORING RECORD



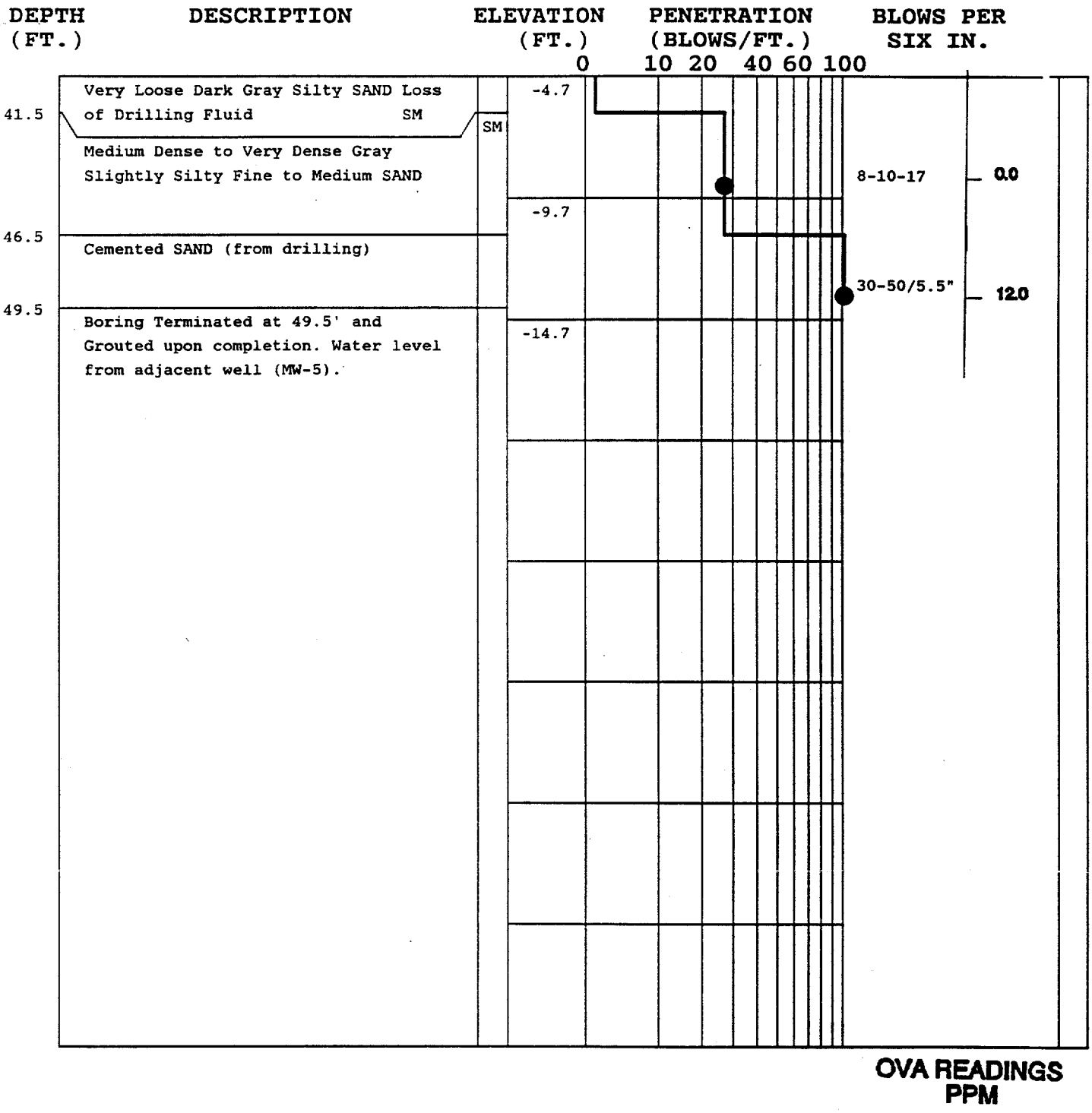
REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER MW-5
DATE 4-10-92

PAGE 1 OF 2

S&ME

TEST BORING RECORD

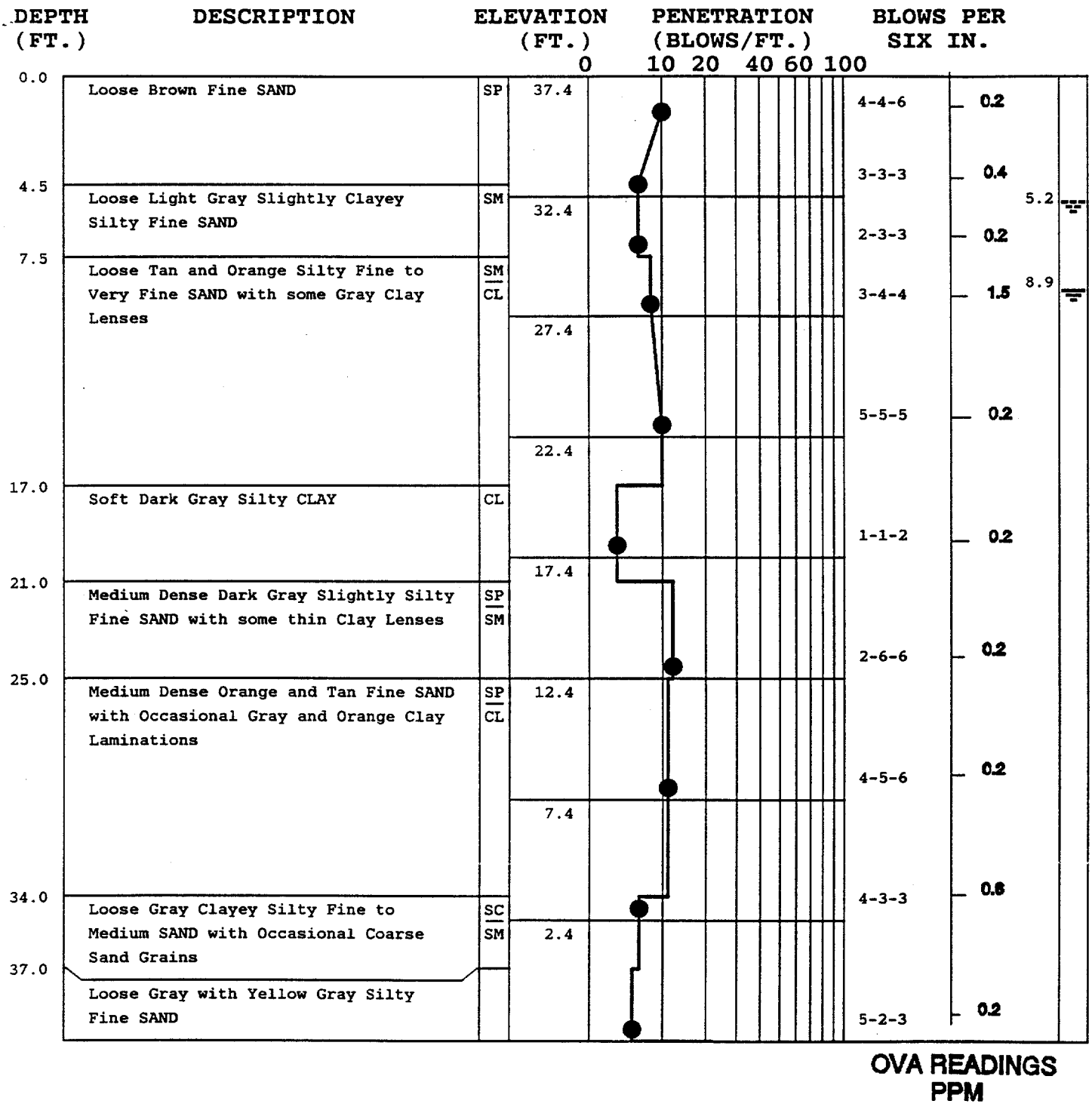


REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER MW-5
DATE 4-10-92

S&ME

TEST BORING RECORD



REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER MW-6
DATE 4-14-92

PAGE 1 OF 2

S&ME

TEST BORING RECORD

DEPTH (FT.)	DESCRIPTION		ELEVATION (FT.)	PENETRATION (BLOWS/FT.) 0 10 20 40 60 100	BLOWS PER SIX IN.	OVA READINGS PPM
40.0	Loose Gray with Yellow Gray Silty Fine SAND	SM	-2.6			
43.0	Medium Dense Light Gray Calcareous SAND and Shell Debris	SM/GM	-7.6		11-7-15	0.2
46.0	Very Dense Gray Fine SAND with some Very Fine Shell Fragments	SP			18-26-33	0.4
50.0	Boring Terminated at 50.0' and Grouted upon completion. Water level from adjacent well (MW-6)		-12.6			

REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER MW-6
DATE 4-14-92

S&ME

TEST BORING RECORD

DEPTH (FT.)	DESCRIPTION		ELEVATION (FT.)	PENETRATION (BLOWS/FT.) 0 10 20 40 60 100	BLOWS PER SIX IN.	
40.0	Medium Dense Light Gray and Yellow Gray Slightly Silty Fine SAND	SM/SP	-11.5		9-9-10	2.2
			-16.5		7-9-12	2.8
50.0	Boring Terminated at 50.0' and grouted upon completion. Water level from adjacent well (MW-8)		-21.5			

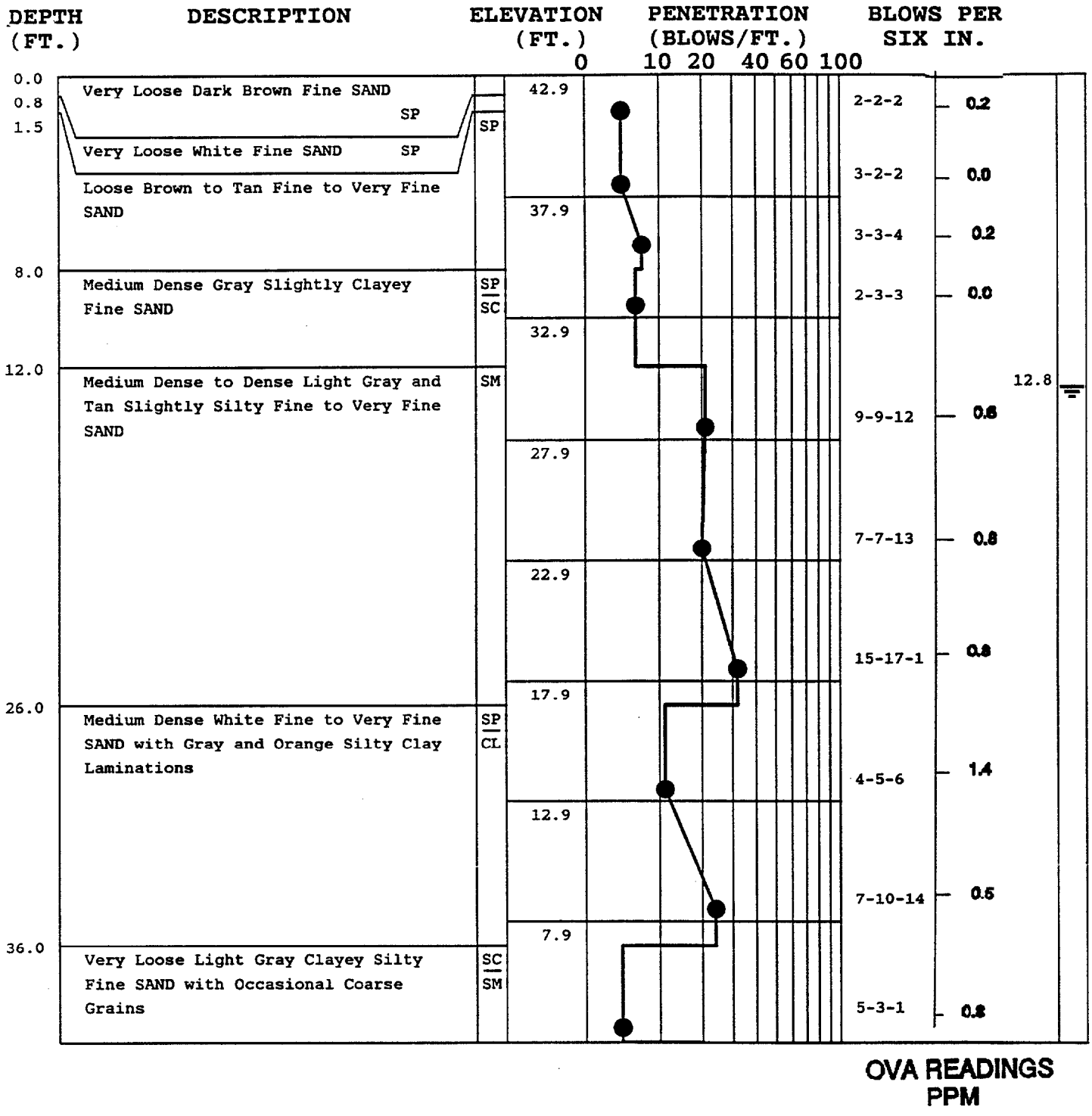
OVA READINGS PPM

REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER MW-8
DATE 4-13-92

S&ME

TEST BORING RECORD

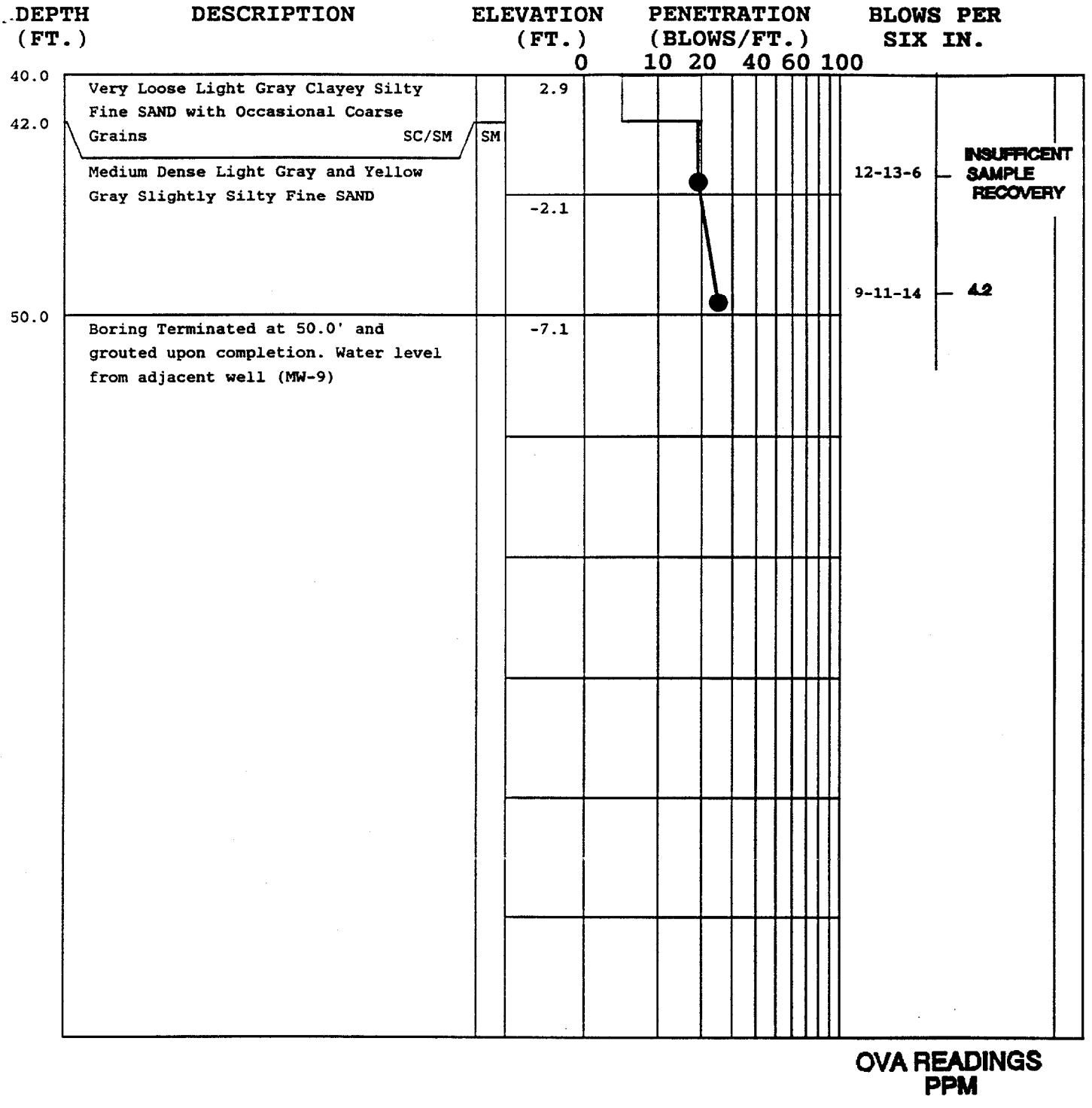


REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER MW-9
DATE 4-14-92

S&ME

TEST BORING RECORD

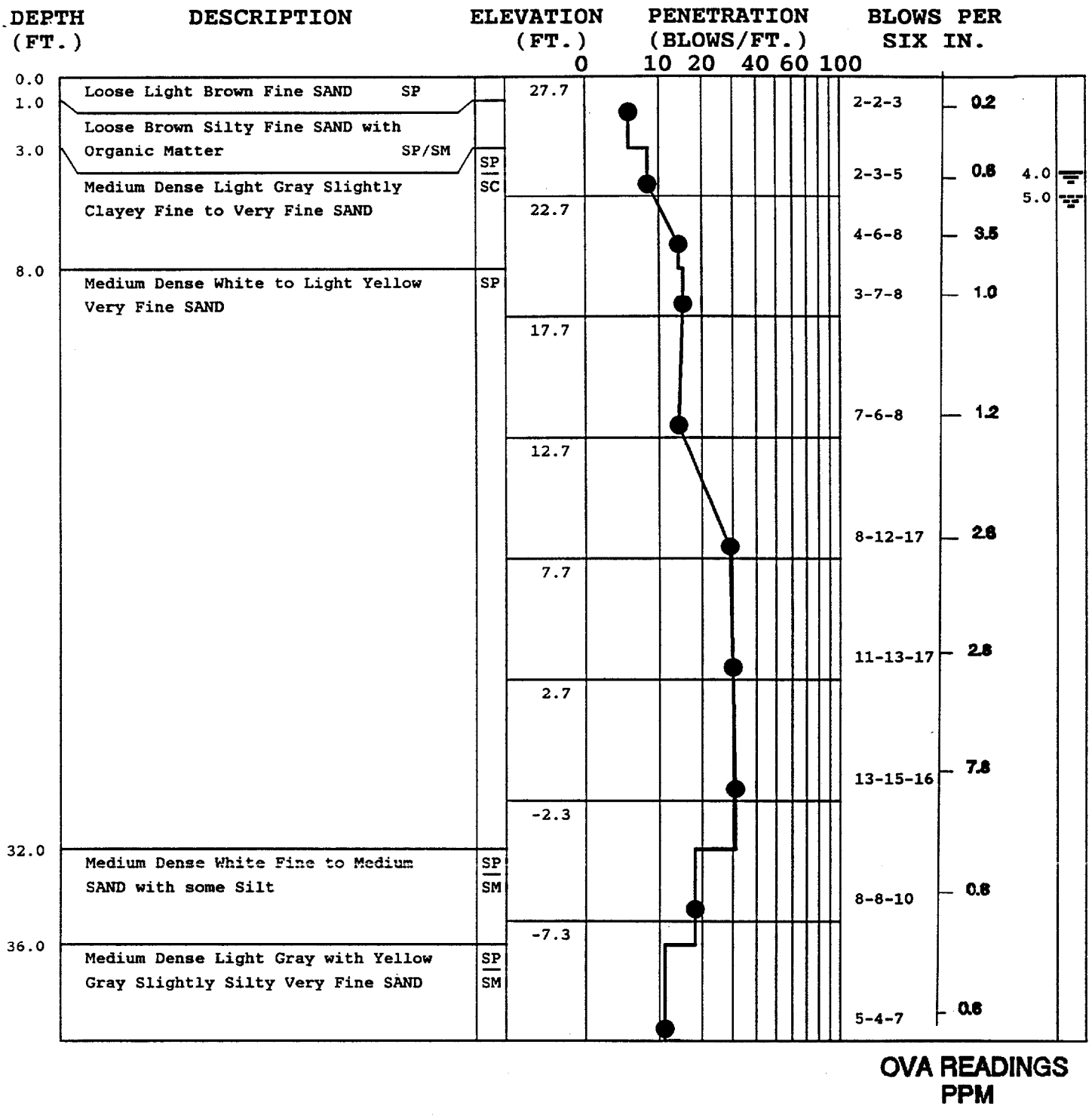


REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER MW-9
DATE 4-14-92

S&ME

TEST BORING RECORD



REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER B-7 (MW-2)
DATE 4-14-92

S&ME

TEST BORING RECORD

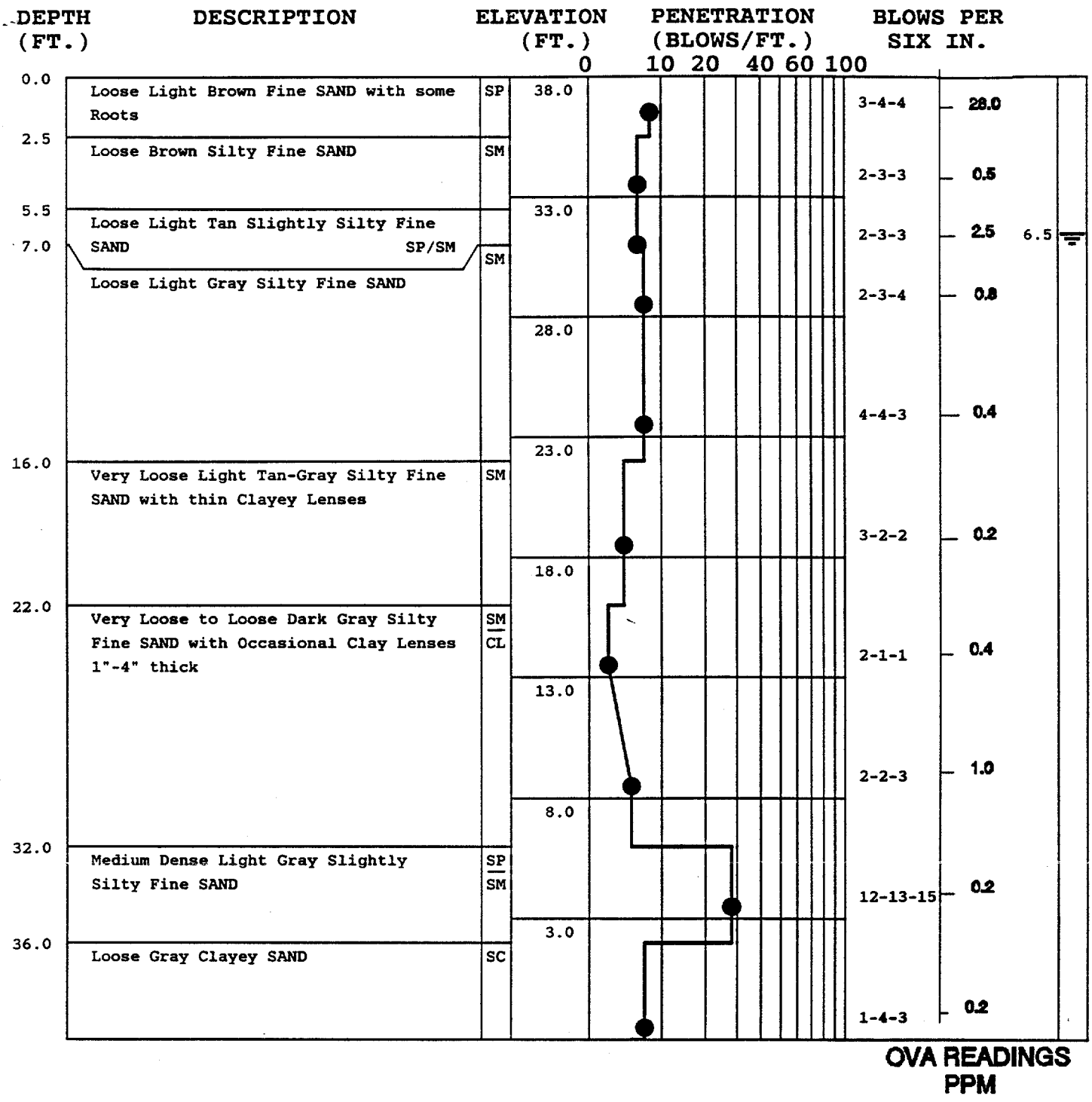
DEPTH (FT.)	DESCRIPTION		ELEVATION (FT.)	PENETRATION (BLOWS/FT.) 0 10 20 40 60 100	BLOWS PER SIX IN.	OVA READINGS PPM
40.0	Medium Dense Light Gray with Yellow Gray Slightly Silty Very Fine SAND	SP/SM	-12.3		7-5-9	1.8
			-17.3		9-12-14	2.5
50.0	Boring Terminated at 50.0' and Grouted upon completion. Water level from adjacent well (MW-2).		-22.3			

REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER B-7 (MW-2)
DATE 4-14-92

S&ME

TEST BORING RECORD



REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER B-8
DATE 4-16-92

PAGE 1 OF 2

S&ME

TEST BORING RECORD

DEPTH (FT.)	DESCRIPTION		ELEVATION (FT.)	PENETRATION (BLOWS/FT.) 0 10 20 40 60 100	BLOWS PER SIX IN.	
40.0	Loose to Medium Dense Gray with Green Slightly Clayey Silty Fine SAND, with Occasional Coarse Grains and Shell Fragments	SM	-2.0		4-2-3	0.5
			-7.0		9-10-7	1.5
50.0	Boring Terminated at 50.0' and Grouted upon completion. Water level from adjacent piezometer (B-8).		-12.0			

