03.12-05/31/95-01540

APPENDIX A
SITE SUMMARY REPORT (ESE, 1990)

SITE SUMMARY REPORT
FINAL

MARINE CORPS BASE
Camp Lejeune, North Carolina

Contract No. N62470-83-B-6101

Prepared For:

Naval Facilities Engineering Command
Atlantic Division

Prepared By:

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
Plymouth Meeting, Pennsylvania

ESE PROJECT NO. 49-02036

September 1990

3.10 SITE 35 - CAMP GEIGER AREA FUEL FARM

3.10.1 SITE BACKGROUND

Camp Geiger Area Fuel Farm (Figure 35-1) is located north of the intersection of G and Fourth Streets, approximately 400 feet southwest of Brinson Creek (PWDM Coordinates 12, C11). This 2,500 square feet AOC was used in 1957 and 1958 for storing and pumping fuel. Mogas was released to the soil through a leak in an underground line near an above-ground storage tank and tank pad. The Camp Lejeune Fire Department has estimated the amount of fuel released to be in the thousands of gallons. Exact quantities released can not be determined since the records were destroyed. The spill migrated east and northeast towards and into Brinson Creek. Fuel at the surface of the shallow aquifer was disposed of by digging holes to the water table and igniting the fuel. Fuel which contaminated Brinson Creek was also ignited and burned.

Site 35 is underlain by layers of silty sand with interbedded layers of clayey sand, coarse sand, and sandy gravel. A geologic cross section of Site 35 is presented in Figure 35-2. The cross section is drawn on an east-west line (Figure 35-3). The surface of the shallow groundwater lies within the interbedded silty sand and clayey sand at depths ranging from 7.02 to 11.05 feet below land surface. The groundwater contour map presented in Figure 35-4 indicates that the shallow groundwater flows to the northeast toward Brinson Creek with a gradient of approximately 0.014 ft/ft.

3.10.2 SITE INVESTIGATION

GROUNDWATER

Three hand-augered borings to the groundwater surface were dug at the downgradient side of the facility in 1984 and three groundwater samples were collected (35GW1, 35GW2, and 35GW3). The samples were analyzed for lead, O&G, and VOCs. Appendix A lists the individual target analytes and their abbreviations. Table 35-1 presents the analytical results for those analytes that were above the appropriate method detection limits. Levels of lead (above N.C. Groundwater Standards) were identified in all three samples which indicates that the shallow groundwater was contaminated from the release of fuel into the soils. The VOC components of the fuel were not detected.