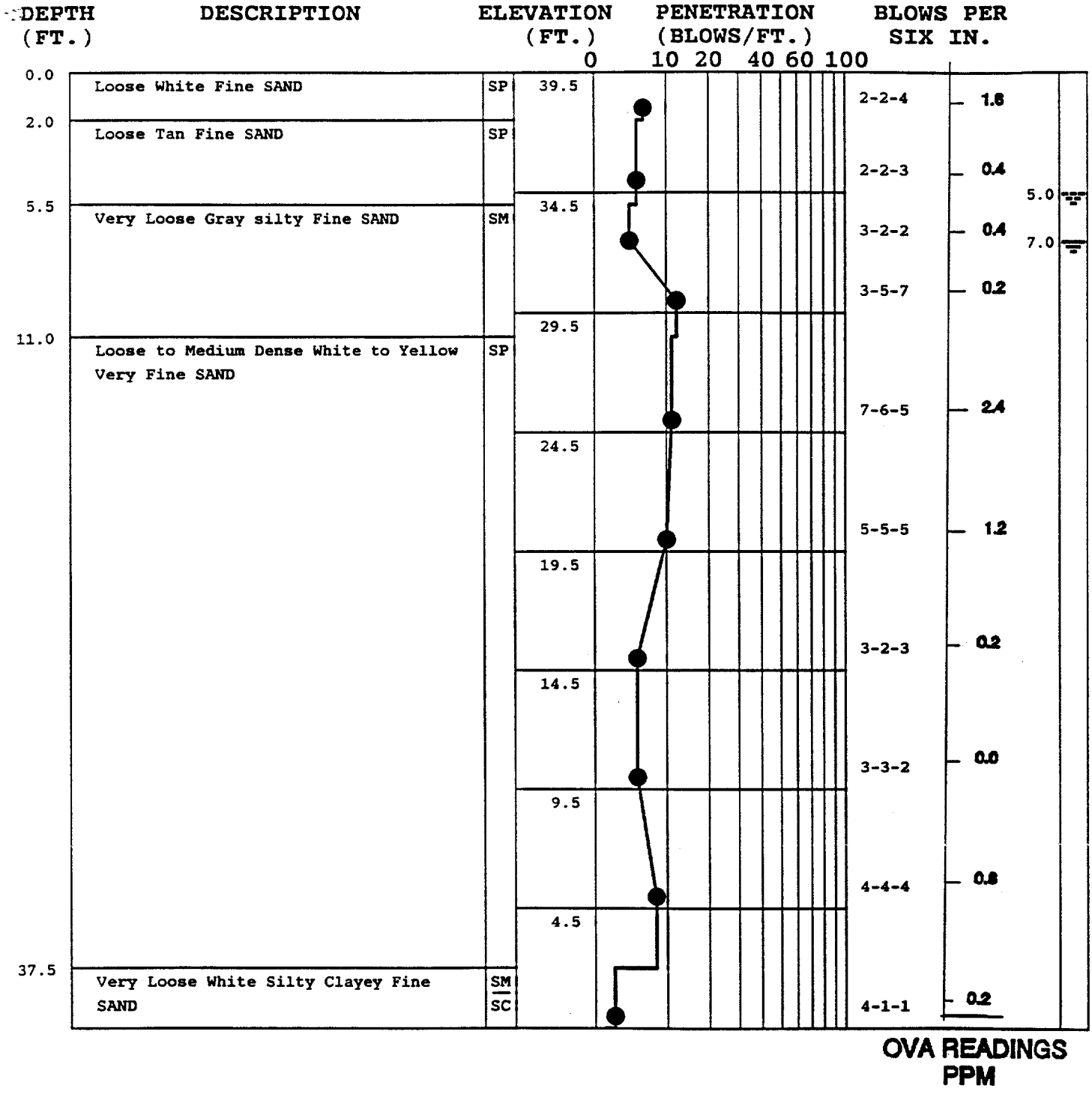
OVA READINGS PPM

REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER B-8
DATE 4-16-92

S&ME

TEST BORING RECORD



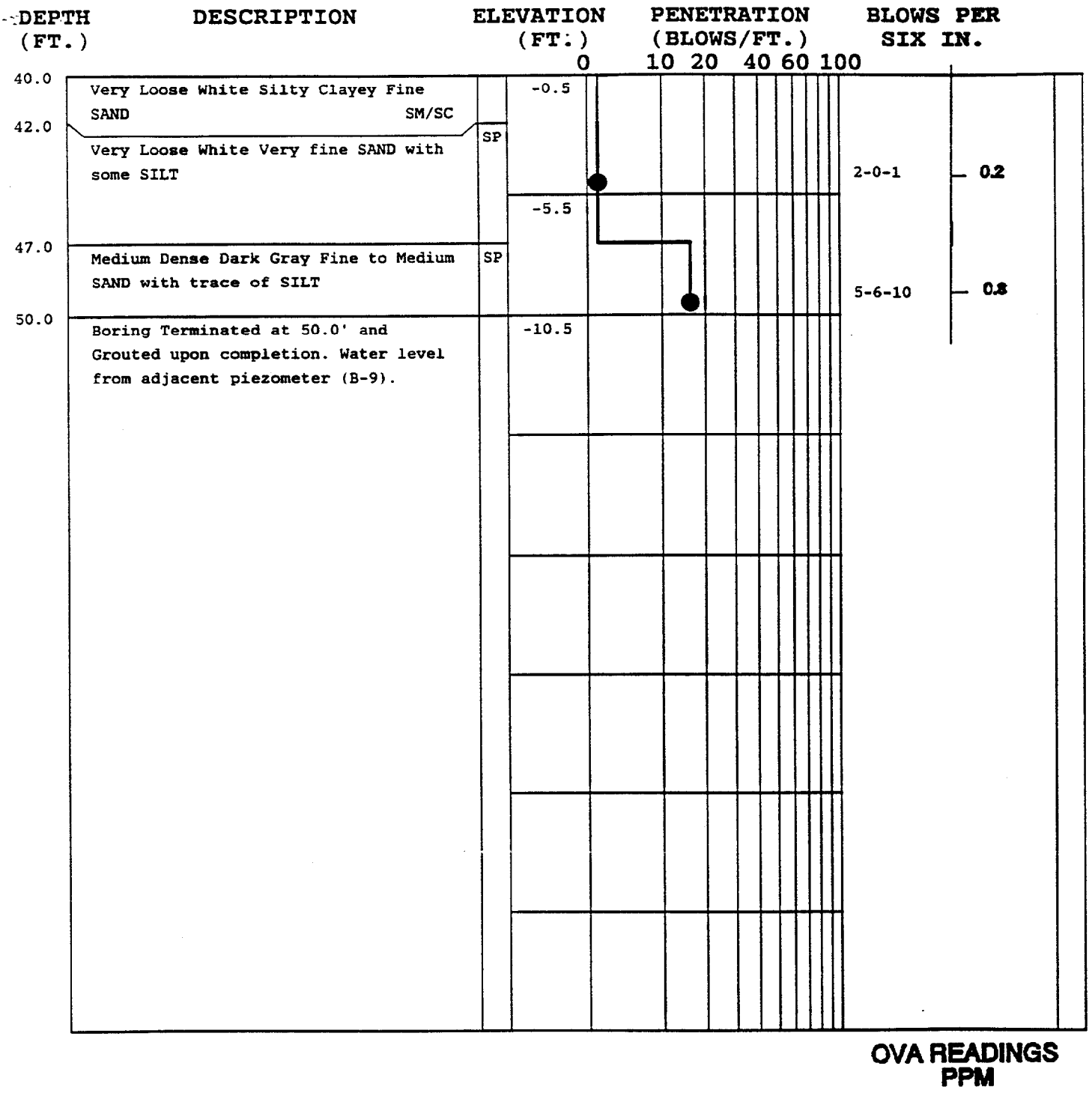
REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER B-9
DATE 4-15-92

PAGE 1 OF 2

S&ME

TEST BORING RECORD

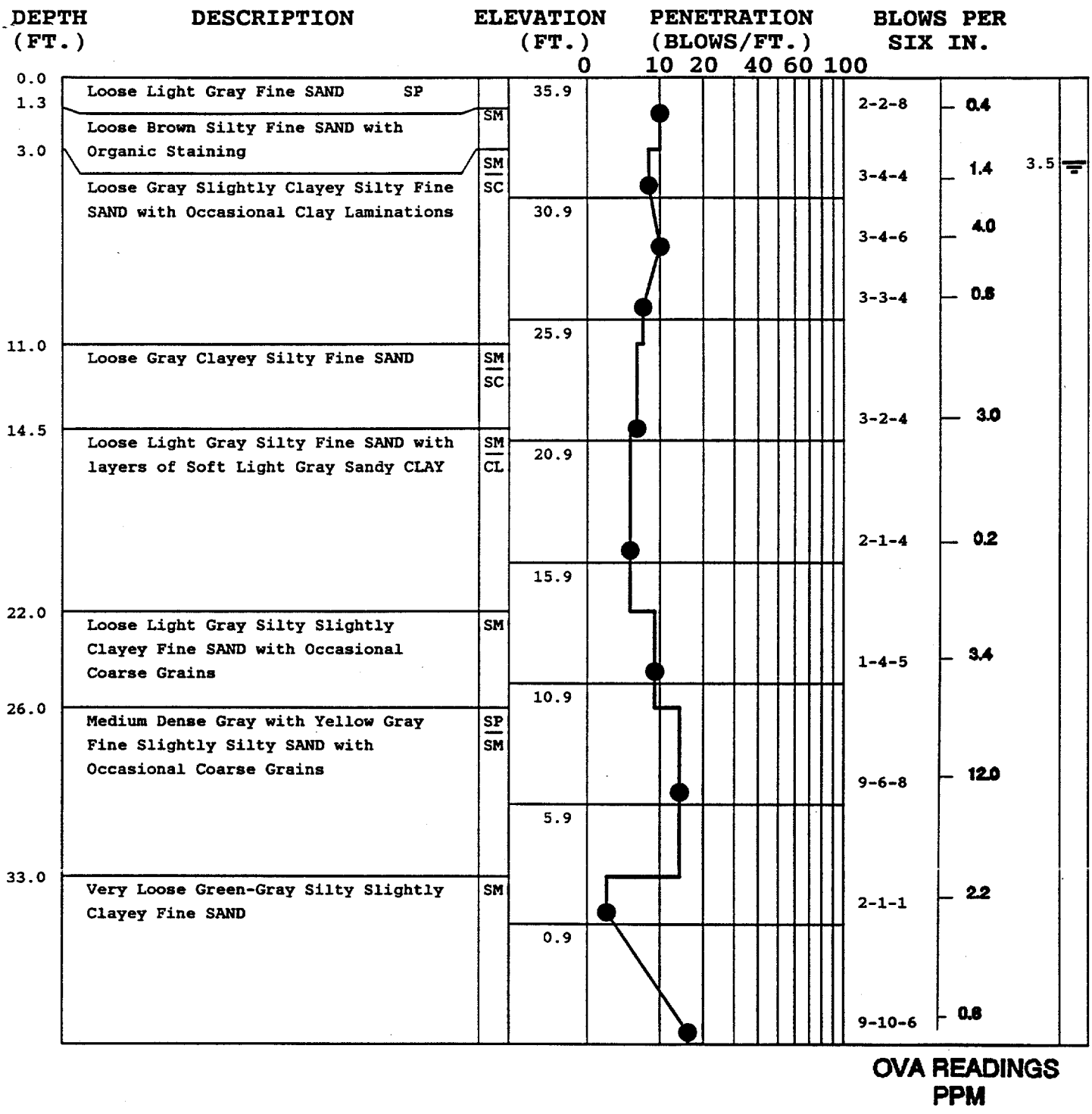


REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER B-9
DATE 4-15-92

S&ME

TEST BORING RECORD



REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER B-10 (MW-1)
DATE 4-15-92

S&ME

TEST BORING RECORD

DEPTH (FT.)	DESCRIPTION		ELEVATION (FT.)	PENETRATION (BLOWS/FT.) 0 10 20 40 60 100	BLOWS PER SIX IN.	OVA READINGS PPM
40.0	Medium Dense Gray with Yellow Gray Fine Slightly Silty SAND with Occasional Coarse Grains	SP/SM	-4.1		6-7-13	0.6
			-9.1		8-12-11	2.0
50.0	Boring Terminated at 50.0' and Grouted upon completion. Water level from adjacent well (MW-1)		-14.1			

REFER TO ATTACHED SHEET FOR EXPLANATIONS AND SYMBOLS

JOB NUMBER 1054-92-003
BORING NUMBER B-10 (MW-1)
DATE 4-15-92

S&ME

Table 1
Location of Monitor Wells and Piezometers[1]
Camp Lejeune Landfill Site "G"
Camp Lejeune, North Carolina

Well or Piezometer Number	North	East
MW-3	347849.73880	2504347.65360
MW-4	347924.90100	2505460.15520
MW-5	347274.26340	2506033.37480
MW-6	346260.73040	2505757.25740
MW-7	345187.58890	2504832.34280
MW-8	344849.10920	2503832.59490
MW-9	346831.71000	2503698.92790
B-8	345988.76160	2504913.91700
B-9	346651.40870	2505515.51850

(1) Locations are referenced to the North Carolina Plane System.

APPENDIX III
GROUNDWATER INFORMATION
and
MONITOR WELL RECORDS

ABSTRACT

This appendix includes a summary of water table readings shown on Table III-1, that was obtained from the monitor wells and piezometers during the Site Characterization. These readings are compared to readings obtained in 1991. Figure III-1 shows the seasonal variation (hydrograph) for two wells located south of Jacksonville, N.C. The seasonal high water table occurs in January and August.

Monitor well construction data for each of the monitor wells, MW-3 through MW-9, and BP-6, are shown on the schematic drawings and Well Completion Records (Form GW-1). The Well Completion Records describe the installation in greater detail, and are a required submittal to NCDEHNR following construction of the well.

Table III-1
Summary of Groundwater Elevation Data
Camp Lejeune Landfill Site "G"
Camp Lejeune, North Carolina

Elevation of Groundwater at Well or Piezometer on Date Shown								
Well or Piezometer	Ground Surface Elevation	August 29 1991(1)	September 9 1991(1)	April 22 1992	April 23 1992	April 24 1992	April 28 1992	May 5 1992
MW-1	35.87	33.31	33.22				31.64	31.02
MW-2	27.73	23.85	24.11			23.25	23.11	22.63
MW-3	28.98						22.29	21.65
MW-4	26.05						16.39	16.24
MW-5	35.29						22.18	21.87
MW-6	37.36			28.60		28.53	27.55	27.10
MW-7	34.22			24.68		24.85	24.75	24.25
MW-8	28.55			22.02		22.01	21.97	21.79
MW-9	42.94					30.13	30.01	29.83
BP-1	35.7(2)	34.38	33.5		32.37		32.05	31.47
BP-2	38.5(2)	30.78	30.39		29.06		29.06	28.65
BP-3	34.8(2)	28.06	27.86		25.84		25.84	26.26
BP-4	36.8(2)	26.31	26.36					24.91
BP-6	36.4(2)	26.21	25.92		22.38		20.72(3)	20.48(3)
B-8	38.04				31.55		31.51	31.31
B-9	39.55				32.62		32.62	32.32
82-MW-30	30.08			22.91	23.04		22.94	22.79
6-GW-2	41.08			29.99	29.99		29.93	29.74

(1) Groundwater levels measured in 1991 are 5.7 to 1.2 feet higher than recent May 1992 readings. Elevations shown are based on revised top of casing elevations determined by survey (Dewberry and Davis - April 1992).

(2) Elevation determined by measurement from top of well casing to ground surface.

(3) Groundwater elevation obtained from replacement well BP-6.

WELL HYDROGRAPHS

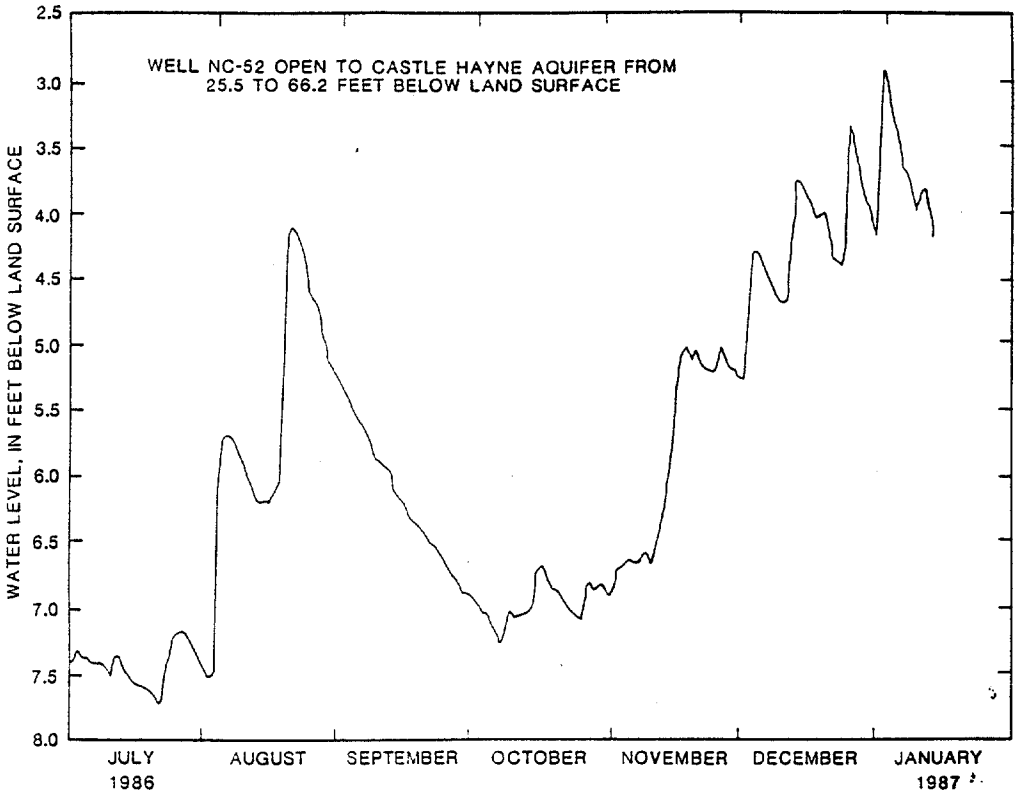


Figure 13.--Water levels in well NC-52, July 1986 through January 1987.

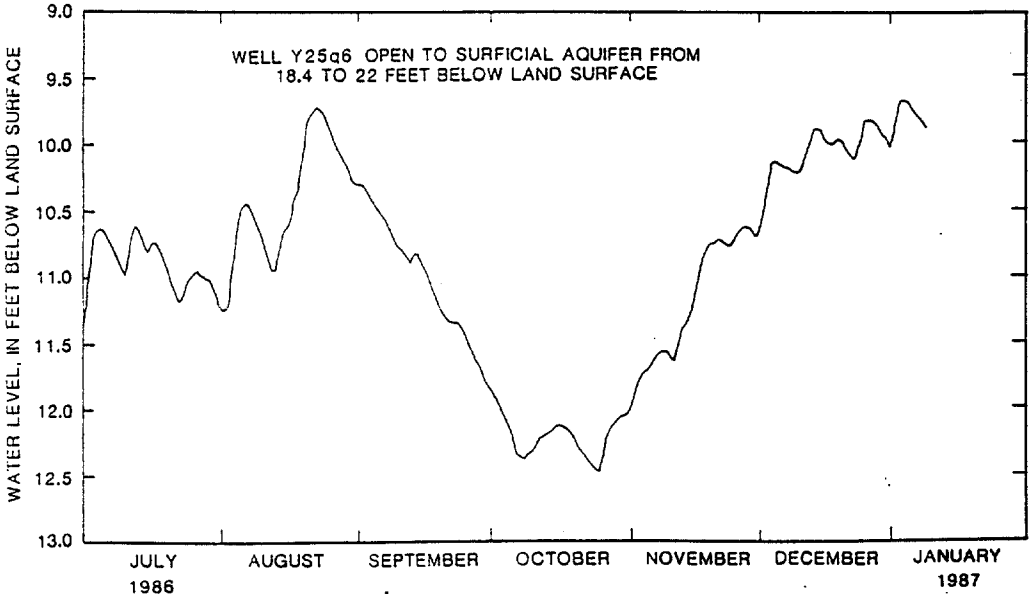


Figure 14.--Water levels in well Y25q6, July 1986 through January 1987.

Well NC 52 is located approximately 0.5 mile east of Highway 17, 1 mile south of Highway 24
Well Y25q6 is located east of Highway 17, approximately 10 miles south of Highway 24

Source of Well Hydrographs: U.S. Geological Survey, Water Resources Investigation Report 89-4096; page 28, Figures 13 and 14

CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE III-1
NO SCALE
1054-92-003

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH,N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc ____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-3

DRILLING CONTRACTOR S&ME Environmental

DRILLER REGISTRATION NUMBER 412

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0272

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Camp Lejeune Landfill Site G
east of Piney Green Road and Old Bear Creek Road
(Road, Community, or Subdivision and Lot No.)

County: Onslow

2. OWNER United States Marine Corps
ADDRESS Marine Corp Base (Street or Route No.)
Camp Lejeune (City or Town) NC (State) 28542 (Zip Code)

3. DATE DRILLED 4-22-92 USE OF WELL Monitoring

4. TOTAL DEPTH 25.0 CUTTINGS COLLECTED ☐ Yes ☒ No

5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

6. STATIC WATER LEVEL: 8.3 FT. ☐ above ☒ below TOP OF CASING,
TOP OF CASING IS 2.1 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): 3gpm METHOD OF TEST Pump

8. WATER ZONES (depth): _____

9. CHLORINATION: Type N/A Amount N/A

10. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	+2.1	15.0 Ft.	2	sch 40	PVC
		Ft.			
		Ft.			

11. GROUT:

	Depth From	Depth To	Material	Method
	0.0	9.4 Ft.	Cement	Tremie
	9.4	12.3 Ft.	Bentonite	Pellets

12. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	15.0	25.0 Ft.	2 in.	.010 in.	PVC
		Ft.	in.	in.	
		Ft.	in.	in.	

13. GRAVEL PACK:

	Depth From	Depth To	Size	Material
	12.3	25.0 Ft.	Fine	Sand
		Ft.		

Depth From	Depth To	DRILLING LOG Formation Description
0.0 - 2.5		Brown slightly fine sand
		light brown slightly silty
		fine sand
4.0 - 23.0		Light gray silty slightly
		clayey fine to very fine san
		with clay lenses
23.0 - 25.0		Green tan slightly silty fin
		sand

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

See Attached Site Map.

14. REMARKS: Well installed through hollow stem augers. Lithology from adjacent soil boring.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

Submit original to Division of Environmental Management and copy to well owner.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH,N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-4

DRILLING CONTRACTOR S&ME Environmental

DRILLER REGISTRATION NUMBER 412

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0272

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Camp Lejeune Landfill Site G
east of Piney Green Road and Old Bear Creek Road
(Road, Community, or Subdivision and Lot No.)

County: Onslow

2. OWNER United States Marine Corps
ADDRESS Marine Corp Base (Street or Route No.)
Camp Lejeune (City or Town) NC (State) 28542 (Zip Code)

3. DATE DRILLED 4-22-92 USE OF WELL Monitoring

4. TOTAL DEPTH 25.0 CUTTINGS COLLECTED ☐ Yes ☒ No

5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

6. STATIC WATER LEVEL: 11.7 FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 2.0 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): 0.5 METHOD OF TEST Pump

8. WATER ZONES (depth): _____

9. CHLORINATION: Type N/A Amount N/A

10. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.0	To 15.0 Ft.	2	sch 40	PVC
From		To Ft.			
From		To Ft.			

11. GROUT:

	Depth		Material	Method
From	0.0	To 10.8 Ft.	Cement	Tremie
From	10.8	To 13.0 Ft.	Bentonite	Pellets

12. SCREEN:

	Depth		Diameter	Slot Size	Material
From	15.0	To 25.0 Ft.	2 in.	.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

13. GRAVEL PACK:

	Depth		Size	Material
From	13.0	To 25.0 Ft.	Fine	Sand
From		To Ft.		

14. REMARKS: Well installed through hollow stem augers. Lithology from adjacent soil boring.

Depth From	Depth To	DRILLING LOG Formation Description
0.0	1.5	Brown Silty Clayey Fine Sand
1.5	16.0	White to Tan silty fine sand with sandy clay and silt len
16.0'	25.0'	Orange and Gray silty fine sand with gray and brown clay lenses

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

See Attached Site Map.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Walter J. Bullock — 5/28/92
SIGNATURE OF CONTRACTOR OR AGENT — DATE

GW-1 Revised 11/84

Submit original to Division of Environmental Management and copy to well owner.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH,N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-5

DRILLING CONTRACTOR S&ME Environmental

DRILLER REGISTRATION NUMBER 412

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0272

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Camp Lejeune Landfill Site G
east of Piney Green Road and Old Bear Creek Road
(Road, Community, or Subdivision and Lot No.)

County: Onslow

2. OWNER United States Marine Corps
ADDRESS Marine Corp Base (Street or Route No.)
Camp Lejeune (City or Town) NC (State) 28542 (Zip Code)

3. DATE DRILLED 4-22-92 USE OF WELL Monitoring

4. TOTAL DEPTH 25.0 CUTTINGS COLLECTED ☐ Yes ☒ No

5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

6. STATIC WATER LEVEL: 15.0 FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 2.0 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): 4gpm METHOD OF TEST Pump

8. WATER ZONES (depth): _____

9. CHLORINATION: Type N/A Amount N/A

10. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.0	To 15.0 Ft.	2	sch 40	PVC
From		To Ft.			
From		To Ft.			

11. GROUT:

	Depth		Material	Method
From	0.0	To 10.6 Ft.	Cement	Tremie
From	10.6	To 12.8 Ft.	Bentonite	Pellets

12. SCREEN:

	Depth		Diameter	Slot Size	Material
From	15.0	To 25.0 Ft.	2 in.	.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

13. GRAVEL PACK:

	Depth		Size	Material
From	12.8	To 25.0 Ft.	Fine	Sand
From		To Ft.		

Depth From	Depth To	DRILLING LOG Formation Description
0.0	- 0.5	Very loose brown fine sand
0.5	- 3.6	Very loose light tan fine sa
3.6	- 8.0	Loose light brown clayey fir sand
8.0	- 16.0	Medium dense light gray brow and red silty clayey fine sa
16.0'	- 25.0'	Loose to medium dense white silty fine to very fine sand with occasional clay laminat

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

See Attached Site Map

14. REMARKS: Well installed through hollow stem augers. Lithology from adjacent soil boring.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Walter J. Bullock 5/28/92
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

Submit original to Division of Environmental Management and copy to well owner.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH,N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-6

DRILLING CONTRACTOR S&ME Environmental

DRILLER REGISTRATION NUMBER 412

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0272

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Camp Lejeune Landfill Site G
east of Piney Green Road and Old Bear Creek Road
(Road, Community, or Subdivision and Lot No.)

County: Onslow

2. OWNER United States Marine Corps
ADDRESS Marine Corp Base (Street or Route No.)
Camp Lejeune (City or Town) NC (State) 28542 (Zip Code)

3. DATE DRILLED 4-17-92 USE OF WELL Monitoring

4. TOTAL DEPTH 25.0 CUTTINGS COLLECTED ☐ Yes ☒ No

5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

6. STATIC WATER LEVEL: 11.2 FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 2.3 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): 5gpm METHOD OF TEST Pump

8. WATER ZONES (depth): _____

9. CHLORINATION: Type N/A Amount N/A

10. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	+2.3	15.0 Ft.	2	sch 40	PVC
		Ft.			
		Ft.			

11. GROUT:

	Depth From	Depth To	Material	Method
	0.0	11.3 Ft.	Cement	Tremie
	11.3	12.5 Ft.	Bentonite	Pellets

12. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	15.0	25.0 Ft.	2 in.	.010 in.	PVC
		Ft.	in.	in.	
		Ft.	in.	in.	

13. GRAVEL PACK:

	Depth From	Depth To	Size	Material
	12.5	25.0 Ft.	Fine	Sand
		Ft.		

Depth From	Depth To	DRILLING LOG Formation Description
0.0 -	4.5	Brown fine sand
4.5 -	7.5	Light gray slightly clayey fine sand
7.5-	17.0	Tan and orange silty fine to very fine sand with some gra clay lenses
17.0 -	21.0	Dark gray silty clay
21.0' -	25.0'	Dark gray slightly silty fin sand with some thin clay len

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

See Attached Site Map

14. REMARKS: Well installed through hollow stem augers. Lithology from adjacent soil boring.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Walter O Bullock 5/28/92
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

Submit original to Division of Environmental Management and copy to well owner.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH,N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-7

DRILLING CONTRACTOR S&ME Environmental

DRILLER REGISTRATION NUMBER 412

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0272

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Camp Lejeune Landfill Site G
east of Piney Green Road and Old Bear Creek Road
(Road, Community, or Subdivision and Lot No.)
County: Onslow

2. OWNER United States Marine Corps
ADDRESS Marine Corp Base (Street or Route No.)
Camp Lejeune (City or Town) NC (State) 28542 (Zip Code)

3. DATE DRILLED 4-21-92 USE OF WELL Monitoring

4. TOTAL DEPTH 25.0 CUTTINGS COLLECTED ☐ Yes ☒ No

5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

6. STATIC WATER LEVEL: 11.5 FT. ☐ above ☒ below TOP OF CASING,
TOP OF CASING IS 2.1 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): 5gpm METHOD OF TEST Pump

8. WATER ZONES (depth): _____

9. CHLORINATION: Type N/A Amount N/A

10. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.2	To 15.0 Ft.	2	sch 40	PVC
From		To Ft.			
From		To Ft.			

11. GROUT:

	Depth		Material	Method
From	0.0	To 11.3 Ft.	Cement	Tremie
From	11.3	To 12.8 Ft.	Bentonite	Pellets

12. SCREEN:

	Depth		Diameter	Slot Size	Material
From	15.0	To 25.0 Ft.	2 in.	.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

13. GRAVEL PACK:

	Depth		Size	Material
From	12.8	To 25.0 Ft.	Fine	Sand
From		To Ft.		

14. REMARKS: Well installed through hollow stem augers. Lithology from adjacent soil boring.

Depth From	Depth To	DRILLING LOG Formation Description
0.0	2.0	White fine sand
2.0	5.0	Brown silty fine sand
5.0	7.5	Light brown slightly clayey silty fine sand
7.5	12.0	Light gray with orange slight clayey silty fine sand
12.0	21.0	Light gray to tan silty very fine sand with clay lenses
21.0	25.0	* Gray fine to medium silty sa

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

* with clay lenses

See Attached Site Map.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Walter Burkett 5/28/92
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

Submit original to Division of Environmental Management and copy to well owner.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH,N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-8

DRILLING CONTRACTOR S&ME Environmental

DRILLER REGISTRATION NUMBER 412

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0272

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Camp Lejeune Landfill Site G
east of Piney Green Road and Old Bear Creek Road
(Road, Community, or Subdivision and Lot No.)
County: Onslow

2. OWNER United States Marine Corps
ADDRESS Marine Corp Base (Street or Route No.)
Camp Lejeune (City or Town) NC (State) 28542 (Zip Code)

3. DATE DRILLED 4-21-92 USE OF WELL Monitoring

4. TOTAL DEPTH 25.0 CUTTINGS COLLECTED ☐ Yes ☒ No

5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

6. STATIC WATER LEVEL: 8.6 FT. ☐ above ☒ below TOP OF CASING,
TOP OF CASING IS 2.1 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): 5gpm METHOD OF TEST Pump

8. WATER ZONES (depth): _____

9. CHLORINATION: Type N/A Amount N/A

10. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.1	To 15.0 Ft.	2	sch 40	PVC
From		To Ft.			
From		To Ft.			

11. GROUT:

	Depth		Material	Method
From	0.0	To 11.2 Ft.	Cement	Tremie
From	11.2	To 13.0 Ft.	Bentonite	Pellets

12. SCREEN:

	Depth		Diameter	Slot Size	Material
From	15.0	To 25.0 Ft.	2 in.	.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

13. GRAVEL PACK:

	Depth		Size	Material
From	13.0	To 25.0 Ft.	Fine	Sand
From		To Ft.		

14. REMARKS: Well installed through hollow stem augers. Lithology from adjacent soil boring.

Depth From	Depth To	DRILLING LOG Formation Description
0.0	1.8	Very loose white fine sand
1.8	7.0	Loose light brown fine sand
7.0	11.0	Medium dense light brown slightly silty fine sand
11.0	25.0	Medium dense white to yellow very fine sand

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

See Attached Site Map.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Walter C. Bullard 5/26/92
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

Submit original to Division of Environmental Management and copy to well owner.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH,N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-9

DRILLING CONTRACTOR S&ME Environmental

DRILLER REGISTRATION NUMBER 412

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0272

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Camp Lejeune Landfill Site G
east of Piney Green Road and Old Bear Creek Road
(Road, Community, or Subdivision and Lot No.)

County: Onslow

2. OWNER United States Marine Corps
ADDRESS Marine Corp Base (Street or Route No.)
Camp Lejeune (City or Town) NC (State) 28542 (Zip Code)

3. DATE DRILLED 4-22-92 USE OF WELL Monitoring

4. TOTAL DEPTH 25.0 CUTTINGS COLLECTED ☐ Yes ☒ No

5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

6. STATIC WATER LEVEL: 14.9 FT. ☐ above ☒ below TOP OF CASING,
TOP OF CASING IS 2.1 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): 4gpm METHOD OF TEST Pump

8. WATER ZONES (depth): _____

9. CHLORINATION: Type N/A Amount N/A

10. CASING:

	Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
	+2.1	15.0 Ft.	2	sch 40	PVC
		Ft.			
		Ft.			

11. GROUT:

	Depth From	To	Material	Method
	0.0	9.9 Ft.	Cement	Tremie
	9.9	11.9 Ft.	Bentonite	Pellets

12. SCREEN:

	Depth From	To	Diameter	Slot Size	Material
	15.0	25.0 Ft.	2 in.	.010 in.	PVC
		Ft.	in.	in.	
		Ft.	in.	in.	

13. GRAVEL PACK:

	Depth From	To	Size	Material
	11.9	25.0 Ft.	Fine	Sand
		Ft.		

Depth From	To	DRILLING LOG Formation Description
0.0 - 0.8		Dark brown fine sand
0.8 - 1.5		White fine sand
1.5 - 8.0		Brown to tan fine to very fi sand
8.0 - 12.0		Gray slightly clayey fine sa
12.0 - 25.0		Light gray and tan slightly silty fine to very fine sand

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)
See Attached Site Map

14. REMARKS: Well installed through hollow stem augers. Lithology from adjacent soil boring.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Walter J. Bullock 5/28/92
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

Submit original to Division of Environmental Management and copy to well owner.

North Carolina
Department of Natural Resources and Community Development
Division of Environmental Management
P.O. Box 27687 - Raleigh, N.C. 27611

Well Abandonment Record

Contractor S&ME, Inc. Reg. No. 412

1. Well Location: (Show a sketch of the location on back of form.)

   Nearest Town: Camp Lejeune County: Onslow

   east of Piney Green Road and Shell Rock Road Quadrangle No.: Camp Lejeune
   (Road, Community, Subdivision, Lot No.)

2. Owner: United States Marine Corps

3. Address: Marine Corp Base; Camp Lejeune, NC

4. Topography: draw, slope, hilltop, valley, flat.

5. Use of Well: piezometer Date: _____

6. Total Depth: 25 Dia.: 1.25"

7. Casing Removed:

feet	diameter
16	1.25

8. Sealing Material:

Neat Cement		Sand Cement	
bags of cement	1.0	bags of cement	
gals. of water	5.5	yds. of sand	
		gals. of water	

Other
Type Material: _____
Amount: _____

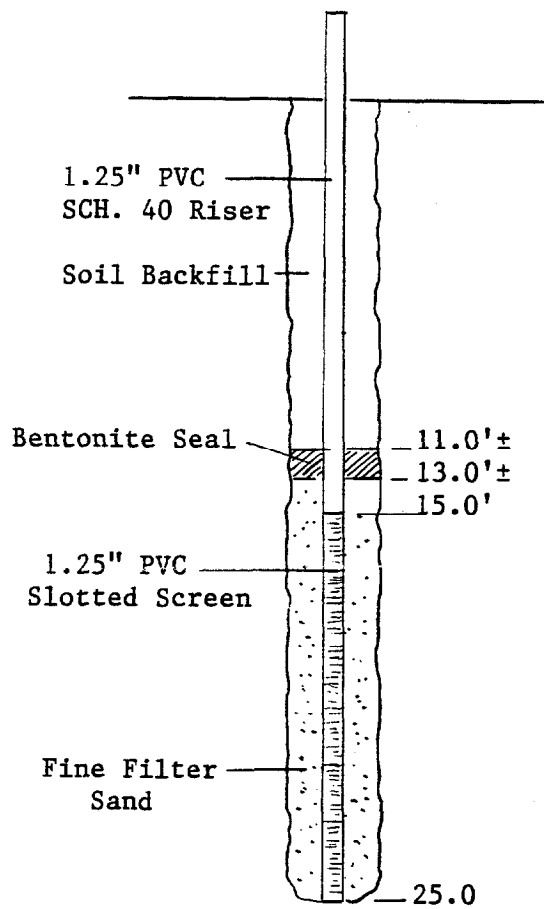
9. Explain Method of emplacement of material

Pull casing and screen. Pump grout through tremie pipe set on bottom of remaining hole.

I do hereby certify that this well abandonment record is true and exact.

Walter O Burkett 5/28/92
Signature of Contractor or Agent Date

Well Diagram: Draw a detailed sketch of well showing total depth, screen depth an diameter remaining in well, gravel interv intervals of casing perforations, and depths and types of fill materials used.



Submit original to the Divesion of Environmental Management, one copy to the Driller, and one copy to the Owner.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH,N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

BP-6

DRILLING CONTRACTOR S&ME Environmental

DRILLER REGISTRATION NUMBER 412

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0272

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Camp Lejeune Landfill Site G
east of Piney Green Road and Old Bear Creek Road
(Road, Community, or Subdivision and Lot No.)

County: Onslow

2. OWNER United States Marine Corps
ADDRESS Marine Corp Base (Street or Route No.)
Camp Lejeune (City or Town) NC (State) 28542 (Zip Code)

3. DATE DRILLED 4-28-92 USE OF WELL Monitoring

4. TOTAL DEPTH 25.0 CUTTINGS COLLECTED ☐ Yes ☒ No

5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

6. STATIC WATER LEVEL: 16.7 FT. ☐ above ☒ below TOP OF CASING,
TOP OF CASING IS 2.0 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): N/A METHOD OF TEST Pump

8. WATER ZONES (depth): _____

9. CHLORINATION: Type N/A Amount N/A

10. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.0	To 15.0 Ft.	2	sch 40	PVC
From		To Ft.			
From		To Ft.			

11. GROUT:

	Depth		Material	Method
From	0.0	To 11.0 Ft.	Cement	Tremie
From	11.0	To 12.5 Ft.	Bentonite	Pellets

12. SCREEN:

	Depth		Diameter	Slot Size	Material
From	15.0	To 25.0 Ft.	2 in.	.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

13. GRAVEL PACK:

	Depth		Size	Material
From	12.5	To 25.0 Ft.	Fine	Sand
From		To Ft.		

DRILLING LOG

Depth From	Depth To	Formation Description
0.0	1.0	Brown tan silty fine sand
1.0	3.0	White slightly silty fine sa
3.0	8.0	Dark brown slightly fine san
8.0	12.5	Gray and tan slightly clayey fine
12.5	18.0	Gray and tan silty fine sand
18.0	25.0	Light gray slightly silty fi sand

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

See Attached Site Map.

14. REMARKS: Well installed through hollow stem augers. Lithology from adjacent soil boring.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Walter J Balcerzak 5/28/92
SIGNATURE OF CONTRACTOR OR AGENT DATE

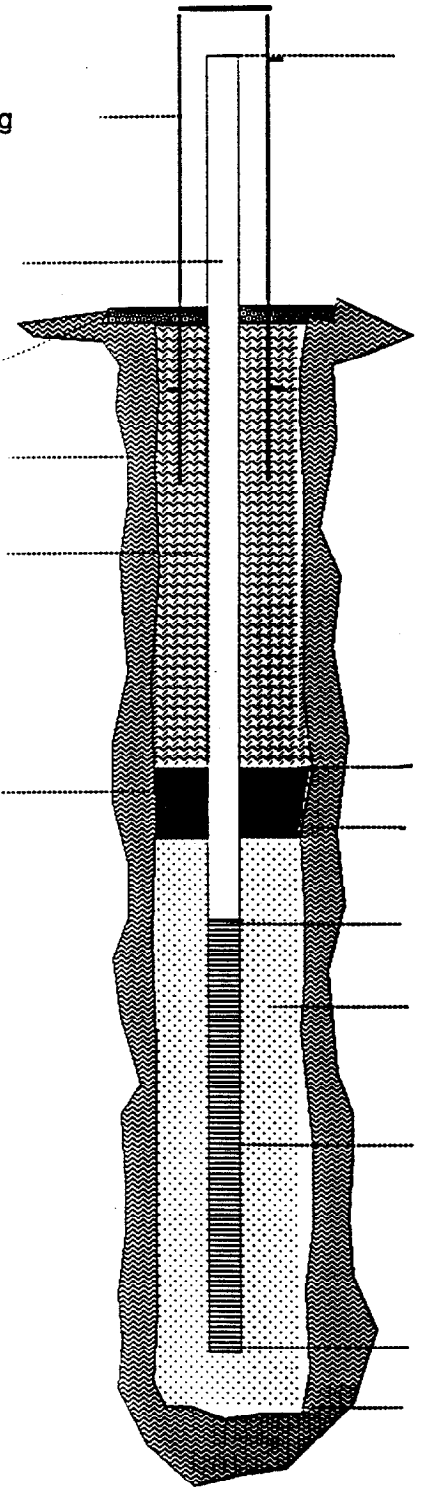
GW-1 Revised 11/84

Submit original to Division of Environmental Management and copy to well owner.

SCHEMATIC OF WELL CONSTRUCTION

MONITOR WELL NO. MW-3

INSTALLATION DATE
4-22-92



4 inch Protective Casing with locking cover

2 inch PVC Riser Schedule 40

24 inch square Concrete Pad

8.5 inch Borehole

Cement Grout

Bentonite Pellets

Top of Casing Elevation 30.75

Top of Casing is 1.80 ft. above ground surface

Ground Surface

9.4 feet to top of Bentonite

12.3 feet to top of Filter Pack

15.0 feet to top of screen

Fine Filter Sand

2 inch PVC Screen 0.010" Slots

25.0 feet to Screen bottom

25.0 feet to Borehole bottom

LITHOLOGY OF THE SCREENED INTERVAL

.4.0 feet to 23.0 feet
. Lse to v. lse gray
. slighty silty clayey
. fn to v. fn Sand with
. clay lnses (SM-SC)
.23.0 feet to 25.0 feet
. V. lse green tan sli.
. silty fine Sand (SP)

DEPTH TO WATER

8.46 Feet on 4-28-92
Depth measured from top of PVC casing on date shown.

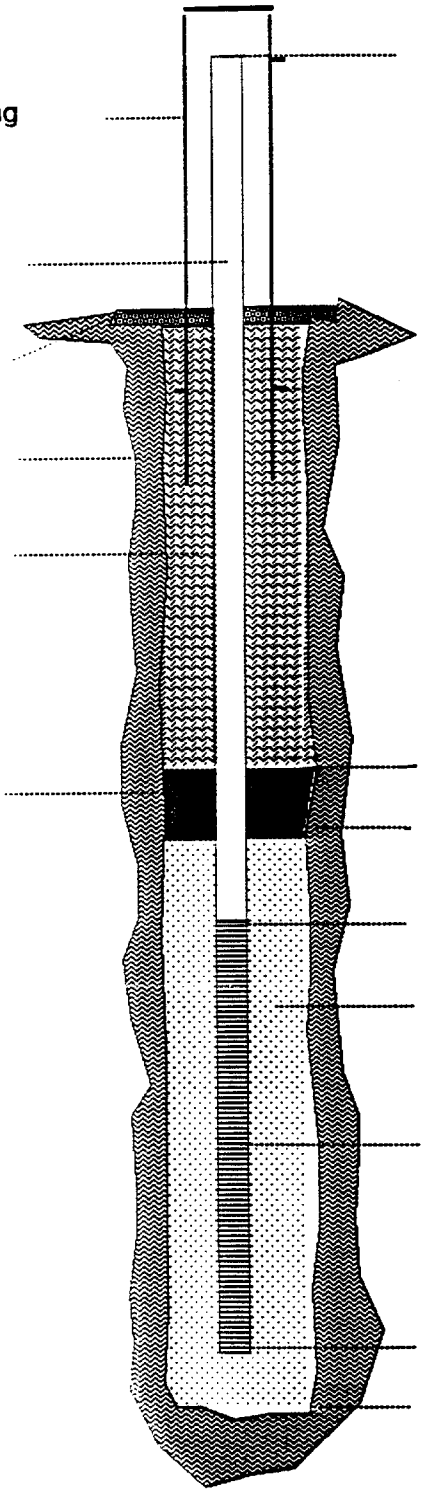
CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

APPENDIX III
NOT TO SCALE
1054-92-003

SCHEMATIC OF WELL CONSTRUCTION

MONITOR WELL NO. MW-4

INSTALLATION DATE
4-22-92



4 inch Protective Casing with locking cover

2 inch PVC Riser Schedule 40

24 inch square Concrete Pad

8.5 inch Borehole

Cement Grout

Bentonite Pellets

Top of Casing Elevation 28.04

Top of Casing is 2.00 ft. above ground surface

Ground Surface

10.8 feet to top of Bentonite

13.0 feet to top of Filter Pack

15.0 feet to top of screen

Fine Filter Sand

2 inch PVC Screen 0.010" Slots

25.0 feet to Screen bottom

25.0 feet to Borehole bottom

LITHOLOGY OF THE SCREENED INTERVAL

. 1.5 feet to 16.0 feet
. Lse to v. lse tan
. silty f. Sand with clay
. & silt lnses (SM-SC)
.
.16.0 feet to 25.0 feet
. Lse gray silty fine
. Sand w/ clay lnses (SM-SC)

DEPTH TO WATER

11.65 Feet on 4-28-92
Depth measured from top of PVC casing on date shown.

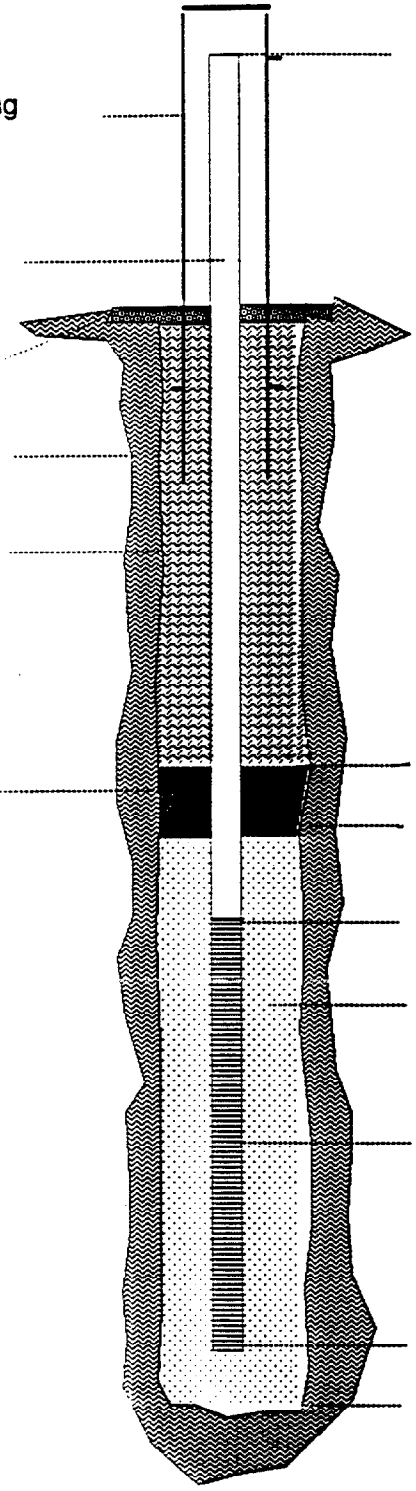
CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

APPENDIX III
NOT TO SCALE
1054-92-003

SCHEMATIC OF WELL CONSTRUCTION

MONITOR WELL NO. MW-5

INSTALLATION DATE
4-22-92



4 inch Protective Casing with locking cover

2 inch PVC Riser Schedule 40

24 inch square Concrete Pad

8.5 inch Borehole

Cement Grout

Bentonite Pellets

Top of Casing Elevation 37.22

Top of Casing is 2.00 ft. above ground surface

Ground Surface

10.6 feet to top of Bentonite

12.8 feet to top of Filter Pack

15.0 feet to top of screen

Fine Filter Sand

2 inch PVC Screen 0.010" Slots

25.0 feet to Screen bottom

25.0 feet to Borehole bottom

LITHOLOGY OF THE SCREENED INTERVAL

. 8.0 feet to 16.0 feet
. Med. dense gr,br, &
. red silty clayey fine
. SAND (SC)
.
.16.0 feet to 25.0 feet
. Lse to m. dnse white
. silty f. to vf. Sand
w clay lamin. (SM-SC)

DEPTH TO WATER

15.04 Feet on 4-28-92
Depth measured from top of PVC casing on date shown.

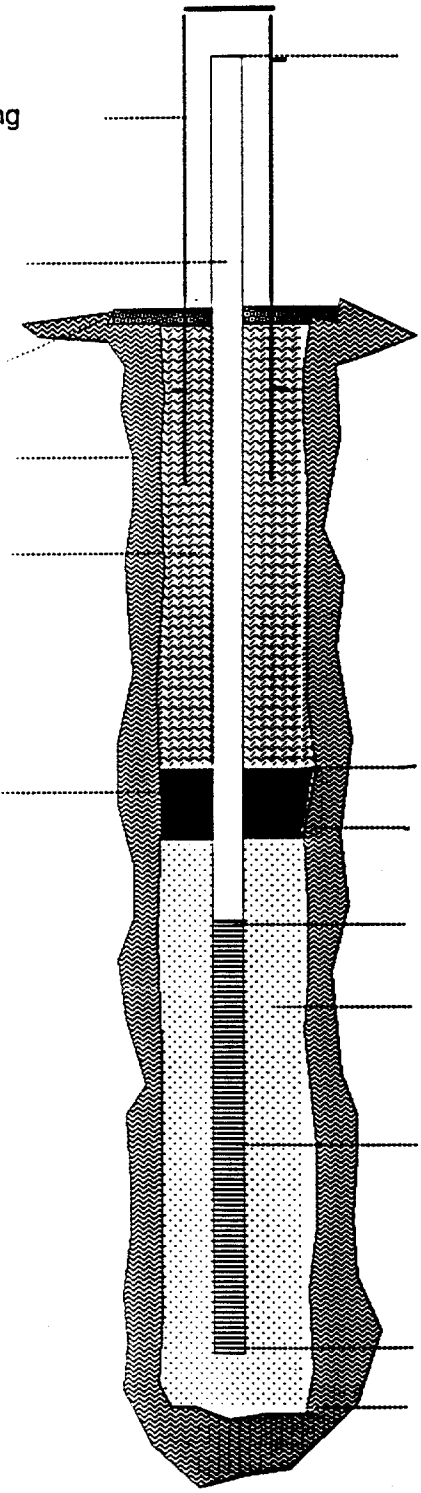
CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

APPENDIX III
NOT TO SCALE
1054-92-003

SCHEMATIC OF WELL CONSTRUCTION

MONITOR WELL NO. MW-6

INSTALLATION DATE
4-17-92



4 inch Protective Casing with locking cover

2 inch PVC Riser Schedule 40

24 inch square Concrete Pad

8.5 inch Borehole

Cement Grout

Bentonite Pellets

Top of Casing Elevation 39.70

Top of Casing is 2.30 ft. above ground surface

Ground Surface

11.3 feet to top of Bentonite

12.5 feet to top of Filter Pack

15.0 feet to top of screen

Fine Filter Sand

2 inch PVC Screen 0.010" Slots

25.0 feet to Screen bottom

25.0 feet to Borehole bottom

LITHOLOGY OF THE SCREENED INTERVAL

. 7.5 feet to 17.0 feet
. Lse. tan silty fine to
. v. fn. Sand with some
. clay lnses. (SM)
. 17.0 feet to 21.0 feet
. Sft. gray silty Clay (CL)
. 21.0 feet to 25.0 feet
. M dnse. gray sli. silty
f. Sand w/s clay lnses (SM)

DEPTH TO WATER

11.17 Feet on 4-24-92
Depth measured from top of PVC casing on date shown.

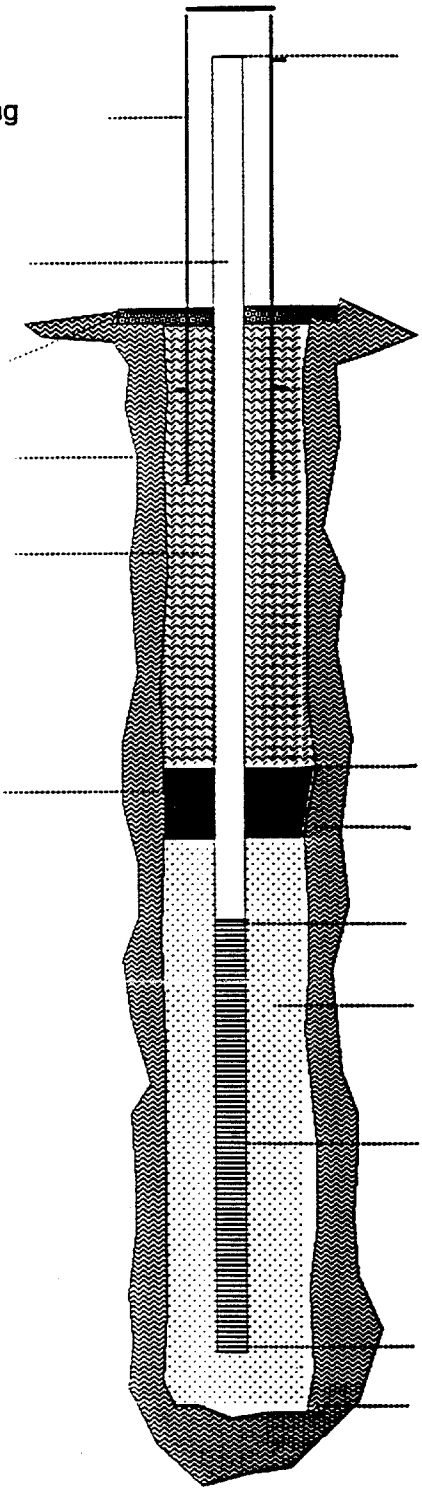
CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

APPENDIX III
NOT TO SCALE
1054-92-003

SCHEMATIC OF WELL CONSTRUCTION

MONITOR WELL NO. MW-7

INSTALLATION DATE
4-21-92



4 inch Protective Casing with locking cover

2 inch PVC Riser Schedule 40

24 inch square Concrete Pad

8.5 inch Borehole

Cement Grout

Bentonite Pellets

Top of Casing Elevation 36.35

Top of Casing is 2.10 ft. above ground surface

Ground Surface

11.3 feet to top of Bentonite

12.8 feet to top of Filter Pack

15.0 feet to top of screen

Fine Filter Sand

2 inch PVC Screen 0.010" Slots

25.0 feet to Screen bottom

25.0 feet to Borehole bottom

LITHOLOGY OF THE SCREENED INTERVAL

. 12.0 feet to 21.0 feet
. Lse. gray tan silty v. fn.
. Sand with clay lenses
. (SM)
. 21.0 feet to 25.0 feet
. Med. dense gray fn to med.
. silty Sand with clay lnses
. (SM)