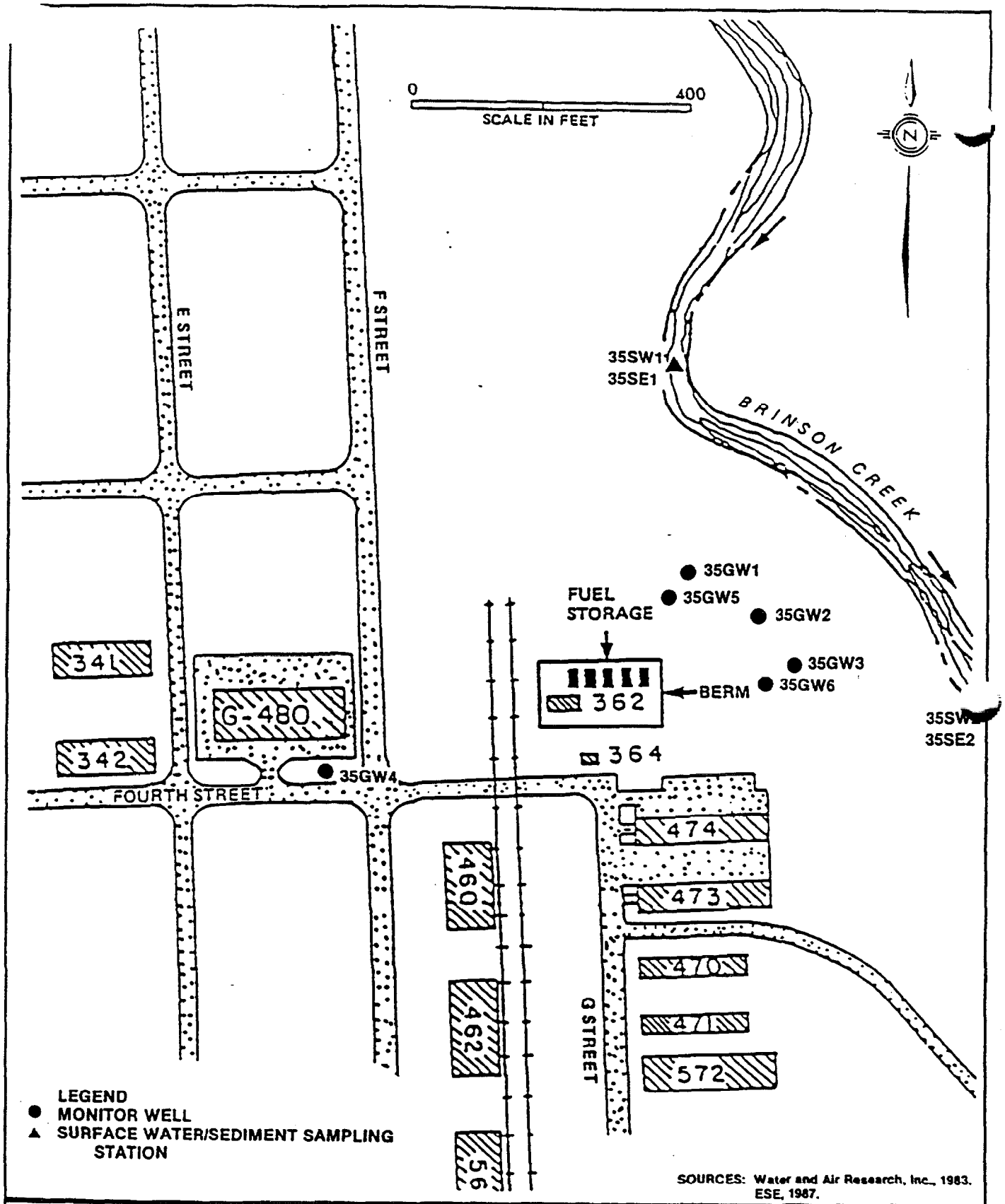

Figure 35-1
SAMPLING LOCATIONS, SITE 35—
CAMP GEIGER AREA FUEL FARM

MARINE CORPS BASE
CAMP LEJEUNE

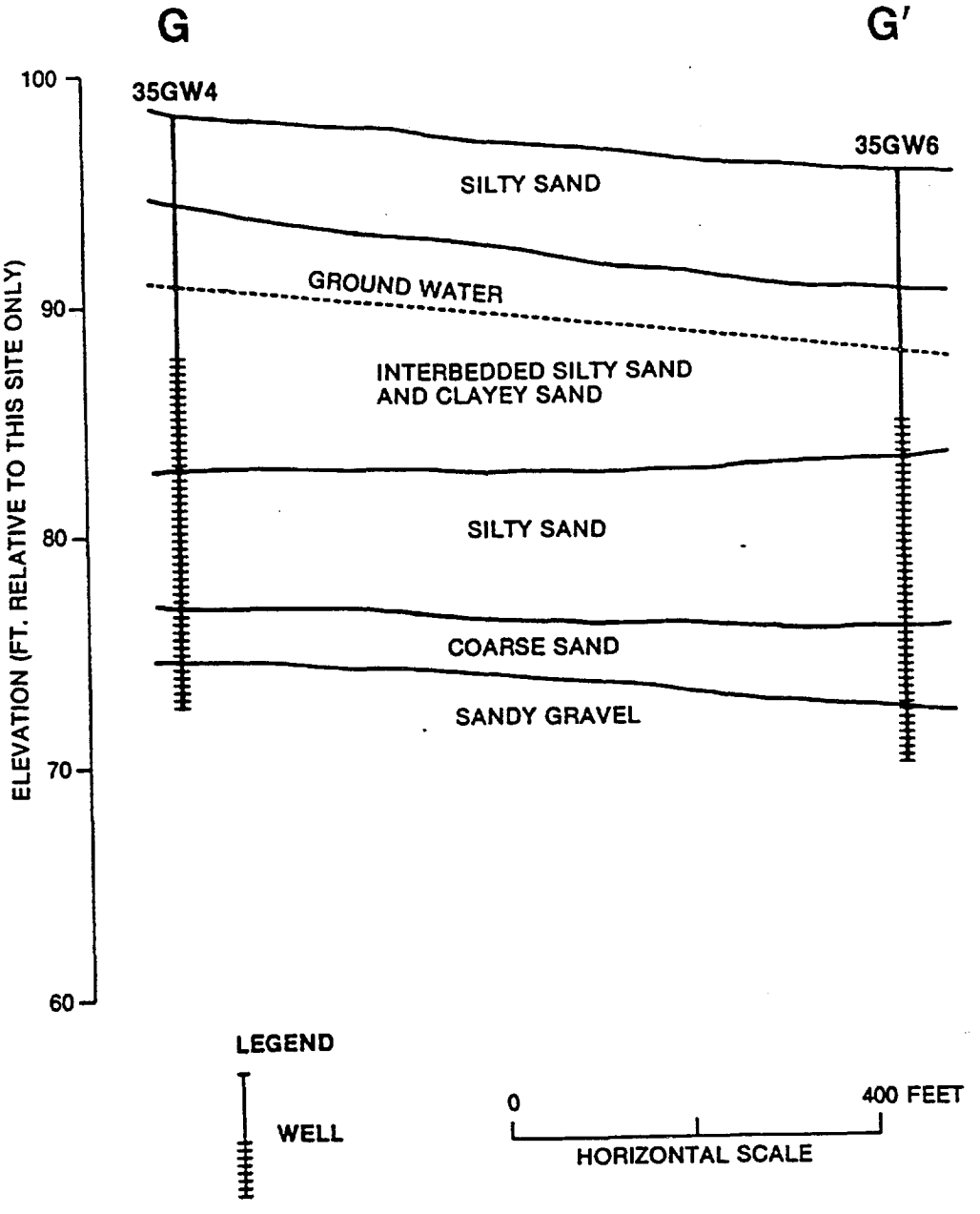

Figure 35-2
GEOLOGIC CROSS SECTION, SITE 35—
CAMP GEIGER AREA FUEL FARM

MARINE CORPS BASE
CAMP LEJEUNE

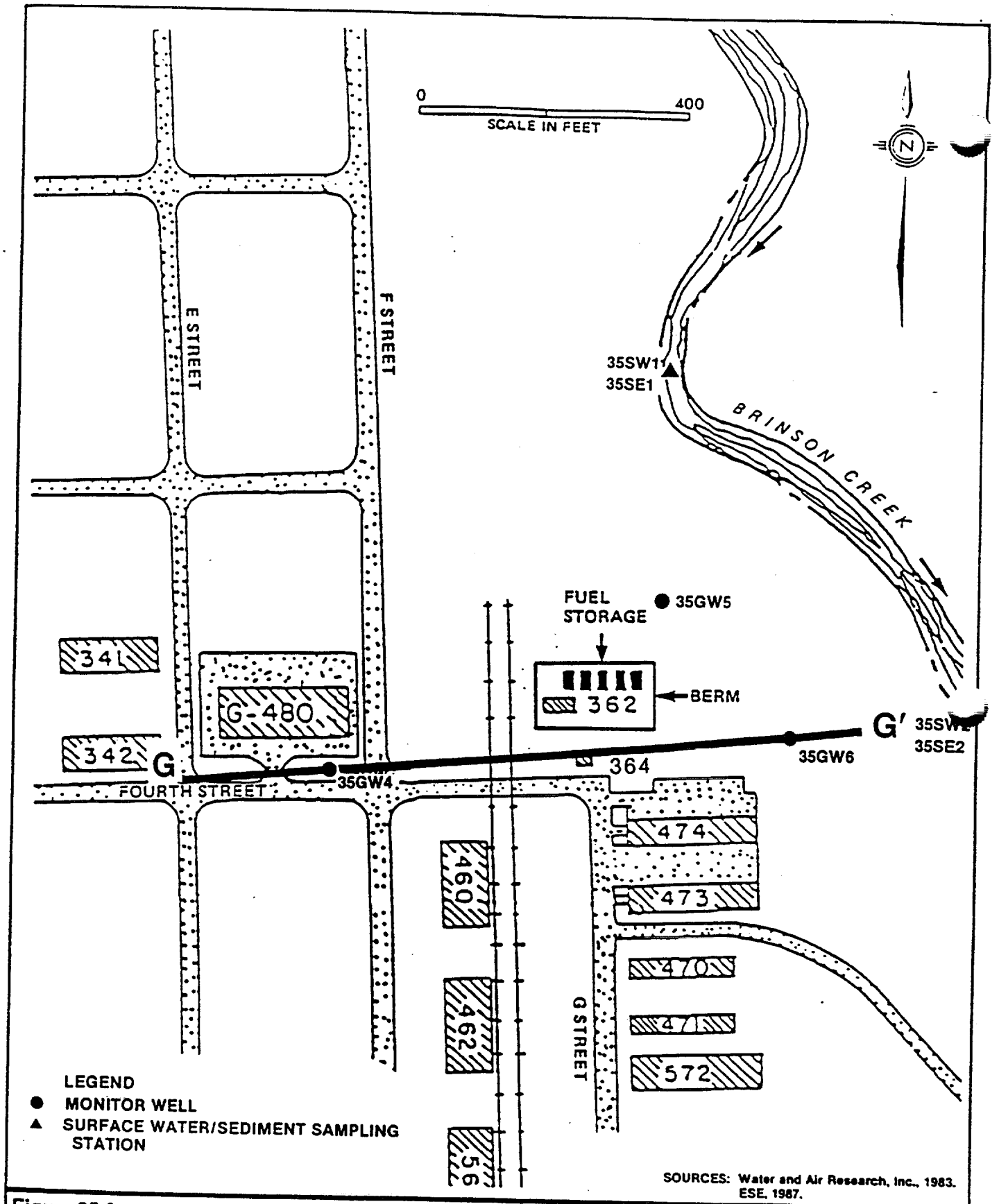

Figure 35-3
GEOLOGIC CROSS SECTION LOCATION, SITE 35—CAMP GEIGER AREA FUEL FARM

MARINE CORPS BASE
CAMP LEJEUNE

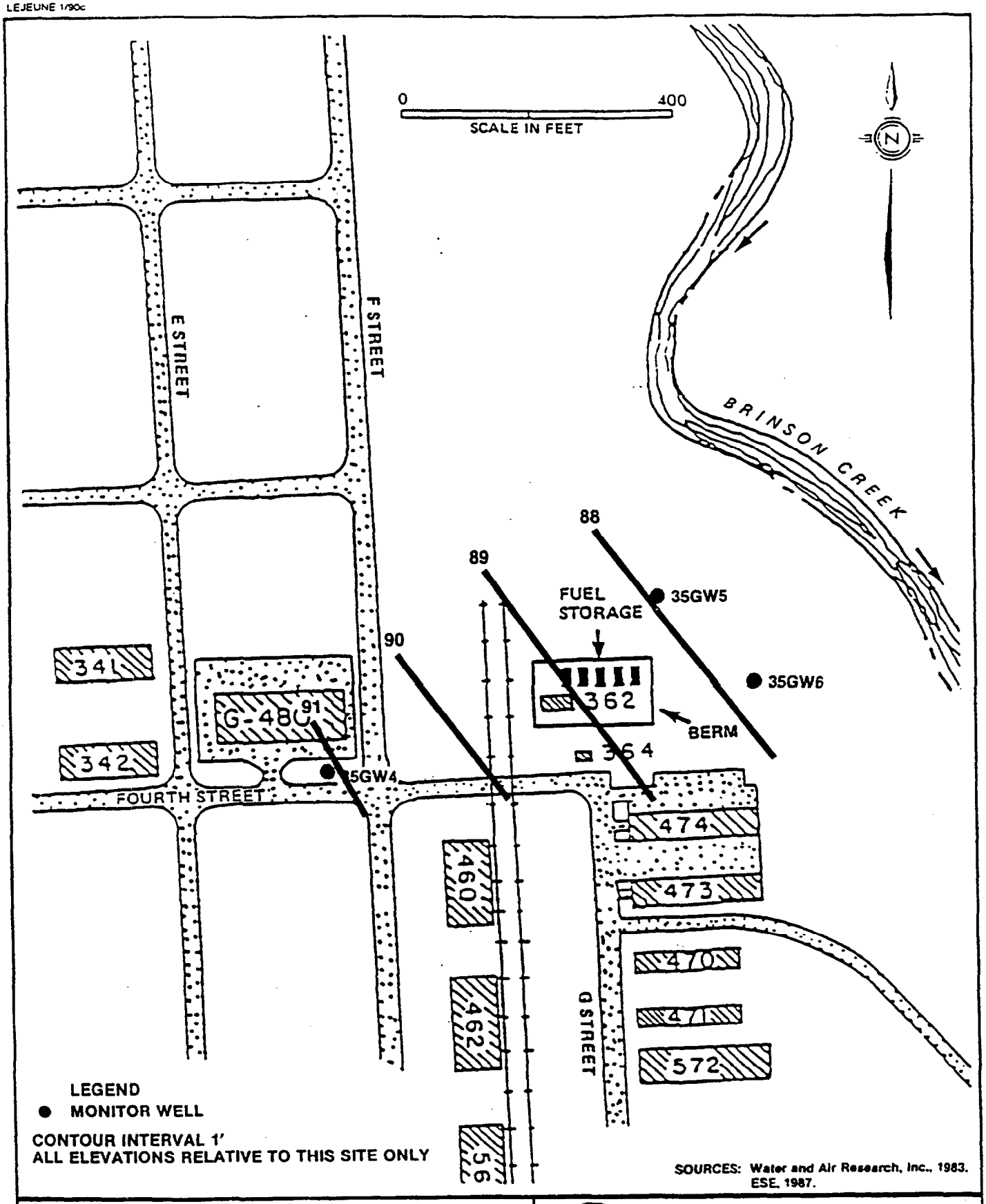

Figure 35-4
GROUND WATER CONTOUR MAP—
SHALLOW AQUIFER, SITE 35—
CAMP GEIGER AREA FUEL FARM

MARINE CORPS BASE
CAMP LEJEUNE

TABLE 35-1. SITE 35 - CAMP GEIGER AREA FUEL FARM
DETECTED TARGET ANALYTES
GROUND WATER SAMPLES

	NC GW	35GW1	35GW2	35GW3	35GW4	35GW4	35GW5	35GW5	35GW6	35GW6
DATE	STANDARDS	8/7/84	8/6/84	8/7/84	12/4/86	3/6/87	12/4/86	3/6/87	12/4/86	3/6/87