DEPTH TO WATER

11.50 Feet on 4-24-92
Depth measured from top of PVC casing on date shown.

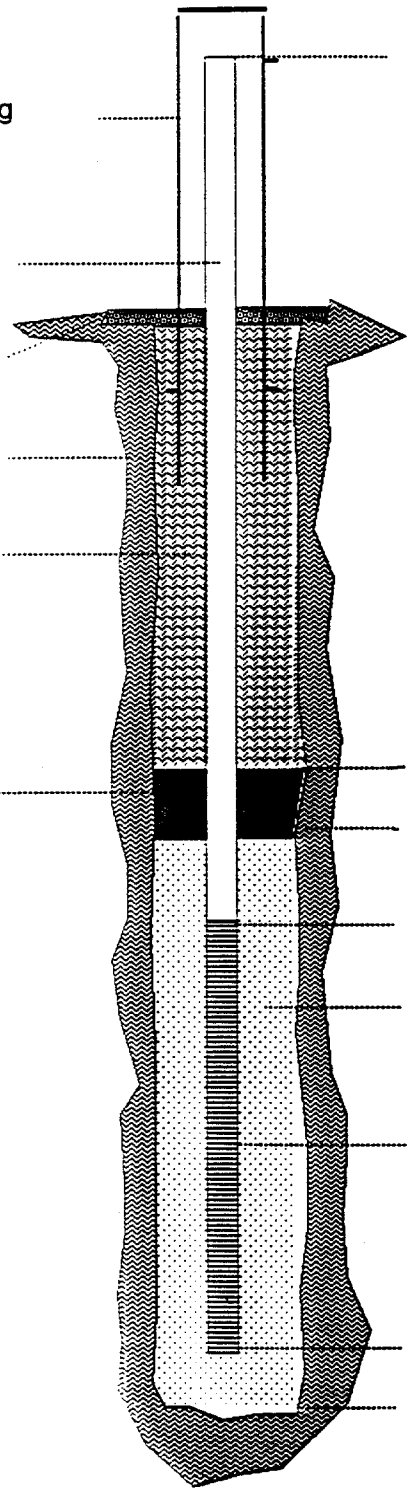
CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

APPENDIX III
NOT TO SCALE
1054-92-003

SCHEMATIC OF WELL CONSTRUCTION

MONITOR WELL NO. MW-8

INSTALLATION DATE
4-21-92



4 inch Protective Casing with locking cover

2 inch PVC Riser Schedule 40

24 inch square Concrete Pad

8.5 inch Borehole

Cement Grout

Bentonite Pellets

Top of Casing Elevation 30.64

Top of Casing is 2.10 ft. above ground surface

Ground Surface

11.2 feet to top of Bentonite

13.0 feet to top of Filter Pack

15.0 feet to top of screen

Fine Filter Sand

2 inch PVC Screen 0.010" Slots

25.0 feet to Screen bottom

25.0 feet to Borehole bottom

LITHOLOGY OF THE SCREENED INTERVAL

. 11.0 feet to 25.0 feet
. Medium dense white to
. yellow very fine Sand
. (SP)

DEPTH TO WATER

8.63 Feet on 4-24-92
Depth measured from top of PVC casing on date shown.

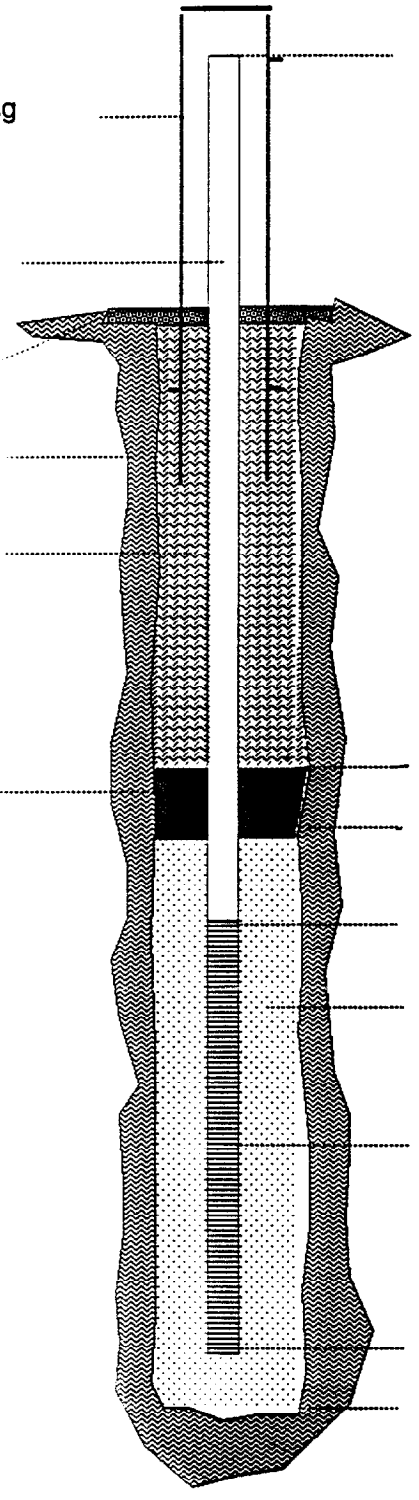
CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

APPENDIX III
NOT TO SCALE
1054-92-003

SCHEMATIC OF WELL CONSTRUCTION

MONITOR WELL NO. MW-9

INSTALLATION DATE
4-22-92



Top of Casing Elevation 44.98

4 inch Protective Casing with locking cover

Top of Casing is 2.10 ft. above ground surface

2 inch PVC Riser Schedule 40

Ground Surface

24 inch square Concrete Pad

8.5 inch Borehole

Cement Grout

Bentonite Pellets

9.9 feet to top of Bentonite
11.9 feet to top of Filter Pack

15.0 feet to top of screen

Fine Filter Sand

2 inch PVC Screen 0.010" Slots

25.0 feet to Screen bottom

25.0 feet to Borehole bottom

LITHOLOGY OF THE SCREENED INTERVAL

. 12.0 feet to 25.0 feet
. Medium dense to dense
. light gray and tan slighty
. silty fine to very fine
. Sand (SM)
.
.
.

DEPTH TO WATER

14.85 feet on 4-24-92
Depth measured from top of PVC casing on date shown.

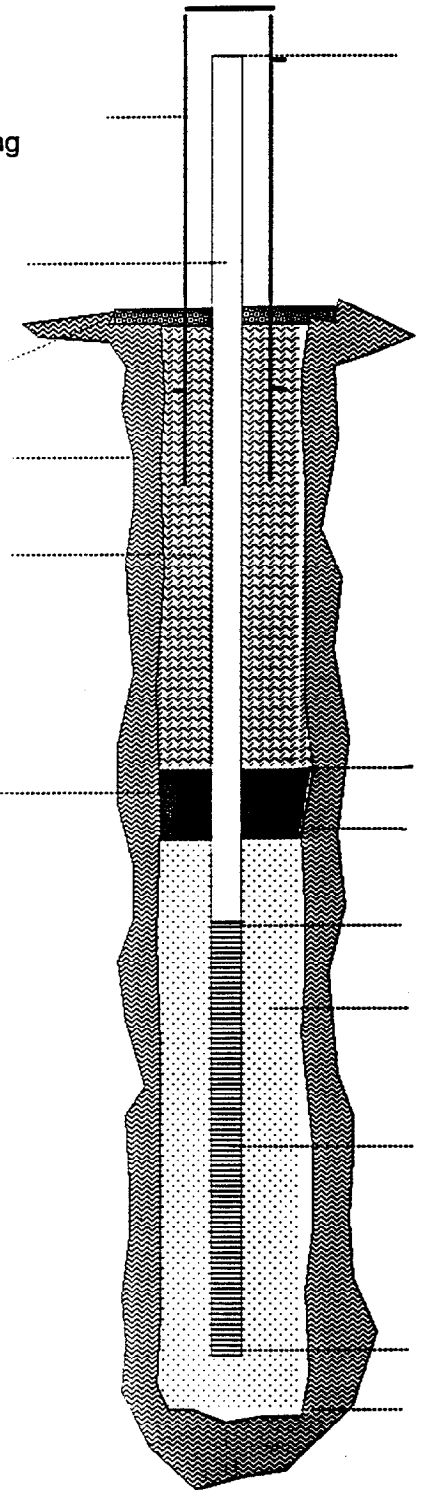
CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

APPENDIX III
NOT TO SCALE
1054-92-003

SCHEMATIC OF WELL CONSTRUCTION

MONITOR WELL NO. BP-6

INSTALLATION DATE
4-28-92



Top of Casing
Elevation 37.42

4 inch Protective
Casing with locking
cover

Top of Casing is
2.00 ft. above
ground surface

2 inch PVC Riser
Schedule 40

Ground Surface

24 inch square
Concrete Pad

8.5 inch Borehole

Cement Grout

Bentonite
Pellets

11.0 feet to top
of Bentonite
12.5 feet to top
of Filter Pack

15.0 feet to top
of screen

Fine Filter Sand

2 inch PVC Screen
0.010" Slots

25.0 feet to
Screen bottom

25.0 feet to
Screen bottom

LITHOLOGY OF THE SCREENED INTERVAL

.10.6 feet to 16.8 feet
. Loose to very loose
. gray slighty silty
. SAND (SM-ML)
.
.16.8 feet to 35.6 feet
. Medium dense to
. clayey SAND (ML-CL)

DEPTH TO WATER
16.70 feet on 4-28-92
Depth measured from top of
PVC casing on date shown.

CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

APPENDIX III
NOT TO SCALE
1054-92-003

APPENDIX IV

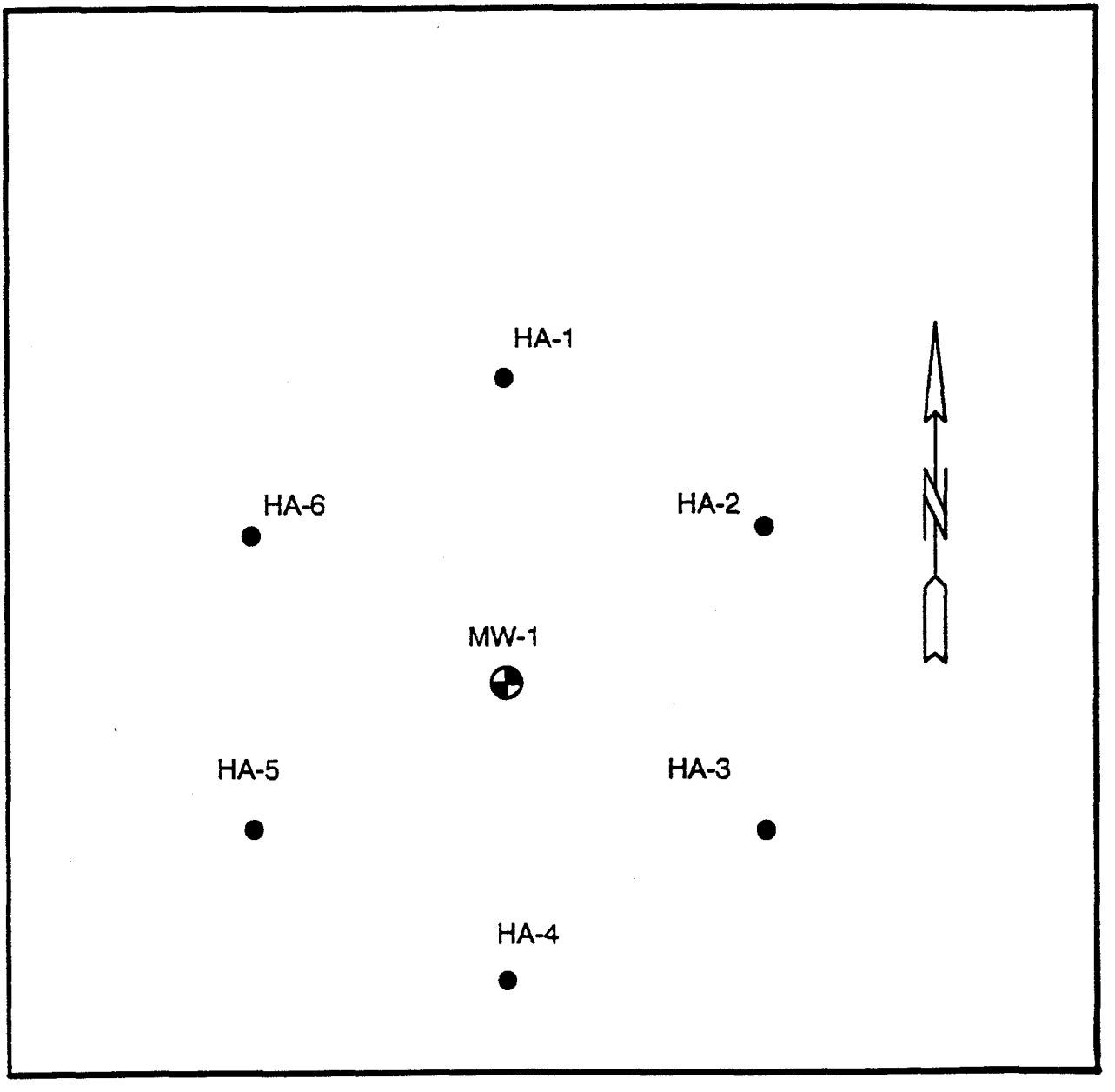
LABORATORY ANALYTICAL RESULTS (Soil Samples)

ABSTRACT

This appendix contains the laboratory analytical reports and Chain of Custody Report for the twelve soil samples obtained from the hand auger borings, HA-1 through HA-6, located, as shown on Figure IV-1, in the vicinity of monitor well MW-1. The samples were submitted for analysis of Pesticides and PCBs by SW-846 Method 8080.

Slight levels of pesticides were found in the groundwater sample obtained from well MW-1 during previous work at the site (Westinghouse 1991) prompted efforts to locate a source area adjacent to the well.

SOIL SAMPLE LOCATIONS
(MW-1 Vicinity)



LEGEND

- ● Hand Auger Boring Location
- ◒ Monitor Well Location

CAMP LEJEUNE LANDFILL
SITE "G"
CAMP LEJEUNE, NORTH CAROLINA

FIGURE IV-1
SCALE: 1"=20'
1054-92-003

IEA
An Aquarion Company

An Environmental Testing Company
Post Office Box 12846
Research Triangle Park, NC 27709

Phone 919·677·0090
Fax 919·677·0427

May 1, 1992

Walt Beckwith
S&ME Raleigh
3109 Spring Forest Road
Raleigh, NC ~~27560~~ 276

IEA Project No.: 170072
IEA Reference No.: W9204224
Client Project I.D.: 1054-92-003

Dear Mr. Beckwith,

Transmitted herewith are the results of analyses on 12 samples submitted to our laboratory.

The sample(s) were received chilled and intact.

Analyses were performed according to approved methodologies and meet the requirements of the IEA Quality Assurance Program. Please see the enclosed reports for your results and a copy of the Chain of Custody documentation.

Please do not hesitate to call your Client Account Representative should you have any questions regarding this report.

Very truly yours,

IEA, Inc.

Linda F. Mitchell
Director, Technical Support Services

State Certification:

Georgia - #816	Tennessee - #00296	Alabama - #40210
New Jersey - #67719	Virginia - #00179	South Carolina - #99021
California - #I-1002	West Virginia - #50	North Carolina - #37720 #84

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-1	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-1 0.0'-0.5'	Date Analyzed:	04/25/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.1	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

FORM 8080 Rev. 101891

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-2	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-1 2.5'-3.0'	Date Analyzed:	04/25/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.3	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-3	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-2 0.0'-0.5'	Date Analyzed:	04/25/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.1	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-4	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-2 2.5'-3.0'	Date Analyzed:	04/26/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.2	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-5	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-3 0.0'-0.5'	Date Analyzed:	04/26/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.1	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

FORM 8080 Rev. 101891

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-6	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-3 2.5'-3.0'	Date Analyzed:	04/26/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.1	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-7	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-4 0.0'-0.5'	Date Analyzed:	04/26/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.1	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

FORM 8080 Rev. 101891

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-8	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-4 2.5'-3.0'	Date Analyzed:	04/26/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.2	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-9	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-5 0.0'-0.5'	Date Analyzed:	04/26/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.3	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-10	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-5 2.5'-3.0'	Date Analyzed:	04/26/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.2	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

FORM 8080 Rev. 101891

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-11	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-6 0.0'-0.5'	Date Analyzed:	04/26/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.1	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072-12	Date Received:	04/16/92
Client Name:	S&ME Raleigh	Date Sampled:	04/15/92
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	HA-6 2.5'-3.0'	Date Analyzed:	04/26/92
Matrix:	Soil	Analysis By:	Willey
Moisture Correction Factor:	1.3	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Adjust quantitation limit for % moisture.

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-072	Date Received:	N/A
Client Name:	S&ME Raleigh	Date Sampled:	N/A
Client Project ID:	1054-92-003	Date Extracted:	04/20/92
Sample Identification:	QC Blank (PB525)	Date Analyzed:	04/25/92
Matrix:	Solid	Analysis By:	Willey
Moisture Correction Factor:	1.0	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/kg)	Results Concentration (ug/kg)
1	alpha-BHC	8.0	BQL
2	beta-BHC	8.0	BQL
3	delta-BHC	8.0	BQL
4	gamma-BHC (Lindane)	8.0	BQL
5	Heptachlor	8.0	BQL
6	Aldrin	8.0	BQL
7	Heptachlor epoxide	8.0	BQL
8	Endosulfan I	8.0	BQL
9	Dieldrin	16	BQL
10	4,4'-DDE	16	BQL
11	Endrin	16	BQL
12	Endosulfan II	16	BQL
13	4,4'-DDD	16	BQL
14	Endosulfan sulfate	16	BQL
15	4,4'-DDT	16	BQL
16	Methoxychlor	80	BQL
17	Toxaphene	160	BQL
18	Aroclor 1016	80	BQL
19	Aroclor 1221	80	BQL
20	Aroclor 1232	80	BQL
21	Aroclor 1242	80	BQL
22	Aroclor 1248	80	BQL
23	Aroclor 1254	160	BQL
24	Aroclor 1260	160	BQL
25	Chlordane (technical)	80	BQL
26	Endrin aldehyde	16	BQL

Additional Compounds:

27	Endrin ketone	16	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 170-072-1 through 170-072-12

FORM 8080 Rev. 101891

iea
an environmental testing company
3000 WESTON PKWY.
CARY, N.C. 27513

CHAIN OF CUSTODY RECORD

NO: 29694

REGULATORY CLASSIFICATION - PLEASE SPECIFY

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☐ OTHER _____

COMPANY: S&ME Environmental

PROJECT NO.	PROJECT NAME
1054-92-003	CAMP LEJEUNE "SITE G"

SAMPLER(S) (SIGNATURE): Walter J Beckwith / [illegible]

	DATE	TIME			SAMPLE IDENTIFICATION	# OF CONTAINERS	SOIL	WATER	REQUESTED PARAMETERS: 8080 PEST/PCB	
1	4/15	15:05		*	HA-1 0.0'-0.5'	1	*		*	STD TURNAROUND
2	4/15	15:20		*	HA-1 2.5'-3.0'	1	*		*	SEND RESULTS TO:
3	4/15	15:30		*	HA-2 0.0'-0.5'	1	*		*	WALT BECKWITH C/O
4	4/15	15:37		*	HA-2 2.5'-3.0'	1	*		*	S&ME ENVIRONMENTAL
5	4/15	15:45		*	HA-3 0.0'-0.5'	1	*		*	3100 SPRING FOREST RD
6	4/15	15:55		*	HA-3 2.5'-3.0'	1	*		*	RALEIGH, N.C. 27693
										FAX NO: 770-9827
										PHONE: 872-2660

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME
[illegible]	4/15	1115	[illegible]	4/15	1115

IEA QUOTE NO.: W9604224

IEA RUSH NO.:

PROJECT MANAGER (PLEASE PRINT): WALTER BECKWITH

P.O. NO.:

☑ BOTTLE INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT
☐ CHILLED ☐ SEE REMARKS

IEA # 170-072

CHAIN OF CUSTODY RECORD

INDUSTRIAL & ENVIRONMENTAL ANALYSTS, INC.
3000 WESTON PKWY.
CARY, N.C. 27513

NO: 14684

REGULATORY CLASSIFICATION - PLEASE SPECIFY

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☐ OTHER

PROJECT NAME / LOCATION: [illegible] SITE 6

SAMPLERS (SIGNATURE): Walter J. Barnett / Mark Knickerbocker

ID	DATE	TIME	COMP	GRAB	STATION LOCATION	# OF CONTAINERS	SOIL	WATER	BOD PESTIC
7	4/15	16:10		*	HA-4, 0.0'-0.5'	1	*		*
8	4/15	16:20		*	HA-4, 2.5'-3.0'	1	*		*
9	4/15	16:25		*	HA-5, 0.0'-0.5'	1	*		*
10	4/15	16:35		*	HA-5, 2.5'-3.0'	1	*		*
11	4/15	16:45		*	HA-6, 0.0'-0.5'	1	*		*
12	4/15	16:55		*	HA-6, 2.5'-3.0'	1	*		*

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY	DATE	TIME
Dana Lindquist	4/16/92	11:15			
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY	DATE	TIME
			Jim Ho	4/11/92	1115

IEA QUOTE NO.	IEA RUSH NO.
PROJECT MANAGER (PLEASE PRINT)	P.O. NO.

IEA REMARKS

DEA # 170-072

FIELD REMARKS

APPENDIX V

LABORATORY ANALYTICAL RESULTS (Groundwater)

ABSTRACT

This appendix contains the laboratory analytical reports and Chain of Custody for the nine groundwater samples obtained from monitor wells, MW-1 through MW-9. The samples were submitted for analysis of Pesticides and PCB's by SW-846 Method 8080, and Volatile Organic Compounds (VOCs) by SW-846 Method 8240. The analysis included tentative identification of non-target VOC gas chromatographic peaks.

Only one naturally occurring compound, dimethyldisulfide, was identified in one well (MW-3). All other parameters were below the quantitative limits of the analyses.

IEA
An Aquarion Company

An Environmental Testing Company
Post Office Box 12846
Research Triangle Park, NC 27709

Phone 919·677·0090
Fax 919·677·0427

May 27, 1992

Susan Laughinghouse
S&ME Raleigh
3109 Spring Forest Road
Raleigh, NC 27568

IEA Project No.: 170077
IEA Reference No.: W9205043
Client Project I.D.: 1054-92-003 Camp Lejeune

Dear Ms. Laughinghouse,

Transmitted herewith are the results of analyses on nine samples submitted to our laboratory.

The sample(s) were received chilled and intact.

Analyses were performed according to approved methodologies and meet the requirements of the IEA Quality Assurance Program. Please see the enclosed reports for your results and a copy of the Chain of Custody documentation.

Please do not hesitate to call your Client Account Representative should you have any questions regarding this report.

Very truly yours,

IEA, Inc.

Darlene K. Branoff
for

Linda F. Mitchell
Director, Technical Support Services

State Certification:

Georgia - #816	Tennessee - #00296	Alabama - #40210
New Jersey - #67719	Virginia - #00179	South Carolina - #99021
California - #I-1002	West Virginia - #50	North Carolina - #37720 #84

IEA
An Aquarion Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077-1	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/19/92
Sample Identification:	MW-1	Analysis By:	Stephenson
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077-1
Sample Identification: MW-1
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria.	5

Comments:

IEA
An Aquanon Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077-2	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/16/92
Sample Identification:	MW-2	Analysis By:	Butler
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077-2
Sample Identification: MW-2
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria.	5

Comments:

FORM TIC Rev. 120491

IEA
An Aquarion Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077-3	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/19/92
Sample Identification:	MW-3	Analysis By:	Stephenson
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077-3
Sample Identification: MW-3
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. Dimethyldisulfide	6

Comments:

FORM TIC Rev. 120491

IEA
An Aquanon Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077-4	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/16/92
Sample Identification:	MW-4	Analysis By:	Butler
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077-4
Sample Identification: MW-4
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria.	5

Comments:

IEA
An Aquarion Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077-5	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/14/92
Sample Identification:	MW-5	Analysis By:	Butler
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077-5
Sample Identification: MW-5
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria	5

Comments:

IEA
An Aquarion Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077-6	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/14/92
Sample Identification:	MW-6	Analysis By:	Butler
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077-6
Sample Identification: MW-6
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria	5

Comments:

IEA
An Aquanon Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077-7	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/14/92
Sample Identification:	MW-7	Analysis By:	Butler
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077-7
Sample Identification: MW-7
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria	5

Comments:

FORM TIC Rev. 120491

IEA
An Aquarion Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077-8	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/14/92
Sample Identification:	MW-8	Analysis By:	Butler
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077-8
Sample Identification: MW-8
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria	5

Comments:

IEA
An Aquarion Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077-9	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/06/92
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/14/92
Sample Identification:	MW-9	Analysis By:	Butler
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077-9
Sample Identification: MW-9
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria	5

Comments:

FORM TIC Rev. 120491

IEA
An Aquarion Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077	Date Received:	N/A
Client Name:	S&ME Raleigh	Date Sampled:	N/A
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/15/92
Sample Identification:	QC Blank (VBLK56)	Analysis By:	Butler
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 170-077-2,4
Filename: 0515e02

FORM 8240 Rev. 100391

IEA
An Aquanon Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077
Sample Identification: QC Blank (VBLK56)
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria.	5

Comments:

FORM TIC Rev. 120491

IEA
An Aquanon Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077	Date Received:	N/A
Client Name:	S&ME Raleigh	Date Sampled:	N/A
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/19/92
Sample Identification:	QC Blank (VBLK75)	Analysis By:	Stephenson
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 170-077-1,3
Filename: 0519702

FORM 8240 Rev. 100391

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077
Sample Identification: QC Blank (VBLK75)
Applicable Fraction: Volatile ___X___ Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria.	5

Comments:

IEA
An Aquarion Company

GC/MS PURGEABLES
SW-846 METHOD 8240

IEA Sample Number:	170-077	Date Received:	N/A
Client Name:	S&ME Raleigh	Date Sampled:	N/A
Client Project ID:	1054-92-003 Camp Lej.	Date Analyzed:	05/13/92
Sample Identification:	QC Blank (VBLK54)	Analysis By:	Butler
Matrix:	Water	Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	Acetone	100	BQL
2	Benzene	5	BQL
3	Bromodichloromethane	5	BQL
4	Bromoform	5	BQL
5	Bromomethane	10	BQL
6	2-Butanone	100	BQL
7	Carbon disulfide	5	BQL
8	Carbon tetrachloride	5	BQL
9	Chlorobenzene	5	BQL
10	Dibromochloromethane	5	BQL
11	Chloroethane	10	BQL
12	2-Chloroethylvinyl ether	10	BQL
13	Chloroform	5	BQL
14	Chloromethane	10	BQL
15	1,1-Dichloroethane	5	BQL
16	1,2-Dichloroethane	5	BQL
17	1,1-Dichloroethene	5	BQL
18	1,2-Dichloroethene (total)	5	BQL
19	1,2-Dichloropropane	5	BQL
20	cis-1,3-Dichloropropene	5	BQL
21	trans-1,3-Dichloropropene	5	BQL
22	Ethylbenzene	5	BQL
23	2-Hexanone	50	BQL
24	Methylene chloride	5	BQL
25	4-Methyl-2-pentanone	50	BQL
26	Styrene	5	BQL
27	1,1,2,2-Tetrachloroethane	5	BQL
28	Tetrachloroethene	5	BQL
29	Toluene	5	BQL
30	1,1,1-Trichloroethane	5	BQL
31	1,1,2-Trichloroethane	5	BQL
32	Trichloroethene	5	BQL
33	Vinyl acetate	50	BQL
34	Vinyl chloride	10	BQL
35	Xylenes (total)	5	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 170-077-5,6,7,8,9

IEA
An Aquarion Company

TENTATIVELY IDENTIFIED COMPOUNDS

IEA Sample Number: 170-077
Sample Identification: QC Blank (VBLK54)
Applicable Fraction: Volatile ___X___Base/Neutral _____ Acid ___ Other _____

Tentatively Identified Compounds (TIC's) are compounds which are not in the specific target compound list but may be present in the sample. An attempt to identify such compounds is made through comparison of the mass spectra of these unknown compounds in the sample with approximately 50,000 spectra contained in the computer's mass spectral library. Analytical standards are not utilized in this procedure and therefore, compounds identified in this manner are referred to as "Tentative" identifications.

IEA personnel identify and classify these compounds using identification guidelines provided by the USEPA under the Contract Laboratory Program (CLP). A gross estimation of concentration is accomplished by comparing the response of the unknown compound versus the nearest internal standard in the total ion chromatogram. As per EPA CLP guidance, TIC's are identified and quantitated only if the response is equal to or greater than 10% of the nearest internal standard. Compounds identified as "unknown" are not uncommon utilizing these guidelines since the requirements for even a tentative identification are quite stringent.

TIC Compound Name	Estimated Concentration (ug/L)
1. None detected per above criteria	5

Comments:

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077-1	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	MW-1	Date Analyzed:	05/16/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077-2	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	MW-2	Date Analyzed:	05/16/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077-3	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	MW-3	Date Analyzed:	05/16/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077-4	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	MW-4	Date Analyzed:	05/17/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077-5	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	MW-5	Date Analyzed:	05/17/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077-7	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	MW-7	Date Analyzed:	05/17/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077-6	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	MW-6	Date Analyzed:	05/17/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquarion Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077-8	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	MW-8	Date Analyzed:	05/17/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077-9	Date Received:	05/07/92
Client Name:	S&ME Raleigh	Date Sampled:	05/05/92
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	MW-9	Date Analyzed:	05/17/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

IEA
An Aquanon Company

PESTICIDES / PCBs
SW-846 METHOD 8080

IEA Sample Number:	170-077	Date Received:	N/A
Client Name:	S&ME Raleigh	Date Sampled:	N/A
Client Project ID:	1054-92-003	Date Extracted:	05/08/92
Sample Identification:	QC Blank	Date Analyzed:	05/16/92
Matrix:	Water	Analysis By:	Travis
		Dilution Factor:	1.0

Number	Compound	Quantitation Limit (ug/L)	Results Concentration (ug/L)
1	alpha-BHC	0.050	BQL
2	beta-BHC	0.050	BQL
3	delta-BHC	0.050	BQL
4	gamma-BHC (Lindane)	0.050	BQL
5	Heptachlor	0.050	BQL
6	Aldrin	0.050	BQL
7	Heptachlor epoxide	0.050	BQL
8	Endosulfan I	0.050	BQL
9	Dieldrin	0.10	BQL
10	4,4'-DDE	0.10	BQL
11	Endrin	0.10	BQL
12	Endosulfan II	0.10	BQL
13	4,4'-DDD	0.10	BQL
14	Endosulfan sulfate	0.10	BQL
15	4,4'-DDT	0.10	BQL
16	Methoxychlor	0.50	BQL
17	Toxaphene	1.0	BQL
18	Aroclor 1016	0.50	BQL
19	Aroclor 1221	0.50	BQL
20	Aroclor 1232	0.50	BQL
21	Aroclor 1242	0.50	BQL
22	Aroclor 1248	0.50	BQL
23	Aroclor 1254	1.0	BQL
24	Aroclor 1260	1.0	BQL
25	Chlordane (technical)	0.50	BQL
26	Endrin aldehyde	0.10	BQL

Additional Compounds:

27	Endrin ketone	0.10	BQL

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 170-077-1 through 170-077-9

CHAIN OF CUSTODY RECORD

iea — an environmental testing company
3000 WESTON PKWY.
CARY, N.C. 27513

NO: 29772

REGULATORY CLASSIFICATION - PLEASE SPECIFY
☐ NPDES ☐ DRINKING WATER ☐ RCRA ☐ OTHER _____

COMPANY: SAIC, INC

Page _____ of _____

PROJECT #	PROJECT NAME
1052.92.003	CAMP LEJEUNE

SAMPLERS: (SIGNATURE) Susan Laughinghouse

SAMPLE I.D.	DATE	TIME	COMP	GRAB	STATION LOCATION	# OF CONTAINERS	MATRIX: SOIL	MATRIX: WATER	REQUESTED PARAMETERS: 8240	REQUESTED PARAMETERS: 9080 Pesticides PCB
1	5/5/92	2:25		X	MW3	3		X	X	
2	5/5/92	2:30		X	MW3	2		X		X
3	5/5/92	3:27		X	MW5	3		X	X	
4	5/5/92	3:30		X	MW5	2		X		X
5	5/6/92	4:27		X	MW4	3		X	X	
6	5/6/92	4:30		X	MW4	2		X		X
7	5/6/92	5:20		X	MW1	3		X	X	
8	5/5/92	5:23		X	MW1	2		X		X
9	5/5/92	6:15		X	MW6	3		X	X	
10	5/5/92	6:18		X	MW6	2		X		X

SAIC
P.O. No. 000258
IEA no. 41-92.0504.3

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY	DATE	TIME
Susan Laughinghouse	5/6/92	8:33	Debra Lain	5-6-92	837
D. La			Johnna Gate	5/7/92	8:35 am

IEA QUOTE NO.

IEA RUSH NO.

PROJECT MANAGER (PLEASE PRINT)

P.O. NO.

REMARKS ON SAMPLE RECEIPT
☐ BOTTLE INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT

IEA REMARKS

FIELD REMARKS

iea an environmental testing company
3000 WESTON PKWY.
CARY, N.C. 27513

CHAIN OF CUSTODY RECORD

NO: 29773

REGULATORY CLASSIFICATION - PLEASE SPECIFY

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☐ OTHER _____

COMPANY: SITE, INC

Page _____ of _____

PROJECT #	PROJECT NAME
1051-12-063	CAMP LEJEUNE

SAMPLERS: (SIGNATURE)

Deborah Laughinghouse

SAMPLE I.D.	DATE	TIME	COMP	GRAB	STATION LOCATION	# OF CONTAINERS	MATRIX SOIL	MATRIX WATER	8240	8260 (Aromatics only)	REQUESTED PARAMETERS
11	5/1/92	7:00		X	MW1	3		X	X		
12	5/1/92	1:03		X	MW7	2		X		X	Send results to Deborah Laughinghouse c/o SITE PO Box 58069 Raleigh, NC 27658
13	5/1/92				MW8	3		X	X		
14	5/1/92			X	MW8	2		X		X	
15	5/1/92	9:30		X	MW2	3		X	X		
16	5/1/92	8:33 AM		X	MW2	2		X		X	
17	5/6/92	8:30 AM		X	MW9	3		X	X		
18	5/6/92	8:33 AM		X	MW9	2		X		X	IEA - W-9205043 PO No. 000258

Deborah Laughinghouse	5/6/92	8:33	Debra Lain	5-6-92	8:37	
			Robert Potter	5/7/92	8:35 am	

IEA QUOTE NO. | IEA RUSH NO.

PROJECT MANAGER (PLEASE PRINT) | P.O. NO.

REMARKS ON SAMPLE RECEIPT

☐ BOTTLE INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT

IEA # 170-022

FIELD REMARKS

APPENDIX VI

HYDRAULIC CONDUCTIVITY VALUES

ABSTRACT

This appendix contains a summary of hydraulic conductivity values for the water table aquifer. Table V-1 shows a summary of hydraulic conductivity values for both, the near surface site soils and the saturated portion of the aquifer. This appendix also contains the laboratory permeability tests; a brief discussion of the Bouwer and Rice Analysis of hydraulic conductivities from slug tests, the graphs of the change in water level with time, intercept points and values used in the calculations, copies of the data recorded, and calculation of hydraulic conductivity by the Hazen Method.

Table VI - 1
Summary of Surface Aquifer Hydraulic Conductivity Values [1]
Camp Lejeune Landfill Site "G"
Camp Lejeune, North Carolina

HYDRAULIC CONDUCTIVITY OF THE UNSATURATED PORTION [2]				
Well Location	Screen Interval		Hydraulic Conductivity	
	Dept (Ft)	Elevation (MSL)	Centimeters per second	Feet per Day
MW-4	0.5 - 2.5	26.6 - 23.6	1.5×10^{-3}	4.32
MW-5	5.0 - 7.0	30.3 -28.3	3.0×10^{-4}	0.86
MW-7	5.0 - 7.0	29.2 - 27.2	1.4×10^{-3}	4.04
MW-9	10.0 - 12.0	32.9 - 30.9	6.0×10^{-4}	1.73
B-8	5.0 - 7.0	33.0 - 31.0	1.9×10^{-3}	5.48
B-9	4.0 - 6.0	35.6 - 33.6	3.4×10^{-3}	9.80
Geometric Mean of Values:			1.16×10^{-3}	3.34

HYDRAULIC CONDUCTIVITY OF THE SATURATED PORTION [2]				
Well Location	Screen Interval		Hydraulic Conductivity	
	Dept (Ft)	Elevation (MSL)	Centimeters per second	Feet per day
MW-1	15.0 - 25.0	20.9 - 10.9	3.44×10^{-4}	0.98
MW-2	15.0 - 25.0	12.7 - 2.7	3.10×10^{-4}	0.88
MW-3	15.0 - 25.0	14.0 - 4.0	1.78×10^{-4}	0.51
MW-4	15.0 - 25.0	11.1 - 1.1	2.46×10^{-4}	0.70
MW-5	15.0 - 25.0	20.3 - 10.3	2.13×10^{-3}	6.03
MW-6	15.0 - 25.0	22.4 - 12.4	5.12×10^{-3}	1.45
MW-7	15.0 - 25.0	19.2 - 9.2	3.76×10^{-4}	1.06
MW-8	15.0 - 25.0	13.6 - 3.6	2.09×10^{-4}	0.59
MW-9	15.0 - 25.0	28.0 - 18.0	1.07×10^{-3}	3.04
6-GW-2	15.7 - 25.7	25.4 - 15.4	2.48×10^{-4}	0.70
Geometric Means of Values:			4.0×10^{-4}	1.13

(1) Hydraulic Conductivity values are determined from laboratory permeability tests of undisturbed samples.

(2) Hydraulic Conductivity values are determined form Slug Tests performed in the wells, using the Bower and Rice Analysis

PROCEDURE FOR DETERMINING THE HYDRAULIC CONDUCTIVITY (K) OF AN AQUIFER FROM SLUG TEST DATA USING THE BOUWER AND RICE ANALYSIS

Reference: The Bouwer and Rice Slug Test - An Update by H. Bouwer, pp. 304-309, Ground Water, May - June 1989.

Conditions: The well can be partially penetrating and partially screened. The test may be performed by either adding or evacuating water. Consult the reference for further information.

Step 1: Determine the well dimensions required for this analysis and complete Figure 1.

Step 2: The elevational difference in feet between the static water level and the water level at time t seconds during the test is defined as (Y_t). Plot Y_t versus t on the semilog paper provided, following the example shown on Figure 3.

Step 3: Determine the natural (static) ground water elevation relative to the top of the well screen and the top of the gravel pack. If the slug test is expected to either drain or flood the gravel pack, a double straight line effect may appear in the data plot due to the relatively high K values of the gravel pack or developed zone versus the formation, as shown on Figure 4. Draw a "best fit" straight line through the "B-C" segment of the data and extrapolate this line to the log Y_t axis and the t axis, as shown in Figures 3 and 4.

Step 4: Having ascertained the values of Y_o (line intersection with Y axis), t (line intersection with t axis), and Y_t (y coordinate with t value) from the extrapolated line drawn in Step 3, calculate the value of $1/t \ln (Y_o/Y_t)$

Step 5: Using well construction and hydrogeologic information (Figure 1) ascertain the values of r_w, r_c, L_e, L_w, and H (saturated thickness). From the information, calculate the value of L_e/r_w.
If $L_w < H$ (Partially penetrating well), ascertain the values of A and B from Figure 2 and substitute them into the following equation to determine the value of $\ln(R_e/r_w)$. The values of L_w, r_w, H and L_e are all expressed in inches.

$$\ln (R_e/r_w) = \frac{1}{\frac{1.1}{\ln (L_w/r_w)} + \left(\frac{A + B \ln\left(\frac{H-L_w}{r_w}\right)}{L_e/r_w} \right)}$$

If $L_w = H$, ascertain the value of C from Figure 2 and substitute it into the following equation to determine the value of $\ln (R_e/r_w)$

$$\ln (R_e/r_w) = \frac{1}{\frac{1.1}{\ln (L_w/r_w)} + \frac{C}{(L_e/r_w)}}$$

Step 6: Substitute the values of $(1/t \ln (Y_o/Y_t))$ and $(\ln (R_e/r_w))$, determined in Steps 4 and 5, respectively, along with r^2_c and $2L_e$ into the following equation to determine the hydraulic conductivity (K) in inches per second:

$$K = \frac{r^2_c \ln (R_e/r_w)}{2L_e} \frac{1}{t} \ln (Y_o/Y_t)$$

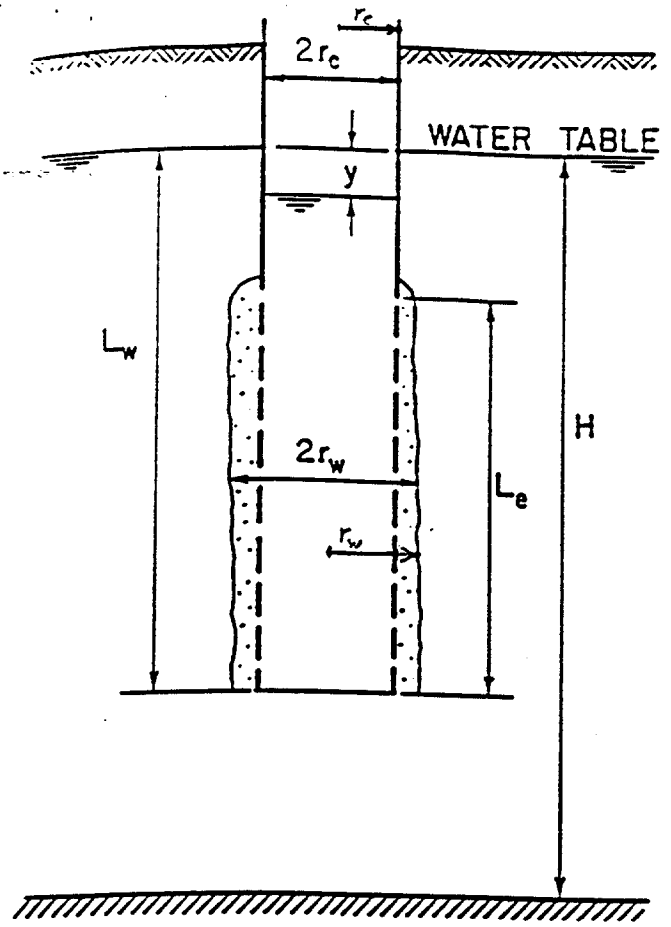


FIGURE 1

r_c = _____ (in)

r_w = _____ (in)

L_e = _____ (in)

L_w = _____ (in)

H = _____ (in)

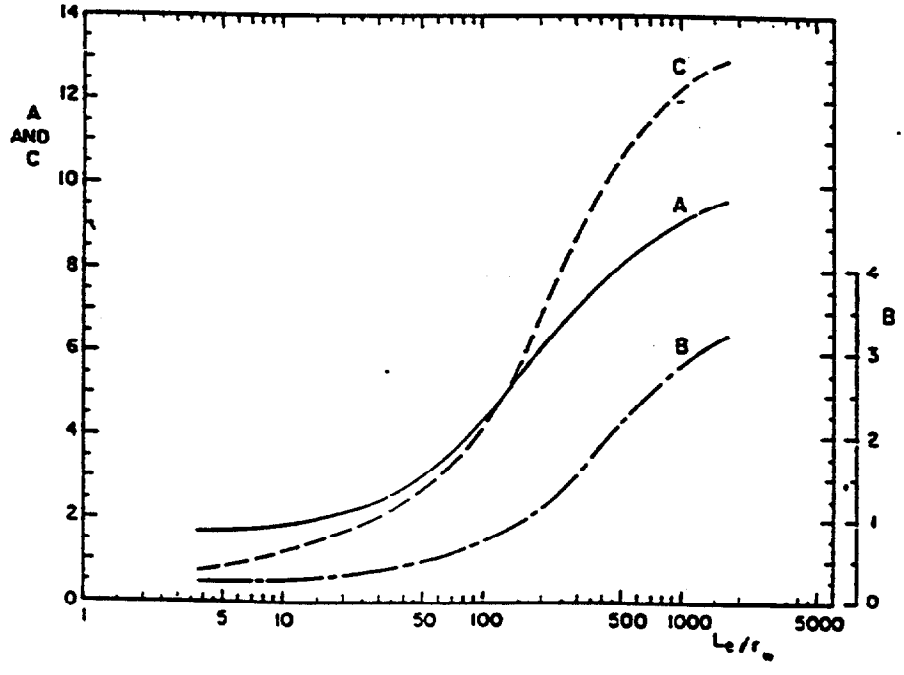


Fig. 2. Dimensionless parameters A, B, and C as a function of L_e/r_w for calculation of $\ln(R_e/r_w)$.

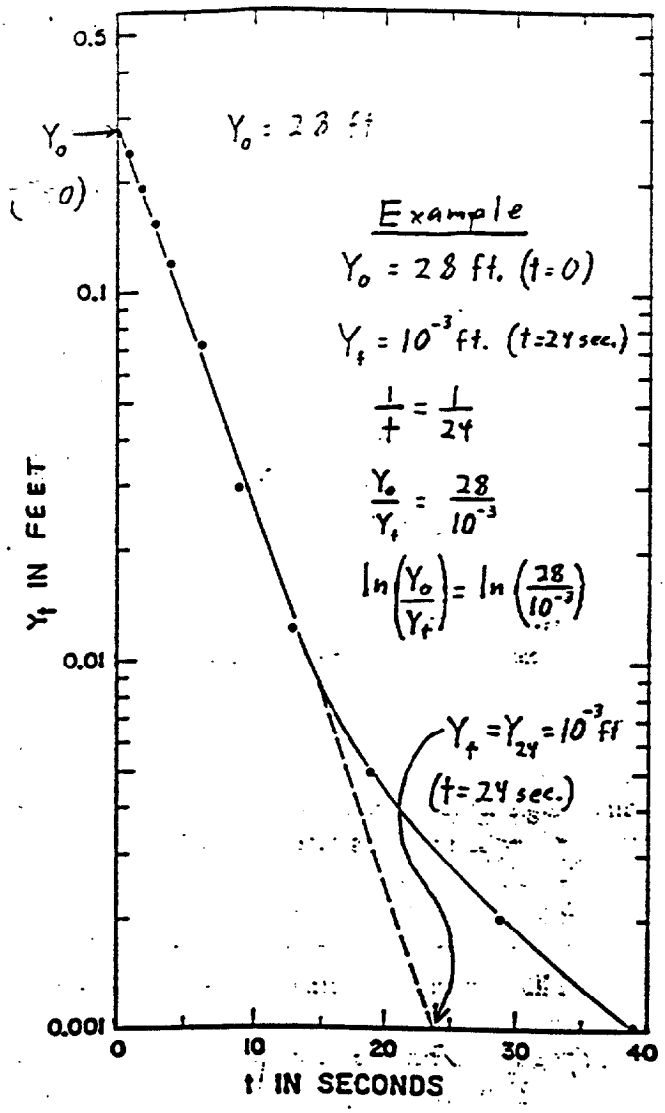


FIGURE 3

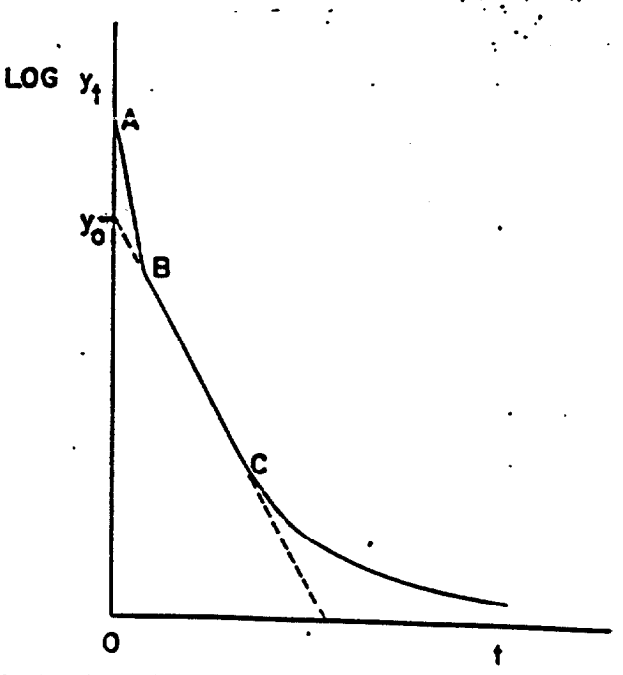


Fig. 4. Schematic of double straight line effect.

S & M E

FALLING HEAD PERMEABILITY TEST
(Increasing Tailwater Pressure)
ASTM C 5084 METHOD (C)

JOB #: 1054-92-003 JOB NAME: CAMP LEJEUNE LANDFILL

DATE: 5-27-92 SAMPLE # MW-4 DEPTH:.5 - 2.5 FT.

SOIL DESCRIPTION: TAN-ORANGE BROWN SILTY SAND

NOTES : Sample cut from bottom 6" of tube. Test Cell #3

Test sample took 15.0 ml of H20 to saturate.

Final Moisture 22.5 %

UNDISTURBED (X) REMOLDED ( ) STANDARD PROCTOR
MAX DRY DENSITY lbs./cu.ft.
OPTIMUM MOISTURE %
% COMPACTION %

SAMPLE DATA :

Length	7.37	cm.	Moisture Content	9	%
Diameter	7.16	cm.	Wet Density	108.7	lb/ft3
Area	40.26	sq.cm.	Dry Density	99.7	lb/ft3
Volume	296.75	cu.cm.	Initial Saturation	35.8	%
Wet Weight	516.76	grams	Final Saturation	100.0	%
Dry Weight	474.09	grams	Initial Void Ratio	0.671	
WATER TEMP. (C)	27.0		Porosity	0.402	
CORRECTION FACTOR	0.850		Spec. G. (apparent)	2.67	

TEST DATA

k = (aL/-2At) X In(h1/h2)
RATIO = Hv1-Hv2 / Hc2
(hv1-hc1=h1) INITIAL LOSS
(hv2-hc2=h2) FINAL LOSS
i = h2/L

k = HYDRAULIC CONDUCTIVITY
L = 7.37 cm. length of sample
A = 40.26 sq.cm. area of sample
a = 0.72 sq.cm. area of burett
t = Elapsed time of test (seconds)
i = HYDRAULIC GRADIENT

Elapsed t/sec.	Hv1	Hc1	Hv2	Hc2	h1	h2	RATIO Out/In	(i) H.G.
30	50.0	0.0	36.5	14.1	50.0	22.4	0.96	3.0
30	50.0	0.0	36.7	14.1	50.0	22.6	0.94	3.1
30	50.0	0.0	36.6	14.2	50.0	22.4	0.94	3.0
30	50.0	0.0	36.7	14.1	50.0	22.6	0.94	3.1

1. k = 1.8E-03 cm./sec.
2. k = 1.7E-03 cm./sec.
3. k = 1.8E-03 cm./sec.
4. k = 1.7E-03 cm./sec.

AVERAGE :
k = 1.5E-03 cm./sec.
i = 3.1
RATIO = 0.95

FINAL (k) VALUE AVERAGE WITH WATER TEMPERATURE CORRECTION.

tested by: D. CARVER

S & M E

FALLING HEAD PERMEABILITY TEST
(Increasing Tailwater Pressure)
ASTM C 5084 METHOD (C)

JOB #: 1054-92-003 JOB NAME: CAMP LEJEUNE LANDFILL

DATE: 5-27-92 SAMPLE # MW-5 DEPTH: 5 - 7 FT.

SOIL DESCRIPTION: YELLOW-BROWN SILTY CLAYEY FINE SAND

NOTES : Sample cut from bottom 6" of tube. Test Cell #12

Test sample took 13.5 ml of H20 to saturate.

Final Moisture 26.4%

UNDISTURBED (X) REMOLDED ( ) STANDARD PROCTOR
MAX DRY DENSITY lbs./cu.ft.
OPTIMUM MOISTURE %
% COMPACTION %

SAMPLE DATA :

Length	7.18	cm.	Moisture Content	13.8	%
Diameter	7.09	cm.	Wet Density	118.7	lb/ft3
Area	39.48	sq.cm.	Dry Density	104.3	lb/ft3
Volume	283.47	cu.cm.	Initial Saturation	61.7	%
Wet Weight	539.20	grams	Final Saturation	99.9	%
Dry Weight	473.81	grams	Initial Void Ratio	0.597	
WATER TEMP. (C)	27.0		Porosity	0.374	
CORRECTION FACTOR	0.850		Spec. G. (apparent)	2.67	

TEST DATA

k = (aL/-2At) X In(h1/h2)
RATIO = Hv1-Hv2 / Hc2
(hv1-hc1=h1)INITIAL LOSS
(hv2-hc2=h2)FINAL LOSS
i = h2/L

k = HYDRAULIC CONDUCTIVITY
L = 7.18 cm. length of sample
A = 39.48 sq.cm. area of sample
a = 0.72 sq.cm. area of burett
t = Elapsed time of test (seconds)
i = HYDRAULIC GRADIENT

Elapsed t/sec.	Hv1	Hc1	Hv2	Hc2	h1	h2	RATIO Out/In	(i) H.G.
120	50.0	0.0	38.5	12.1	50.0	26.4	0.95	3.7
120	50.0	0.0	38.4	12.1	50.0	26.3	0.96	3.7
120	50.0	0.0	38.4	12.1	50.0	26.3	0.96	3.7
120	50.0	0.0	38.3	12.2	50.0	26.1	0.96	3.6

1. k = 3.5E-04 cm./sec.
2. k = 3.5E-04 cm./sec.
3. k = 3.5E-04 cm./sec.
4. k = 3.5E-04 cm./sec.

AVERAGE :
k = 3.0E-04 cm./sec.
i = 3.7
RATIO = 0.96

FINAL (k) VALUE AVERAGE WITH WATER TEMPERATURE CORRECTION.

tested by: D. CARVER

S & M E

FALLING HEAD PERMEABILITY TEST
(Increasing Tailwater Pressure)
ASTM C 5084 METHOD (C)

JOB #: 1054-92-003 JOB NAME: CAMP LEJEUNE LANDFILL

DATE: 5-27-92 SAMPLE # MW-7 DEPTH: 5 - 7 FT.

SOIL DESCRIPTION: LIGHT BROWN CLAYEY SILTY FINE SAND

NOTES : U.D. Sample had a small piece of wax running thoughtout sample.

Total H20 used to saturate sample----- 24.5 ml

Final Moisture 24.7% Test Cell #10

UNDISTURBED (X) REMOLDED ( ) STANDARD PROCTOR
MAX DRY DENSITY lbs./cu.ft.
OPTIMUM MOISTURE %
% COMPACTION %

SAMPLE DATA :

Length	7.15 cm.	Moisture Content	12.1 %
Diameter	7.10 cm.	Wet Density	96.9 lb/ft3
Area	39.59 sq.cm.	Dry Density	86.4 lb/ft3
Volume	283.08 cu.cm.	Initial Saturation	35.1 %
Wet Weight	439.29 grams	Final Saturation	99.7 %
Dry Weight	391.87 grams	Initial Void Ratio	0.914
WATER TEMP. (C)	27.0	Porosity	0.478
CORRECTION FACTOR	0.850	Spec. G. (apparent)	2.65

TEST DATA

k = (aL/-2At) X In(h1/h2)
RATIO = Hv1-Hv2 / Hc2
(hv1-hc1=h1) INITIAL LOSS
(hv2-hc2=h2) FINAL LOSS
i = h2/L

k = HYDRAULIC CONDUCTIVITY
L = 7.15 cm. length of sample
A = 39.59 sq.cm. area of sample
a = 0.72 sq.cm. area of burett
t = Elapsed time of test (seconds)
i = HYDRAULIC GRADIENT

Elapsed t/sec.	Hv1	Hc1	Hv2	Hc2	h1	h2	RATIO Out/In	(i) H.G.
60	50.0	0.0	30.9	20.0	50.0	10.9	0.96	1.5
60	50.0	0.0	31.0	20.0	50.0	11.0	0.95	1.5
60	50.0	0.0	31.0	20.0	50.0	11.0	0.95	1.5
60	50.0	0.0	30.9	19.9	50.0	11.0	0.96	1.5

1. k = 1.7E-03 cm./sec.
2. k = 1.6E-03 cm./sec.
3. k = 1.6E-03 cm./sec.
4. k = 1.6E-03 cm./sec.

AVERAGE :
k = 1.4E-03 cm./sec.
i = 1.5
RATIO = 0.95

FINAL (k) VALUE AVERAGE WITH WATER TEMPERATURE CORRECTION.

tested by: D. CARVER

S & M E

FALLING HEAD PERMEABILITY TEST
(Increasing Tailwater Pressure)
ASTM C 5084 METHOD (C)

JOB #: 1054-92-003 JOB NAME: CAMP LEJEUNE LANDFILL

DATE: 5-27-92 SAMPLE # B - 8 DEPTH: 5 - 7 FT.

SOIL DESCRIPTION: ORANGE-BROWN SLIGHTLY CLAYEY SILTY FINE SAND

NOTES : Small Amount of Organic Material in Sample.

Total H20 used to saturate sample-----11.0 ml.

Final Moisture 27.5 Test Cell #4

UNDISTURBED (X) REMOLDED ( ) STANDARD PROCTOR
MAX DRY DENSITY lbs./cu.ft.
OPTIMUM MOISTURE %
% COMPACTION %

SAMPLE DATA :

Length	7.75 cm.	Moisture Content	12.1 %	
Diameter	7.10 cm.	Wet Density	95.7	lb/ft3
Area	39.59 sq.cm.	Dry Density	85.4	lb/ft3
Volume	306.84 cu.cm.	Initial Saturation	34.2 %	
Wet Weight	470.40 grams	Final Saturation	97.7 %	
Dry Weight	419.63 grams	Initial Void Ratio	0.938	
WATER TEMP. (C)	27.0	Porosity	0.484	
CORRECTION FACTOR	0.850	Spec. G. (apparent)	2.65	

TEST DATA

k = (aL/-2At) X In(h1/h2)
RATIO = Hv1-Hv2 / Hc2
(hv1-hc1=h1) INITIAL LOSS
(hv2-hc2=h2) FINAL LOSS
i = h2/L

k = HYDRAULIC CONDUCTIVITY
L = 7.75 cm. length of sample
A = 39.59 sq.cm. area of sample
a = 0.72 sq.cm. area of burett
t = Elapsed time of test (seconds)
i = HYDRAULIC GRADIENT

Elapsed t/sec.	Hv1	Hc1	Hv2	Hc2	h1	h2	RATIO Out/In	(i) H.G.
20	50.0	0.0	38.7	12.2	50.0	26.5	0.93	3.4
60	50.0	0.0	29.5	22.1	50.0	7.4	0.93	1.0
60	50.0	0.0	29.5	22.1	50.0	7.4	0.93	1.0
60	50.0	0.0	29.5	22.1	50.0	7.4	0.93	1.0

1. k = 2.2E-03 cm./sec.
2. k = 2.2E-03 cm./sec.
3. k = 2.2E-03 cm./sec.
4. k = 2.2E-03 cm./sec.

AVERAGE :
k = 1.9E-03 cm./sec.
i = 1.6
RATIO = 0.93

FINAL (k) VALUE AVERAGE WITH WATER TEMPERATURE CORRECTION.

tested by: D. CARVER

S & M E

FALLING HEAD PERMEABILITY TEST
(Increasing Tailwater Pressure)
ASTM C 5084 METHOD (C)

JOB #: 1054-92-003 JOB NAME: CAMP LEJEUNE LANDFILL

DATE: 5-27-92 SAMPLE # B -9 DEPTH: 4 - 6 ft.

SOIL DESCRIPTION: TAN-BROWN FINE SAND

NOTES :

Total H20 used to saturate sample-----26.6 ml

Final Moisture 27.5 Test Cell #2

UNDISTURBED (X) REMOLDED ( ) STANDARD PROCTOR
MAX DRY DENSITY lbs./cu.ft.
OPTIMUM MOISTURE %
% COMPACTION %

SAMPLE DATA :

Length	7.35	cm.	Moisture Content	9.6	%
Diameter	7.15	cm.	Wet Density	102.4	lb/ft3
Area	40.15	sq.cm.	Dry Density	93.5	lb/ft3
Volume	295.11	cu.cm.	Initial Saturation	33.1	%
Wet Weight	484.34	grams	Final Saturation	98.6	%
Dry Weight	441.92	grams	Initial Void Ratio	0.770	
WATER TEMP. (C)	27.0		Porosity	0.435	
CORRECTION FACTOR	0.850		Spec. G. (apparent)	2.65	

TEST DATA

k = (aL/-2At) X In(h1/h2)
RATIO = Hv1-Hv2 / Hc2
(hv1-hc1=h1)INITIAL LOSS
(hv2-hc2=h2)FINAL LOSS
i = h2/L

k = HYDRAULIC CONDUCTIVITY
L = 7.35 cm. length of sample
A = 40.15 sq.cm. area of sample
a = 0.72 sq.cm. area of burett
t = Elapsed time of test (seconds)
i = HYDRAULIC GRADIENT

Elapsed t/sec.	Hv1	Hc1	Hv2	Hc2	h1	h2	RATIO Out/In	(i) H.G.
30	50.0	1.0	30.1	22.2	49.0	7.9	0.90	1.1
30	50.0	1.0	30.1	22.2	49.0	7.9	0.90	1.1
30	50.0	1.0	30.1	22.2	49.0	7.9	0.90	1.1
30	50.0	1.0	30.1	22.2	49.0	7.9	0.90	1.1

1. k = 4.0E-03 cm./sec.
2. k = 4.0E-03 cm./sec.
3. k = 4.0E-03 cm./sec.
4. k = 4.0E-03 cm./sec.

AVERAGE :
k = 3.4E-03 cm./sec.
i = 1.1
RATIO = 0.90

FINAL (k) VALUE AVERAGE WITH WATER TEMPERATURE CORRECTION.

tested by: D. CARVER

S & M E

FALLING HEAD PERMEABILITY TEST
(Increasing Tailwater Pressure)
ASTM C 5084 METHOD (C)

JOB #: 1054-92-003 JOB NAME: CAMP LEJEUNE LANDFILL

DATE: 5-27-92 SAMPLE # MW-9 DEPTH: 10 - 12 FT.

SOIL DESCRIPTION: LIGHT-ORANGE BROWN SLIGHTLY SILTY CLAYEY FINE SAND

NOTES : Sample cut from bottom 6" of tube.

Total H20 used to saturate sample----- 21.0 ml

Final Moisture 21.9% Test Cell #8

UNDISTURBED (X) REMOLDED ( ) STANDARD PROCTOR
MAX DRY DENSITY lbs./cu.ft.
OPTIMUM MOISTURE %
% COMPACTION %

SAMPLE DATA :

Length	7.31 cm.	Moisture Content	18.6 %
Diameter	7.10 cm.	Wet Density	121.2 lb/ft3
Area	39.59 sq.cm.	Dry Density	102.2 lb/ft3
Volume	289.42 cu.cm.	Initial Saturation	79.3 %
Wet Weight	562.13 grams	Final Saturation	100.0 %
Dry Weight	473.97 grams	Initial Void Ratio	0.624
WATER TEMP. (C)	31.5	Porosity	0.384
CORRECTION FACTOR	0.772	Spec. G. (apparent)	2.66

TEST DATA

k = (aL/-2At) X In(h1/h2)
RATIO = Hv1-Hv2 / Hc2
(hv1-hc1=h1) INITIAL LOSS
(hv2-hc2=h2) FINAL LOSS
i = h2/L

k = HYDRAULIC CONDUCTIVITY
L = 7.31 cm. length of sample
A = 39.59 sq.cm. area of sample
a = 0.72 sq.cm. area of burett
t = Elapsed time of test (seconds)
i = HYDRAULIC GRADIENT

Elapsed t/sec.	Hv1	Hc1	Hv2	Hc2	h1	h2	RATIO Out/In	(i) H.G.
120	50.0	0.0	31.0	18.7	50.0	12.3	1.02	1.7
120	50.0	0.0	30.9	18.7	50.0	12.2	1.02	1.7
120	50.0	0.0	31.0	18.8	50.0	12.2	1.01	1.7
120	50.0	0.0	31.0	18.7	50.0	12.3	1.02	1.7

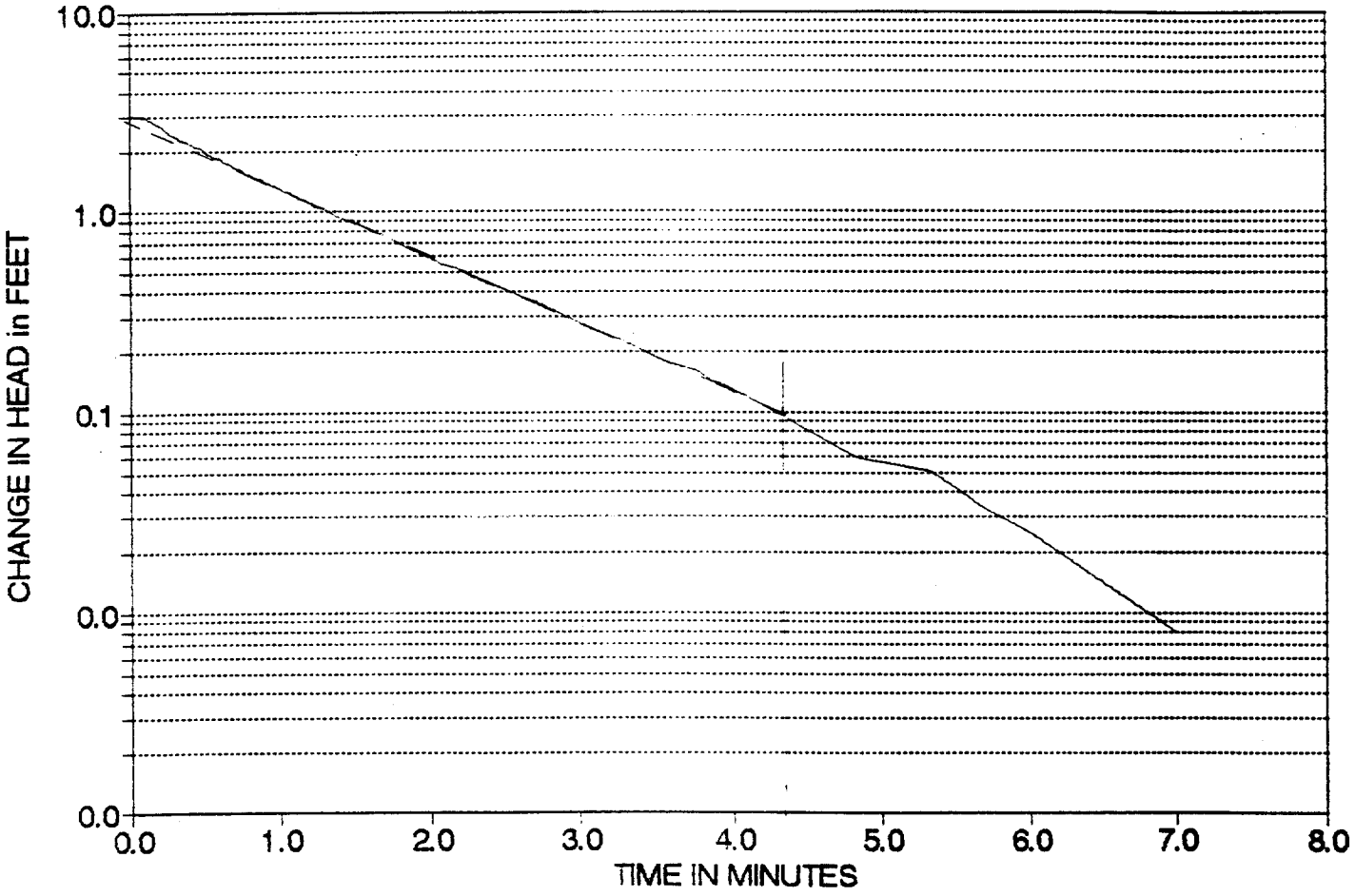
1. k = 7.8E-04 cm./sec.
2. k = 7.8E-04 cm./sec.
3. k = 7.8E-04 cm./sec.
4. k = 7.8E-04 cm./sec.

AVERAGE :
k = 6.0E-04 cm./sec.
i = 1.7
RATIO = 1.02

FINAL (k) VALUE AVERAGE WITH WATER TEMPERATURE CORRECTION.

tested by: D. CARVER

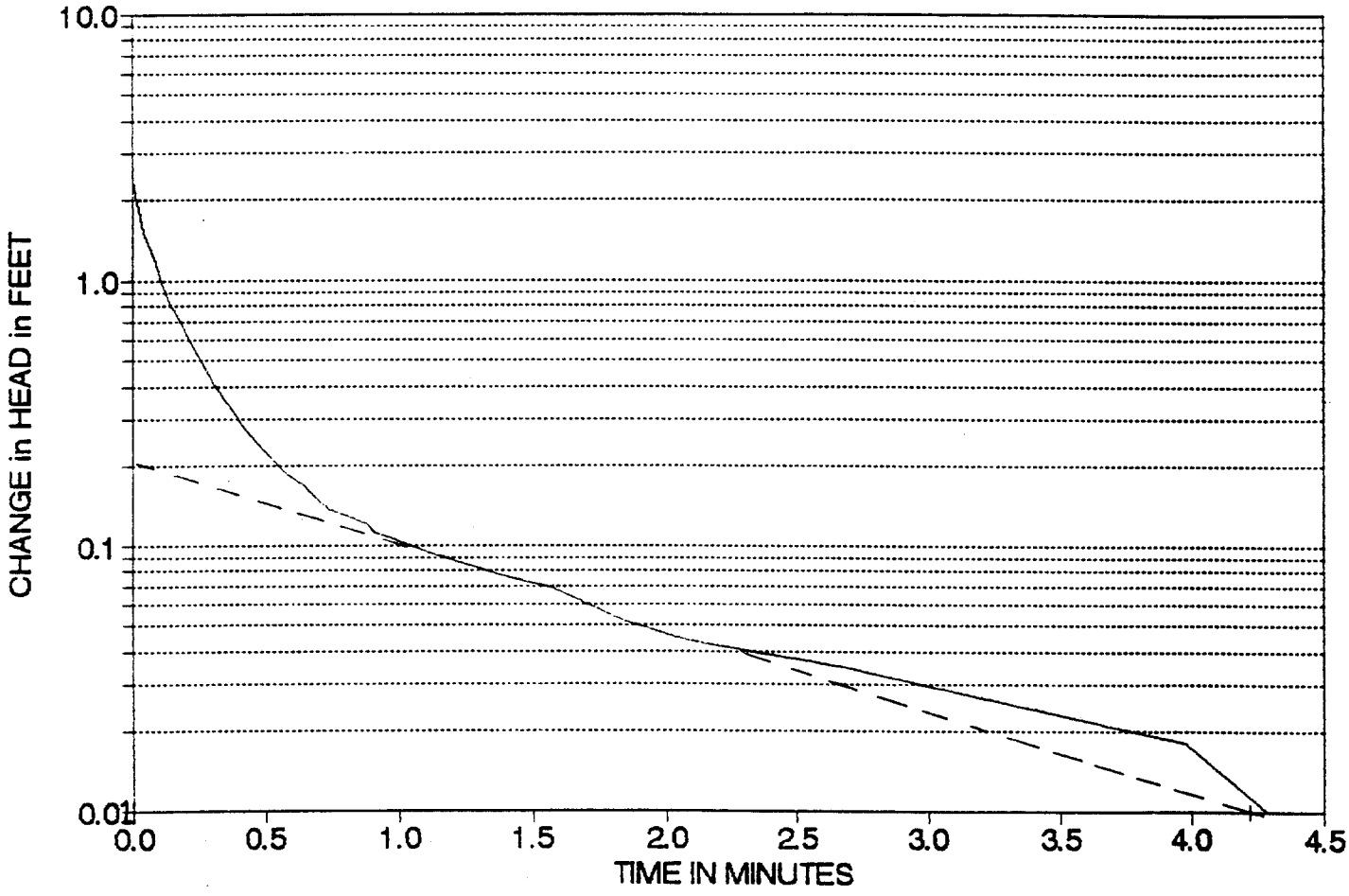
CAMP LEJEUNE LANDFILL SITE "G"
AQUIFER TEST MONITOR WELL MW-1



Y_o = 2.95 ft @ t = 0 min

Y_f = 0.1 ft @ t = 4.36 min

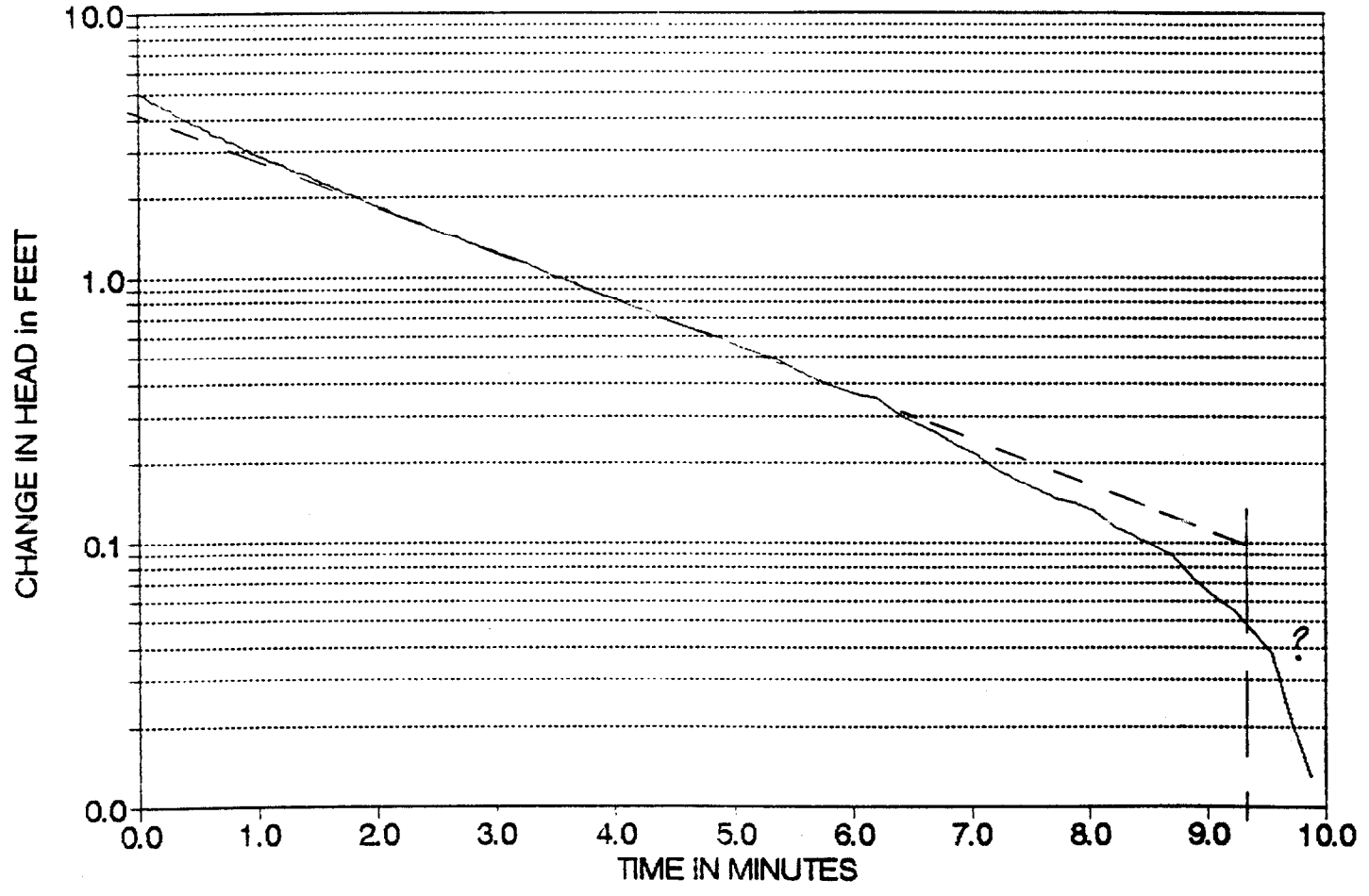
CAMP LEJEUNE LANDFILL SITE "G"
AQUIFER TEST MONITOR WELL MW-2



$Y_o = 0.20$ ft @ $t = 0$ min

$Y_t = 0.01$ ft @ $t = 4.23$ min

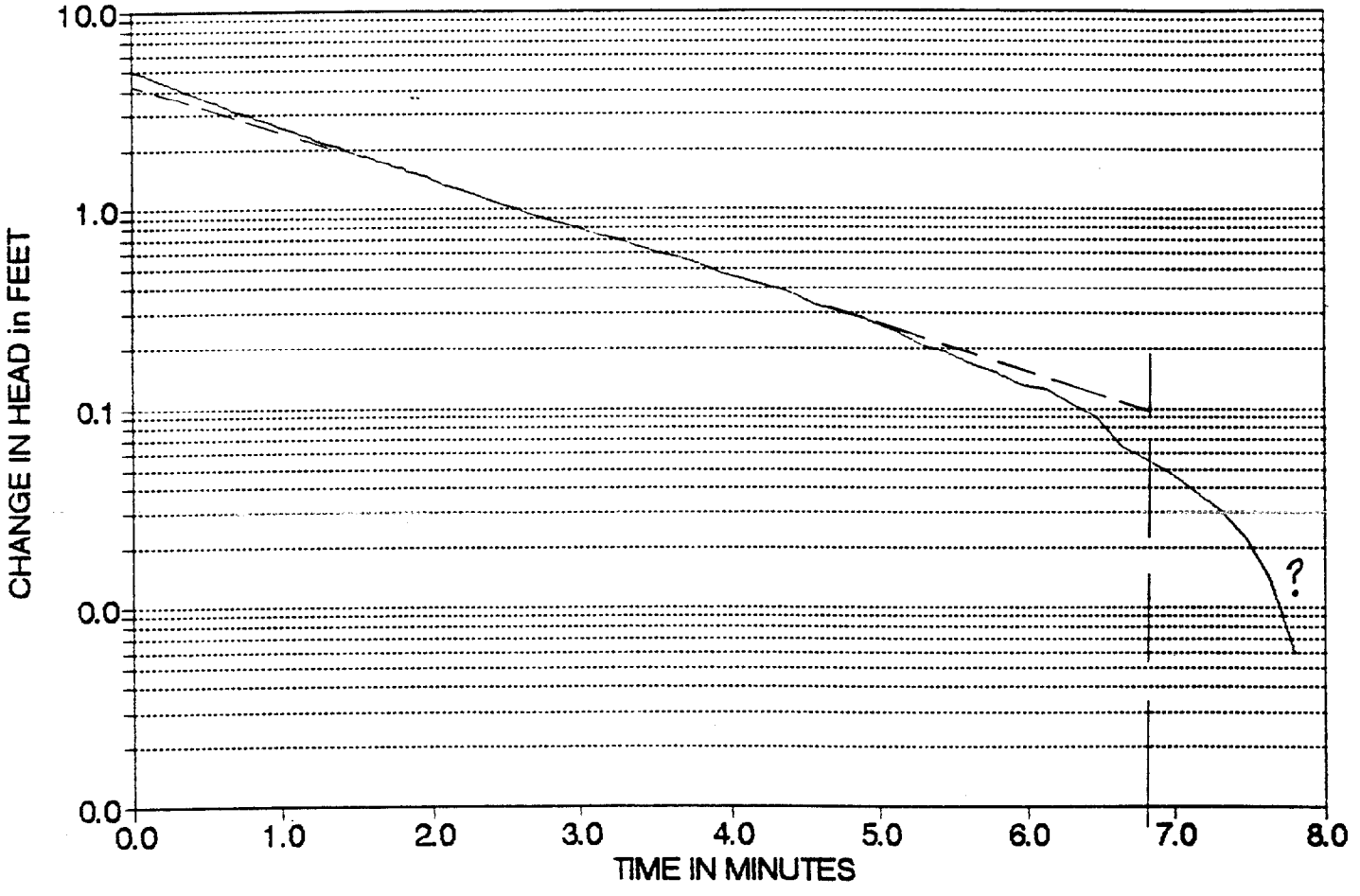
CAMP LEJEUNE LANDFILL SITE "G"
AQUIFER TEST MONITOR WELL MW-3



Y_0 = 4.2 ft @ t = 0 min

Y_f = 0.10 ft @ t = 9.33 min

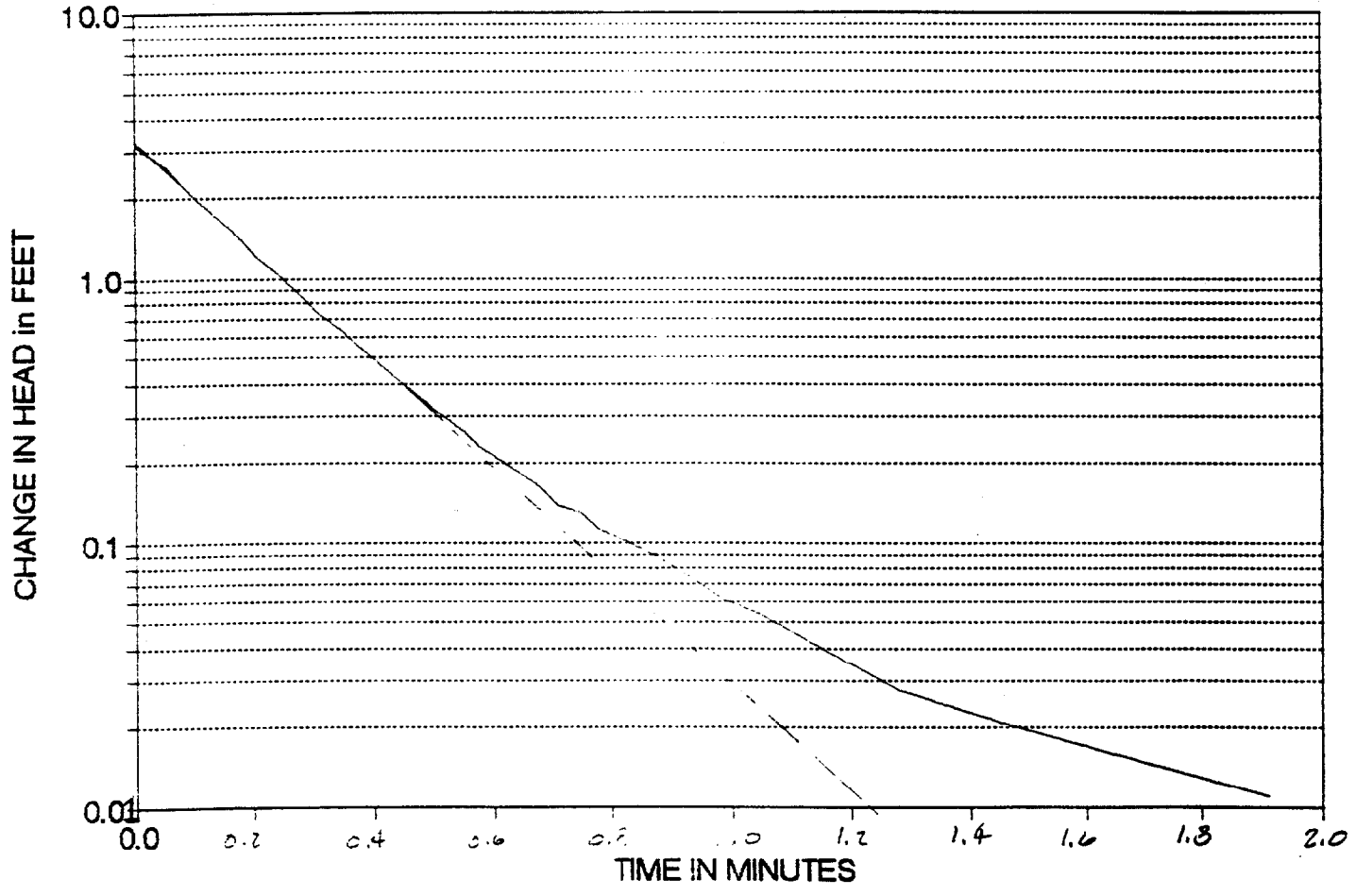
CAMP LEJEUNE LANDFILL SITE "G"
AQUIFER TEST MONITOR WELL MW-4



Y_0 = 1.2 ft @ t = 0 min

Y_t = 0.1 ft @ t = 6.80 min

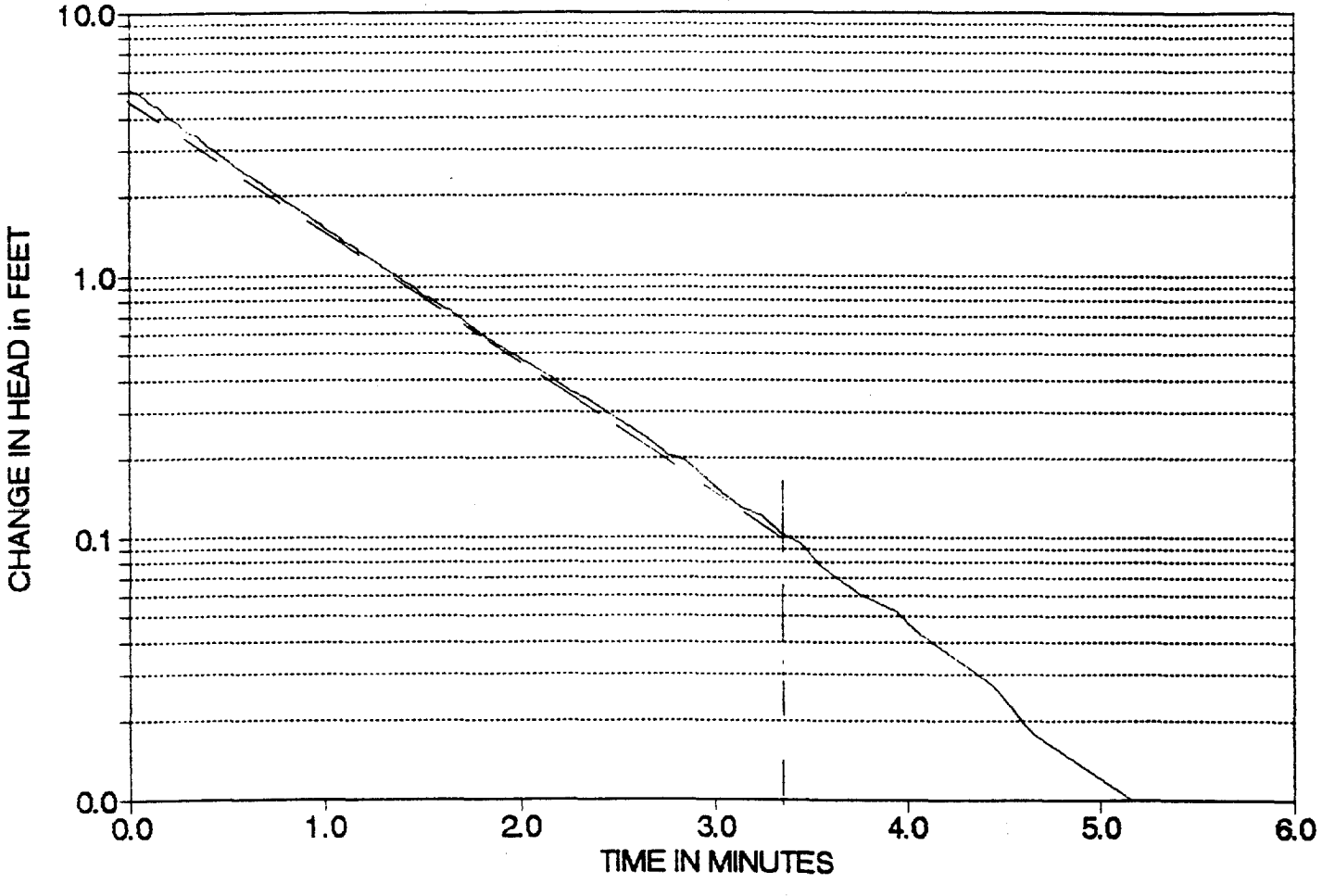
CAMP LEJEUNE LANDFILL SITE "G"
AQUIFER TEST MONITOR WELL MW-5 TEST#1



$Y_0 = 3.3$ ft @ $t = 0$ min

$Y_t = .01$ ft @ $t = 1.23$ min

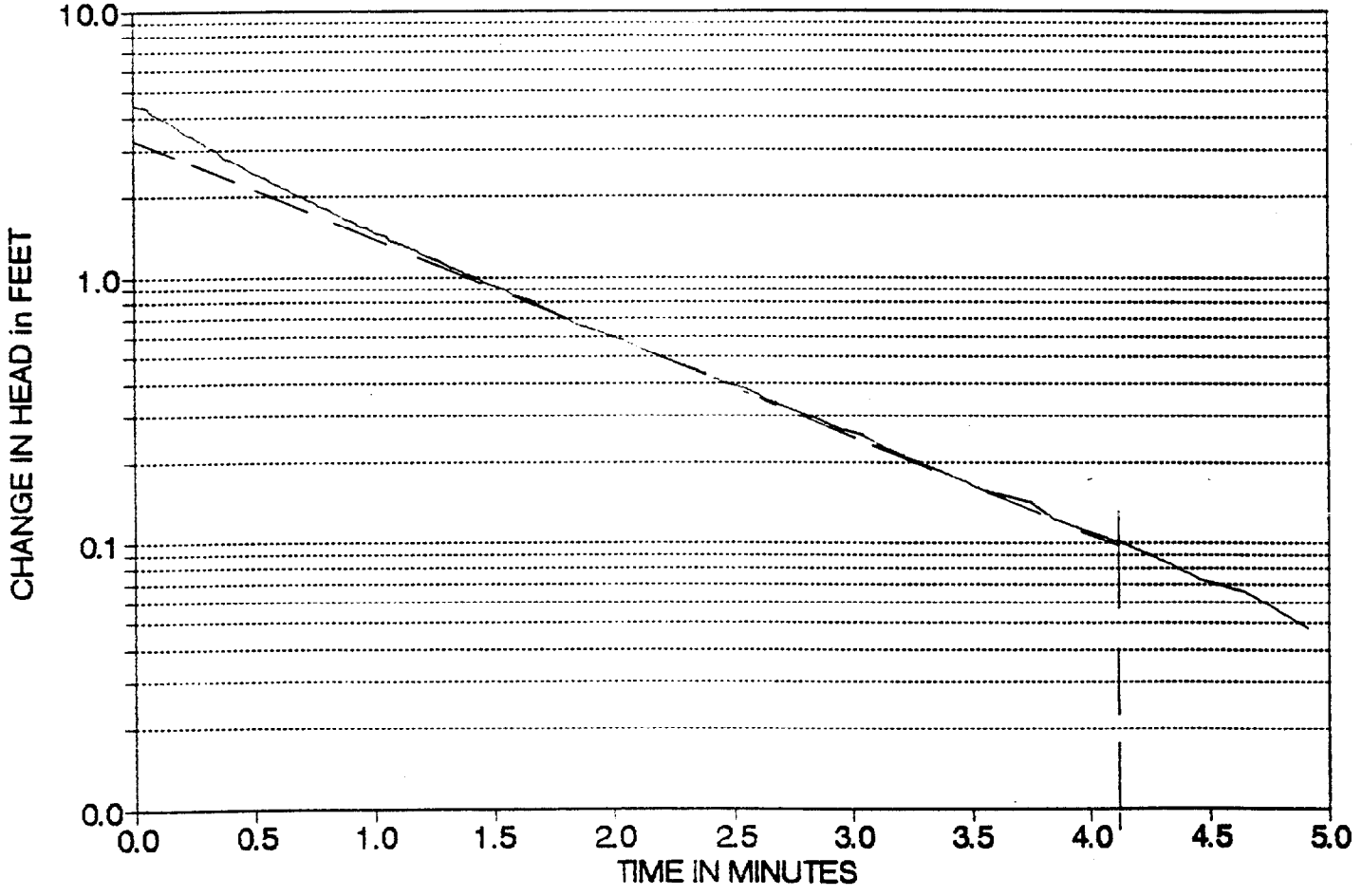
CAMP LEJEUNE LANDFILL SITE "G"
AQUIFER TEST MONITOR WELL MW-6



Y_0 = 1.7 ft @ t = 0 min

Y_t = 0.1 ft @ t = 3.36 min

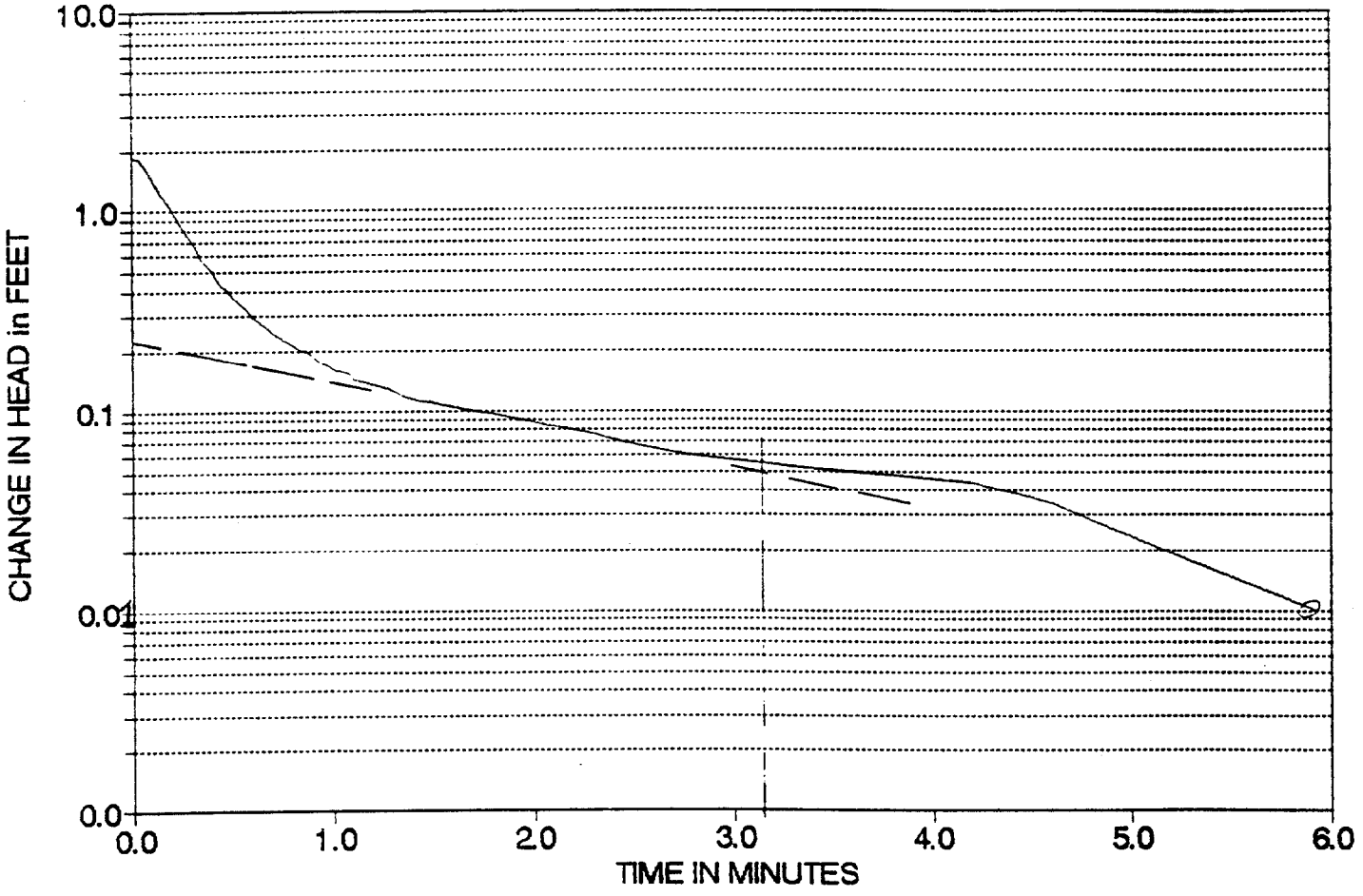
CAMP LEJEUNE LANDFILL SITE "G"
AQUIFER TEST MONITOR WELL MW-7



Y_o = 3.2 ft @ t = 0 min

Y_t = 0.1 ft @ t = 4.12 min

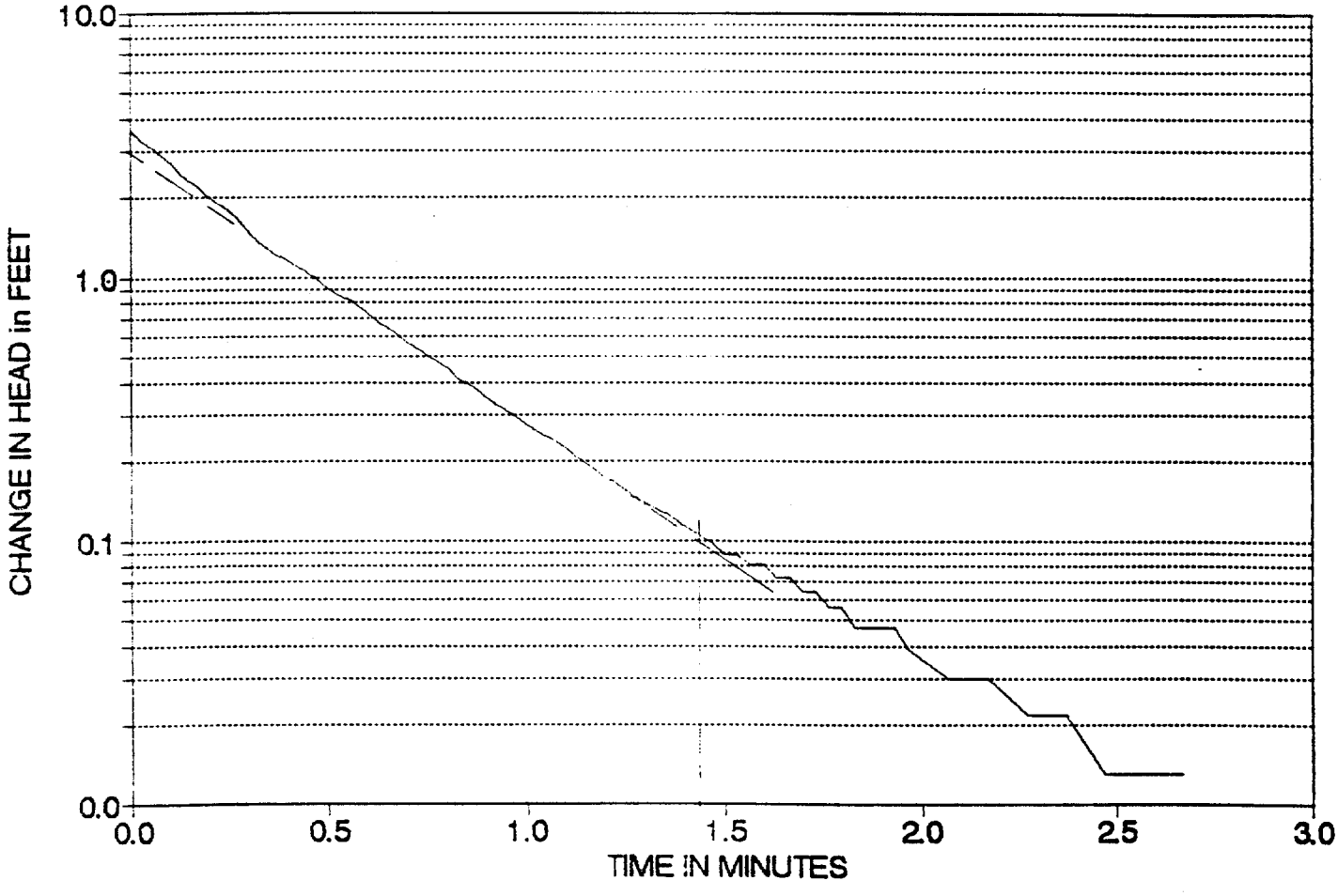
CAMP LEJEUNE LANDFILL SITE "G"
AQUIFER TEST MONITOR WELL MW-8



Y_o = 0.22 ft @ t = 0 min

Y_t = 0.05 ft @ t = 3.15 min

CAMP LEJEUNE LANDFILL SITE "G"
AQUIFER TEST MONITOR WELL MW-9

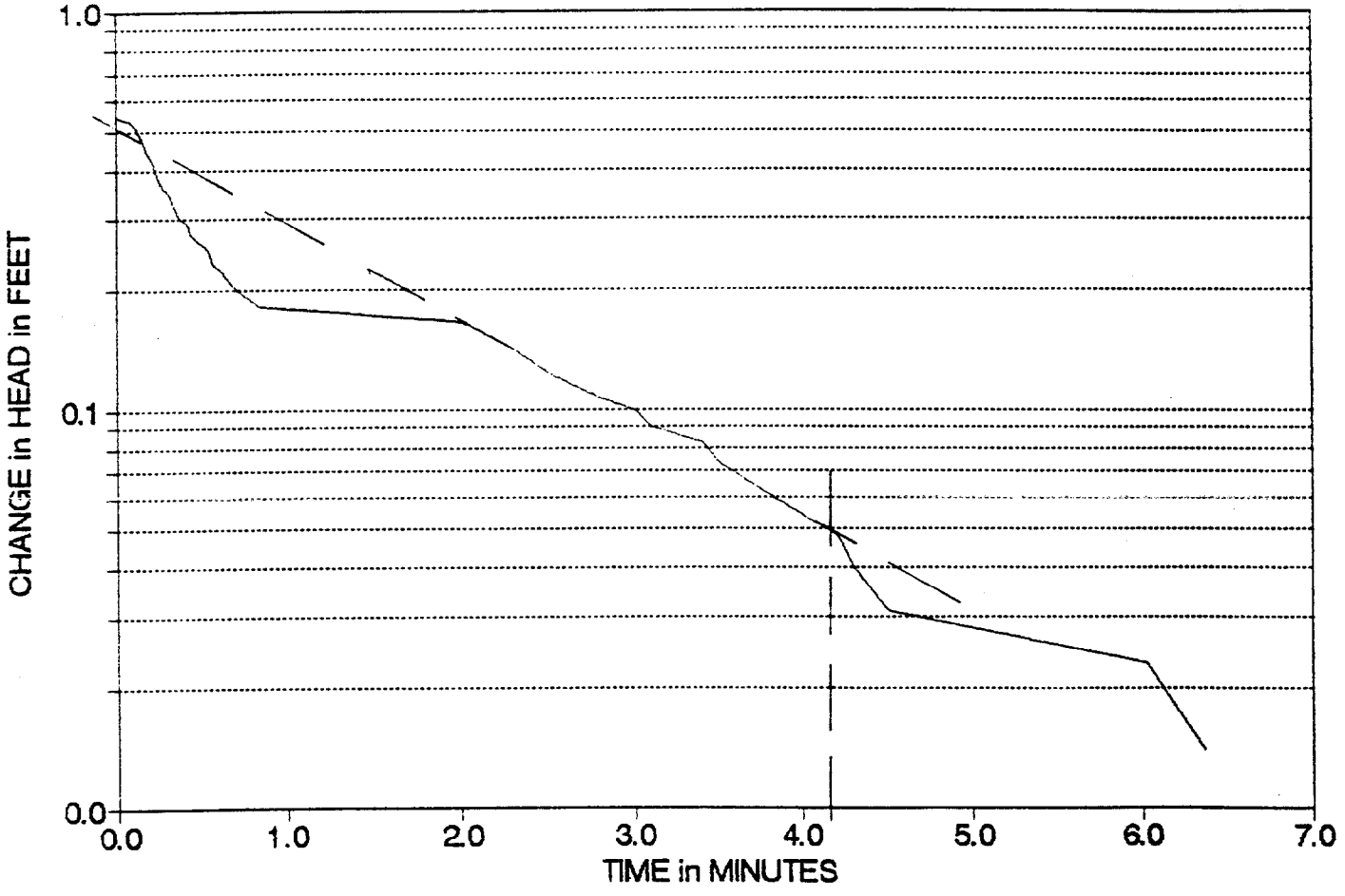


$Y_0 = 3.0\ ft\ @\ t = 0.0\ min$

$Y_t = 0.1\ ft\ @\ t = 1.43\ min$

CAMP LEJEUNE LANDFILL SITE "G"

AQUIFER TEST MONITOR WELL 6-GW-2



Y_o = 0.5 ft @ t = 0 min

Y_t = 0.05 ft @ t = 4.16 min

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	MW-1
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND:	2.36	Feet
(Show subgrade completions as minus)		
TOTAL DEPTH OF WELL:	27.36	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	5.67	Feet
DEPTH TO AN IMPERMEABLE SURFACE:	50	Feet
(Measured from the ground surface)		
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	2.95	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.1	Feet
Yt at time (t2):	4.36	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

3.44E-04	cm/sec
0.297247	m/day
355.9416	ft/yr
7.29469	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic Conductivity of well no.: MW-1

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	661.1112	
H (cm)	1423.111	
Le/Rw	28.23529	
Lw/Rw	61.24235	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	2.95	
Yt	0.1	
t (sec)	261.6	
Ln((H-Lw)/Rw))	4.256863	
Ln(Lw/Rw)	4.114839	
Ln(Re/Rw)	2.512554	
Ln(Yo/Yt)	3.38439	
K (cm/sec)	0.000344	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	Mw-2
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND:	2.39	Feet
(Show subgrade completions as minus)		
TOTAL DEPTH OF WELL:	27.39	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	6.38	Feet
DEPTH TO AN IMPERMEABLE SURFACE:	50	Feet
(Measured from the ground surface)		
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	0.2	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.01	Feet
Yt at time (t2):	4.28	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

3.10E-04	cm/sec
0.268252	m/day
321.2213	ft/yr
6.58313	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic
Conductivity of well no.: Mw-2

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or
calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	640.3848	
H (cm)	1402.385	
Le/Rw	28.23529	
Lw/Rw	59.32235	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	0.2	
Yt	0.01	
t (sec)	256.8	
Ln((H-Lw)/Rw))	4.256863	
Ln(Lw/Rw)	4.082986	
Ln(Re/Rw)	2.51464	
Ln(Yo/Yt)	2.995732	
K (cm/sec)	0.00031	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	MW-3
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND:	1.8	Feet
(Show subgrade completions as minus)		
TOTAL DEPTH OF WELL:	26.8	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	8.3	Feet
DEPTH TO AN IMPERMEABLE SURFACE:	50	Feet
(Measured from the ground surface)		
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	4.2	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.1	Feet
Yt at time (t2):	9.33	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

1.78E-04	cm/sec
0.154062	m/day
184.4838	ft/yr
3.780824	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic
Conductivity of well no.: MW-3

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or
calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	563.88	
H (cm)	1325.88	
Le/Rw	28.23529	
Lw/Rw	52.23529	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	4.2	
Yt	0.1	
t (sec)	559.8	
Ln((H-Lw)/Rw))	4.256863	
Ln(Lw/Rw)	3.955758	
Ln(Re/Rw)	2.523305	
Ln(Yo/Yt)	3.73767	
K (cm/sec)	0.000178	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	MW-4
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND:	1.99	Feet
(Show subgrade completions as minus)		
TOTAL DEPTH OF WELL:	26.99	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	11.58	Feet
DEPTH TO AN IMPERMEABLE SURFACE:	50	Feet
(Measured from the ground surface)		
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	4.2	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.1	Feet
Yt at time (t2):	6.8	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

2.46E-04	cm/sec
0.212511	m/day
254.4738	ft/yr
5.215203	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic
Conductivity of well no.: MW-4

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or
calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	469.6968	
H (cm)	1231.697	
Le/Rw	28.23529	
Lw/Rw	43.51059	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	4.2	
Yt	0.1	
t (sec)	408	
Ln((H-Lw)/Rw))	4.256863	
Ln(Lw/Rw)	3.773004	
Ln(Re/Rw)	2.536774	
Ln(Yo/Yt)	3.73767	
K (cm/sec)	0.000246	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	MW-5
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND:	1.93	Feet
(Show subgrade completions as minus)		
TOTAL DEPTH OF WELL:	26.93	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	15	Feet
DEPTH TO AN IMPERMEABLE SURFACE:	50	Feet
(Measured from the ground surface)		
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	3.3	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.01	Feet
Yt at time (t2):	1.23	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

2.13E-03	cm/sec
1.83807	m/day
2201.017	ft/yr
45.10779	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic
Conductivity of well no.: MW-5

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or
calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	363.6264	
H (cm)	1125.626	
Le/Rw	28.23529	
Lw/Rw	33.68471	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	3.3	
Yt	0.01	
t (sec)	73.8	
Ln((H-Lw)/Rw))	4.256863	
Ln(Lw/Rw)	3.517044	
Ln(Re/Rw)	2.557992	
Ln(Yo/Yt)	5.799093	
K (cm/sec)	0.002127	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	MW-6
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND: (Show subgrade completions as minus)	2.34	Feet
TOTAL DEPTH OF WELL:	27.34	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	11.22	Feet
DEPTH TO AN IMPERMEABLE SURFACE: (Measured from the ground surface)	50	Feet
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	4.7	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.1	Feet
Yt at time (t2):	3.36	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

5.12E-04	cm/sec
0.442424	m/day
529.7854	ft/yr
10.85746	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic Conductivity of well no.: MW-6

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	491.3376	
H (cm)	1253.338	
Le/Rw	28.23529	
Lw/Rw	45.51529	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	4.7	
Yt	0.1	
t (sec)	201.6	
Ln((H-Lw)/Rw))	4.256863	
Ln(Lw/Rw)	3.818048	
Ln(Re/Rw)	2.533334	
Ln(Yo/Yt)	3.850148	
K (cm/sec)	0.000512	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	MW-7
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND:	2.13	Feet
(Show subgrade completions as minus)		
TOTAL DEPTH OF WELL:	27.13	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	11.59	Feet
DEPTH TO AN IMPERMEABLE SURFACE:	50	Feet
(Measured from the ground surface)		
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	3.2	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.1	Feet
Yt at time (t2):	4.12	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

3.76E-04	cm/sec
0.325145	m/day
389.3485	ft/yr
7.979332	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic
Conductivity of well no.: MW-7

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	473.6592	
H (cm)	1235.659	
Le/Rw	28.23529	
Lw/Rw	43.87765	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	3.2	
Yt	0.1	
t (sec)	247.2	
Ln((H-Lw)/Rw))	4.256863	
Ln(Lw/Rw)	3.781405	
Ln(Re/Rw)	2.536126	
Ln(Yo/Yt)	3.465736	
K (cm/sec)	0.000376	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	MW-8
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND:	2.09	Feet
(Show subgrade completions as minus)		
TOTAL DEPTH OF WELL:	27.09	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	8.64	Feet
DEPTH TO AN IMPERMEABLE SURFACE:	50	Feet
(Measured from the ground surface)		
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	0.22	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.05	Feet
Yt at time (t2):	3.15	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

2.09E-04	cm/sec
0.180897	m/day
216.6175	ft/yr
4.439373	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic
Conductivity of well no.: MW-8

Camp Lejeune Landfill Site "G"

Bouwer and Rice Analysis for the Hydraulic Conductivity of well no.: MW-8

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	562.356	
H (cm)	1324.356	
Le/Rw	28.23529	
Lw/Rw	52.09412	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	0.22	
Yt	0.05	
t (sec)	189	
Ln((H-Lw)/Rw))	4.256863	
Ln(Lw/Rw)	3.953052	
Ln(Re/Rw)	2.523495	
Ln(Yo/Yt)	1.481605	
K (cm/sec)	0.000209	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	MW-9
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND:	2.11	Feet
(Show subgrade completions as minus)		
TOTAL DEPTH OF WELL:	27.11	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	14.95	Feet
DEPTH TO AN IMPERMEABLE SURFACE:	50	Feet
(Measured from the ground surface)		
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	3	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.1	Feet
Yt at time (t2):	1.43	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

1.07E-03	cm/sec
0.92665	m/day
1109.628	ft/yr
22.74079	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic Conductivity of well no.: MW-9

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	370.6368	
H (cm)	1132.637	
Le/Rw	28.23529	
Lw/Rw	34.33412	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	3	
Yt	0.1	
t (sec)	85.8	
Ln((H-Lw)/Rw))	4.256863	
Ln(Lw/Rw)	3.53614	
Ln(Re/Rw)	2.556303	
Ln(Yo/Yt)	3.401197	
K (cm/sec)	0.001072	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

PROJECT NAME:	Camp Lejeune Landfill Site "G"
PROJECT LOCATION:	Camp Lejeune, N.C.
PROJECT NUMBER:	1054-92-003
WELL IDENTIFICATION:	6-GW-2
DATE OF TEST:	April 23, 1992

The following values are obtained by measurement of the well or from well records. All measurements are from top of casing or:

HEIGTH OF DATUM ABOVE GROUND: (Show subgrade completions as minus)	2.29	Feet
TOTAL DEPTH OF WELL:	28	Feet
INSIDE DIAMETER OF WELL:	2	Inches
DIAMETER OF THE BOREHOLE:	8.5	Inches
LENGTH OF SCREEN INTERVAL:	10	Feet
DEPTH TO THE STABILIZED WATER TABLE:	13.4	Feet
DEPTH TO AN IMPERMEABLE SURFACE: (Measured from the ground surface)	50	Feet
SLUG (IN) or SLUG (OUT):	I	I or O
APPROXIMATE CHANGE IN WATER LEVEL:	4	Feet

The data for this test was stored as shown:
BLOCK 1 CHANNEL: 1

The following values are obtained from the Semi-log graph of the change in water level with time. Both intercepts are required.

Intercept with the Y axis (Yo):	0.5	Feet
Yo at time (t1):	0	Minutes
Intercept with the X axis (Xt):	0.05	Feet
Yt at time (t2):	4.16	Minutes

The Hydraulic Conductivity (K) for the aquifer within the screen interval using Bouwer and Rice Analysis is shown to the right:

2.48E-04	cm/sec
0.21433	m/day
256.6523	ft/yr
5.259849	gal/day/sq ft

Bouwer and Rice Analysis for the Hydraulic Conductivity of well no.: 6-GW-2

Camp Lejeune Landfill Site "G"
Camp Lejeune, N.C.
1054-92-003 April 23, 1992

The following intermediate values were used or calculated for the determination of K:

Rc (cm)	2.54	
Rw (cm)	10.795	
Le (cm)	304.8	
Lw (cm)	445.008	
H (cm)	1185.367	
Le/Rw	28.23529	
Lw/Rw	41.22353	
A	2.2	
B	0.3	
C	1.8	Value not used
Yo	0.5	
Yt	0.05	
t (sec)	249.6	
Ln((H-Lw)/Rw))	4.228052	
Ln(Lw/Rw)	3.719009	
Ln(Re/Rw)	2.540701	
Ln(Yo/Yt)	2.302585	
K (cm/sec)	0.000248	

The following conditions were specified for this test:

The well is partially penetrating
as the impermeable layer is below the screen

The screen is completely submerged

The slug was added to the well

Camp Lejeune Landfill Site [illegible]
Monitor Well MW-1
S/N [illegible]DEE-[illegible]A-SN-[illegible] Block [illegible]

Program: STEP TEST
Readings: 112
Start Time: 15:[illegible]
Start Date: 04/[illegible]
Range: 0015 PSI
Channels: [illegible]
Units: [illegible]

Step 1
Interval 00:00:[illegible]
Readings [illegible]

Time	Chnl 1
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
0.07	+23.742
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
0.17	+23.[illegible]
0.20	+23.[illegible]
0.23	+23.[illegible]
0.27	+23.[illegible]
[illegible]	+23.[illegible]
0.33	+23.[illegible]
0.37	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.[illegible]
[illegible]	+23.049
[illegible]	+22.[illegible]
[illegible]	+22.[illegible]
[illegible]	+22.[illegible]
[illegible]	+22.[illegible]
[illegible]	+22.[illegible]
[illegible]	+22.[illegible]
[illegible]	+22.[illegible]
[illegible]	+22.[illegible]
[illegible]	+22.[illegible]
[illegible]	+22.509
[illegible]	+22.449
[illegible]	+22.[illegible]
[illegible]	+22.[illegible]

Time	Chnl 1
[illegible]	+22.340
[illegible]	+22.297
[illegible]	+22.263
[illegible]	+22.230
[illegible]	+22.[illegible]
[illegible]	+22.162
[illegible]	+22.128
[illegible]	+22.094
[illegible]	+22.069
[illegible]	+22.035
[illegible]	+22.002
[illegible]	+21.976
[illegible]	+21.951
[illegible]	+21.917
[illegible]	21.892
[illegible]	+21.866
[illegible]	+21.841
[illegible]	+21.824
[illegible]	+21.799
[illegible]	+21.790
[illegible]	+21.773
[illegible]	+21.748
[illegible]	+21.714
[illegible]	+21.697

Step 2
Interval 00:00:06
Readings 30

Time	Chnl 1
[illegible]	+21.630
[illegible]	+21.571
[illegible]	+21.528
[illegible]	+21.478
[illegible]	+21.444
[illegible]	+21.402
[illegible]	+21.368
[illegible]	+21.343
[illegible]	+21.309
[illegible]	+21.283
[illegible]	+21.258
[illegible]	+21.233
[illegible]	+21.207
[illegible]	+21.182

Time	Chnl 1
3.47	+21.16[illegible]
3.57	+21.14[illegible]
3.67	+21.13[illegible]
3.77	+21.1[illegible]
3.87	+21.09[illegible]
3.97	+21.08[illegible]
4.07	+21.08[illegible]
4.17	+21.06[illegible]
4.27	+21.05[illegible]
4.37	+21.04[illegible]
4.47	+21.03[illegible]
4.57	+21.02[illegible]
4.67	+21.01[illegible]
4.77	+21.00[illegible]
4.87	+21.00[illegible]
4.97	+20.99[illegible]

Step 3
Interval 00:00:10
Readings 30

Time	Chnl 1
5.13	+20.97[illegible]
5.30	+20.97[illegible]
5.47	+20.97[illegible]
5.63	+20.97[illegible]
5.80	+20.96[illegible]
5.97	+20.95[illegible]
6.13	+20.95[illegible]
6.30	+20.94[illegible]
6.47	+20.94[illegible]
6.63	+20.93[illegible]
6.80	+20.93[illegible]
6.97	+20.93[illegible]
7.13	+20.93[illegible]
7.30	+20.92[illegible]
7.47	+20.92[illegible]
7.63	+20.93[illegible]
7.80	+20.93[illegible]
7.97	+20.93[illegible]
8.13	+20.93[illegible]
8.30	+20.93[illegible]
8.47	+20.93[illegible]
8.63	+20.92[illegible]

Camp Lejeune Landfill Site "G"
Monitor Well MW-I
S/N 3DEE-05A-6M-I.II Slug 1

Program: STEP TEST
Readings: 34
Start Time: 09:24:09
Start Date: 04/29
Range: 001E PSI
Channels: 1
Units: Ft-H2O

Step 1
Interval 00:00:02
Readings 50

Time	Chnl 1
0.00	+21.706
0.03	+22.061
0.07	+22.218
0.10	+22.304
0.13	+22.125
0.17	+22.821
0.20	+22.601
0.23	+22.647
0.27	+22.733
0.30	+22.279
0.33	+22.175
0.37	+22.086
0.40	+22.027
0.43	+21.975
0.47	+21.942
0.50	+21.906
0.53	+21.883
0.57	+21.858
0.60	+21.841
0.63	+21.824
0.67	+21.807
0.70	+21.799
0.73	+21.790
0.77	+21.773
0.80	+21.765
0.83	+21.757
0.87	+21.757
0.90	+21.748
0.93	+21.748
0.97	+21.740
1.00	+21.731
1.03	+21.731

Time	Chnl 1
1.07	+21.731
1.10	+21.723
1.13	+21.723
1.17	+21.723
1.20	+21.714
1.23	+21.706
1.27	+21.706
1.30	+21.697
1.33	+21.697
1.37	+21.697
1.40	+21.697
1.43	+21.697
1.47	+21.689
1.50	+21.689
1.53	+21.689
1.57	+21.689
1.60	+21.689
1.63	+21.689
1.67	+21.689
1.70	+21.689
1.73	+21.672
1.77	+21.680

Step 1
Interval 00:00:06
Readings 70

Time	Chnl 1
2.57	+21.655
2.67	+21.664
2.77	+21.655
2.87	+21.655
2.97	+21.655
3.07	+21.664
3.17	+21.655

Time	Chnl 1
3.27	+21.655
3.37	+21.647
3.47	+21.647
3.57	+21.647
3.67	+21.647
4.27	+21.647
4.37	+21.630

Camp Lejeune Landfill Site "D"
Monitor Well MW-7
S/N 5DEE-[illegible]-SN-[illegible] Block 1

Program: STEP TEST
Readings: 120
Start Time: 13:[illegible]:22
Start Date: 04/[illegible]
Range: 0015 PSI
Channels: 1
Units: PS--IN

Step 1
Interval [illegible]:00:01
Readings 29

Time	Chnl 1
0.00	-22.[illegible]
0.03	+23.[illegible]
0.07	+24.166
0.10	-24.[illegible]
0.13	-24.477
0.17	+24.[illegible]
0.20	+24.241
0.23	+24.[illegible]
0.27	+24.[illegible]
0.30	+23.[illegible]
0.33	+23.[illegible]
0.37	-23.[illegible]
0.40	+23.[illegible]
0.43	+23.[illegible]
0.47	+23.[illegible]
0.50	+23.[illegible]
0.53	+23.[illegible]
0.57	+23.[illegible]
0.60	+23.[illegible]
0.63	+23.[illegible]
0.67	+23.[illegible]
0.70	+23.[illegible]
0.73	+22.[illegible]
0.77	-22.[illegible]
0.80	-22.[illegible]
0.83	-22.[illegible]
0.87	-22.[illegible]
0.90	-22.[illegible]
0.93	+22.[illegible]
0.97	+22.[illegible]
1.00	+22.[illegible]
1.03	+22.[illegible]
1.07	+22.466
1.10	+22.[illegible]
1.13	+22.[illegible]
1.17	+22.[illegible]

Time	Chnl 1
1.20	+22.289
1.23	+22.247
1.27	+22.204
1.30	+22.162
1.33	+22.128
1.37	+22.086
1.40	+22.052
1.43	+22.018
1.47	+21.976
1.50	+21.942
1.53	+21.909
1.57	+21.875
1.60	+21.833
1.63	+21.807
1.67	+21.773
1.70	+21.740
1.73	+21.706
1.77	+21.672
1.80	+21.647
1.83	+21.613
1.87	+21.588
1.90	+21.554
1.93	+21.528
1.97	+21.503

Step 2
Interval [illegible]:00:06
Readings 30

Time	Chnl 1
[illegible]	+21.402
[illegible]	+21.326
[illegible]	+21.250
[illegible]	+21.182
[illegible]	+21.114
[illegible]	+21.047
[illegible]	+20.988
[illegible]	+20.928
[illegible]	+20.878
[illegible]	+20.827
[illegible]	+20.776
[illegible]	+20.726
[illegible]	+20.683
[illegible]	+20.641
[illegible]	+20.591
[illegible]	+20.548
[illegible]	+20.506

Time	Chnl 1
3.77	+20.472
3.87	+20.430
3.97	+20.396
4.07	+20.362
4.17	+20.329
4.27	+20.295
4.37	+20.269
4.47	+20.236
4.57	+20.210
4.67	+20.185
4.77	+20.160
4.87	+20.143
4.97	+20.117

Step 3
Interval 00:00:10
Readings 30

Time	Chnl 1
5.13	+20.075
5.30	+20.041
5.47	+20.016
5.63	+19.974
5.80	+19.940
5.97	+19.915
6.13	+19.889
6.30	+19.881
6.47	+19.839
6.63	+19.813
6.80	+19.788
6.97	+19.762
7.13	+19.746
7.30	+19.720
7.47	+19.703
7.63	+19.695
7.80	+19.678
7.97	+19.670
8.13	+19.661
8.30	+19.644
8.47	+19.636
8.63	+19.627
8.80	+19.619
8.97	+19.602
9.13	+19.593
9.30	+19.585
9.47	+19.577
9.63	+19.568
9.80	+19.551
9.97	+19.543

Camp Lejeune Landfill Site "G"
Monitor Well MW-5 Slug Test

S/N SDEE-03A -SIZE Block 1

Program: STEP TEST
Readings: 61
Start Time:
Start Date: 0.17C917
Range: 15 PSI
Channels: 1
Units: Ft

Step 1
Interval
Readings 60

Time	Chnl	Time	Chnl
0	15.71	0.7	12.78
0.03	15.77	0.73	12.76
0.07	15.28	0.77	12.75
0.1	14.87	0.8	12.73
0.13	14.54	0.83	12.72
0.17	14.26	0.9	12.71
0.2	14.02	0.93	12.70
0.23	13.81	0.97	12.69
0.27	13.64	1	12.68
0.3	13.49	1.07	12.67
0.33	13.36	1.13	12.66
0.37	13.25	1.3	12.65
0.4	13.16	1.5	12.64
0.43	13.09	1.93	12.63
0.47	13.02		
0.5	12.97		
0.53	12.93		
0.57	12.88		
0.6	12.85		
0.63	12.83		
0.67	12.80		

Camp Lejeune Landfill Site "9"
Monitor Well MW-4 Slug Test

S/N 9EEE-03A -TEST Block 1

Program: STEP TEST
Readings: 107
Start Time:
Start Date: **
Range: 15 PSI
Channels: 1
Units: Ft

Step 1
Interval
Readings 50

Time	Chnl	Time	Chnl	Time	Chnl
0	20.97	1.03	18.27	3.87	16.49
0.03	20.92	1.07	18.22	3.97	16.46
0.07	20.81	1.1	18.18	4.07	16.43
0.1	20.69	1.13	18.14	4.17	16.41
0.13	20.59	1.17	18.10	4.27	16.39
0.17	20.48	1.2	18.06	4.37	16.37
0.2	20.38	1.23	17.79	5.13	16.22
0.23	20.28	1.27	17.74	5.3	16.19
0.27	20.18	1.3	17.71	5.47	16.17
0.3	20.09	1.33	17.67	5.63	16.15
0.33	20.00	1.37	17.64	5.8	16.13
0.37	19.91	1.4	17.61	5.97	16.11
0.4	19.82	1.43	17.58	6.13	16.10
0.43	19.74	1.47	17.55	6.3	16.09
0.47	19.65	1.5	17.52	6.47	16.07
0.5	19.58	1.53	17.49	6.63	16.05
0.53	19.50	1.57	17.46	6.8	16.04
0.57	19.42	1.6	17.43	6.97	16.03
0.6	19.35	1.63	17.39	7.13	16.02
0.63	19.28	1.67	17.35	7.3	16.01
0.67	19.18	1.7	17.18	7.47	16.00
0.7	19.13	1.73	17.12	7.63	15.99
0.73	19.06	1.77	17.05	7.8	15.99
0.77	18.99	1.8	17.00		
0.8	18.93	1.83	16.94		
0.83	18.88	1.87	16.89		
0.87	18.82	1.9	16.84		
0.9	18.78	1.93	16.80		
0.93	18.69	1.97	16.75		
0.97	18.64	2	16.71		
1	18.59	2.03	16.68		
1.03	18.53	2.07	16.64		
1.07	18.48	2.1	16.60		
1.1	18.43	2.13	16.58		
1.13	18.38	2.17	16.55		
1.17	18.33	2.2	16.53		

Camp Lejeune Landfill Site "S"
Monitor Well MW-6 Slug Test

S/N SDEE-03A -3100 Block 1

Program: STEP TEST
Readings: 94
Start Time:
Start Date: **
Range: 15 PSI
Channels: 1
Units: Ft

Step 1
Interval
Reacings 60

Time	Chnl	Time	Chnl	Time	Chnl
0	16.45	1.23	17.37	3.47	15.81
0.03	16.45	1.27	17.30	3.57	15.80
0.07	16.45	1.3	17.24	3.67	15.78
0.1	16.46	1.33	17.18	3.77	15.77
0.13	16.45	1.37	17.12	3.87	15.76
0.17	16.45	1.4	17.07	3.97	15.75
0.2	16.84	1.43	17.02	4.07	15.74
0.23	18.70	1.47	16.97	4.27	15.73
0.27	20.16	1.5	16.92	4.37	15.72
0.3	20.65	1.53	16.86	4.77	15.71
0.33	20.78	1.57	16.82	4.97	15.70
0.37	20.62	1.6	16.78	5.47	15.69
0.4	20.40	1.63	16.74		
0.43	20.20	1.67	16.70		
0.47	20.01	1.7	16.66		
0.5	19.82	1.73	16.62		
0.53	19.65	1.77	16.59		
0.57	19.48	1.8	16.55		
0.6	19.33	1.83	16.52		
0.63	19.19	1.87	16.49		
0.67	19.04	1.9	16.46		
0.7	18.91	1.93	16.43		
0.73	18.78	1.97	16.41		
0.77	18.66	2.07	16.32		
0.8	18.54	2.17	16.25		
0.83	18.43	2.27	16.19		
0.87	18.27	2.37	16.14		
0.9	18.18	2.47	16.09		
0.93	18.11	2.57	16.05		
0.97	18.01	2.67	16.01		
1	17.91	2.77	15.98		
1.03	17.84	2.87	15.94		
1.07	17.74	2.97	15.92		
1.1	17.67	3.07	15.88		
1.13	17.58	3.17	15.88		
1.17	17.51	3.27	15.85		
1.2	17.44	3.37	15.82		

Camp Lejeune Landfill Site "G"
Monitor Well MW-7
S/N SDEE-03A-SN-3132 Block 1

Program: STEP TEST
Readings: 90
Start Time: 08:24:03
Start Date: 04/24
Range: 0015 PSI
Channels: 1
Units: Ft-H20

Step 1
Interval 00:00:02
Readings 30

Time	Chnl 1
0.00	+16.095
0.03	+16.095
0.07	+16.095
0.10	+16.270
0.13	+17.639
0.17	+19.425
0.20	+20.212
0.23	+20.306
0.27	+20.371
0.30	+20.193
0.33	+20.024
0.37	+19.864
0.40	+19.712
0.43	+19.568
0.47	+19.432
0.50	+19.298
0.53	+19.179
0.57	+19.061
0.60	+18.952
0.63	+18.791
0.67	+18.698
0.70	+18.605
0.73	+18.512
0.77	+18.427
0.80	+18.343
0.83	+18.267
0.87	+18.199
0.90	+18.123
0.93	+18.056
0.97	+17.988
1.00	+17.929
1.03	+17.870
1.07	+17.811
1.10	+17.752
1.13	+17.701
1.17	+17.650
1.20	+17.599
1.23	+17.549
1.27	+17.507
1.30	+17.456
1.33	+17.414
1.37	+17.371
1.40	+17.338
1.43	+17.295
1.47	+17.261
1.50	+17.228
1.53	+17.194
1.57	+17.152
1.60	+17.126
1.63	+17.092
1.67	+17.067
1.70	+17.033
1.73	+17.008
1.77	+16.983
1.80	+16.957
1.83	+16.932
1.87	+16.907
1.90	+16.881
1.93	+16.856
1.97	+16.831

Step 2
Interval 00:00:06
Readings 30

Time	Chnl 1
2.07	+16.763
2.17	+16.712
2.27	+16.662
2.37	+16.611
2.47	+16.569
2.57	+16.535
2.67	+16.493
2.77	+16.467
2.87	+16.433
2.97	+16.408
3.07	+16.383
3.17	+16.357
3.27	+16.341
3.37	+16.315
3.47	+16.298
3.57	+16.281
3.67	+16.264
3.77	+16.248
3.87	+16.239
3.97	+16.231
4.07	+16.214
4.17	+16.205
4.27	+16.197
4.37	+16.188
4.47	+16.180
4.57	+16.172
4.67	+16.163
4.77	+16.163
4.87	+16.155
4.97	+16.146

Step 3
Interval 00:00:10
Readings 30

Time	Chnl 1
5.13	+16.138
5.30	+16.138

Camp Lejeune Landfill Site "S"
Monitor Well MW-8 Slug Test

S/N 3DEE-03A -3132 Block 1

Program: STEP TEST
Reacings: 100
Start Time:
Start Date: 0.166667
Range: 15 PSI
Channels: 1
Units: Ft

Step 1
Interval
Reacings 60

Time	Chnl	Time	Chnl
0	19.12	1.2	19.11
0.03	19.90	1.27	19.10
0.07	20.28	1.3	19.10
0.1	20.54	1.47	19.08
0.13	20.70	1.53	19.07
0.17	20.79	1.63	19.06
0.2	20.82	1.67	19.06
0.23	20.77	1.8	19.05
0.27	20.54	2.07	19.04
0.3	20.35	2.47	19.03
0.33	20.18	2.67	19.02
0.37	20.04	2.97	19.01
0.4	19.92	3.57	19.00
0.43	19.80	4.37	18.99
0.47	19.70	4.77	18.98
0.5	19.63	5.47	18.97
0.53	19.53	6.13	18.96
0.57	19.48	6.63	18.95
0.6	19.44		
0.63	19.39		
0.67	19.36		
0.7	19.32		
0.73	19.30		
0.77	19.27		
0.8	19.25		
0.83	19.23		
0.87	19.21		
0.9	19.20		
0.93	19.19		
0.97	19.17		
1	19.16		
1.03	19.15		
1.07	19.15		
1.1	19.14		
1.13	19.13		
1.17	19.12		

Camp Lejeune Landfill Site "G"
Monitor well MW-9
S/N 3DEE-03A-SN-3132 Block 1

Program: STEP TEST
Readings: 61
Start Time: 11:35:30
Start Date: 04/24
Range: 0015 PSI
Channels: 1
Units: Ft-H2O

Step 1
Interval 00:00:02
Readings 60

Time	Chnl 1
0.00	+16.332
0.03	+16.011
0.07	+15.741
0.10	+15.470
0.13	+15.183
0.17	+14.980
0.20	+14.769
0.23	+14.642
0.27	+14.465
0.30	+14.270
0.33	+14.110
0.37	+14.000
0.40	+13.924
0.43	+13.856
0.47	+13.780
0.50	+13.679
0.53	+13.620
0.57	+13.569
0.60	+13.502
0.63	+13.442
0.67	+13.392
0.70	+13.341
0.73	+13.299
0.77	+13.256
0.80	+13.223
0.83	+13.180
0.87	+13.155
0.90	+13.121
0.93	+13.096
0.97	+13.071
1.00	+13.045
1.03	+13.028
1.07	+13.011
1.10	+12.995
1.13	+12.978
1.17	+12.961
1.20	+12.944
1.23	+12.935
1.27	+12.919
1.30	+12.910
1.33	+12.902
1.37	+12.893
1.40	+12.885
1.43	+12.876
1.47	+12.868
1.50	+12.859
1.53	+12.859
1.57	+12.851
1.60	+12.851
1.63	+12.842
1.67	+12.842
1.70	+12.834
1.73	+12.834
1.77	+12.826
1.80	+12.826
1.83	+12.817
1.87	+12.817
1.90	+12.817
1.93	+12.817
1.97	+12.809

Step 2
Interval 00:00:06
Readings 30

Time	Chnl 1
2.07	+12.800
2.17	+12.800
2.27	+12.792
2.37	+12.792
2.47	+12.783
2.57	+12.783
2.67	+12.783
2.77	+12.775
2.87	+12.775
2.97	+12.775
3.07	+12.766
3.17	+12.766
3.27	+12.766
3.37	+12.766
3.47	+12.766
3.57	+12.758
3.67	+12.758
3.77	+12.758
3.87	+12.766
3.97	+12.766
4.07	+12.766

Camp Lejeune Landfill Site "G"
Monitor Well 6-GW-2 Slug Test

S/N SDEE-03A Block 1

Program: STEP
Readings: 105
Start Time:
Start Date:
Range: 15
Channels: 1
Units: Ft

Step 1

Time	Chnl	Time	Chnl
0	14.35	0.87	14.51
0.03	14.36	0.9	14.51
0.07	14.48	0.93	14.50
0.1	14.62	0.97	14.49
0.13	14.72	1.03	14.48
0.17	14.79	1.1	14.47
0.2	14.80	2.27	14.46
0.23	14.83	2.37	14.45
0.27	14.84	2.47	14.44
0.3	14.83	2.57	14.43
0.33	14.82	2.67	14.42
0.37	14.80	2.77	14.41
0.4	14.77	3.07	14.40
0.43	14.74	3.27	14.39
0.47	14.71	3.37	14.38
0.5	14.68	3.67	14.37
0.53	14.65	3.77	14.36
0.57	14.64	3.97	14.35
0.6	14.61	4.47	14.34
0.63	14.59	4.57	14.33
0.67	14.58	4.77	14.32
0.7	14.57	6.3	14.31
0.73	14.56	6.63	14.30
0.77	14.55		
0.8	14.54		
0.83	14.52		

Hazen Method to estimate hydraulic Conductivity from Grain Size Information. Reference: Fetter, C.W. Applied Hydrogeology, 1988 pg. 81

The hydraulic conductivity of sandy sediments can be estimated from the grain size distribution by the Hazen Method. The method is applicable to sands where the effective grain size (D_{10}) is between approximately 0.1 mm and 3.0 mm. The Hazen approximation is:

$$K = C(D_{10})^2$$

Where
K is hydraulic conductivity in cm/sec
D_{10} is the effective grain size in cm.
C is a coefficient (40 to 80 for fine Sand)

From Table

D_{10} range = .0004 mm to .14 mm = .00004 to .014 mm
D_{10} average = .052 mm = .0052 cm

Low Value $K = 6.4 \times 10^{-8}$
High Value $K = 7.8 \times 10^{-3}$ to 1.6×10^{-2}
Mean Value $K = 1.08 \times 10^{-3}$ to 2.1×10^{-3}, use average = 1.6×10^{-3} cm/

COMPARISON OF THE MEAN VALUES TO LAB DATA

SAMPLE LOCATION	LABORATORY (K) cm/sec	HAZEN METHOD (K) cm/sec	DEGREE OF CORRELATION
MW-4	1.5×10^{-3}	1.6×10^{-3}	GOOD
MW-5	3.0×10^{-4}		FAIR
MW-7	1.4×10^{-4}		GOOD
MW-9	6.0×10^{-4}		FAIR
B-8	1.9×10^{-3}		GOOD
B-9	3.4×10^{-3}		FAIR