PARAMETER										
BENZENE	1	<0.2	<0.2	<0.2	<1	<1	30	17	<1	1.3
T-1,2-DICHLORO										
ETHENE	70	<0.7	<0.7	<0.7	<1.6	3.2	<1.6	<1.6	28	29
TRICHLOROETHENE	NONE	<0.8	<0.9	<0.9	<1.0	<3	<1.0	<3	11	11
METHYLENE CHLORIDE	5	4	<0.7	<0.7	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
LEAD		1063	1102	3659	<27	<27	33	<27	<27	<27
OIL & GREASE	NONE	<1000	46000	<1000	200	12000	2000	2000	200	1000

Values reported are concentrations in micrograms per liter (ug/L); this approximates parts per billion (ppb).

Source: ESE, 1990.

Three permanent groundwater monitoring wells were installed in 1986 to allow for more representative samples of the groundwater (Figure 35-1). Well 35GW4 was installed upgradient of the spill area and Wells 35GW5 and 35GW6 were installed downgradient. The groundwater samples taken from these wells were analyzed for lead, O&G, and VOCs, as well as xylene and ethylene dibromide (EDB). Table 35-1 presents the analytical results of the December 1986 and March 1987 sampling efforts. In the upgradient well (35GW4), no analytes were detected except for O&G in 1986. In 1987, O&G and trans-1,2-dichloroethene were detected. The source of these two analytes in the upgradient well is not clearly defined in the current database.

Wells 35GW5 and 35GW6 were found to contain sporadic distributions of fuel-derived compounds and VOCs. Benzene, lead and O&G were detected in Well 35GW5, which is located northeast of the tanks. This suggests that the detected analytes are a result of the recorded fuel spillage at the site. Well 35GW6 is located east of the tanks and was found to contain O&G, trans-1,2-dichloroethene, trichloroethene and benzene. The presence of VOCs in this well suggests that widespread low level contamination of the shallow aquifer may be present as a result of the fuel release or other as yet unidentified sources. Well 35GW6 is in a generally cross gradient position of the tanks and is located approximately 200 feet downgradient of an automobile maintenance (hobby) shop. Due to the distance of the well from the tanks, VOCs in the recorded fuel release may not be a sole contributor to VOCs in the groundwater at Well 35GW6. The automobile maintenance shop represents a potential source of waste solvents detected in this well.

SOILS

Three soil samples were analyzed from the three hand-augered borings in 1984. Lead and O&G were detected in all three samples. The analytical results are listed below.

	Concentration (ug/g)		
Parameter	35GW1	35GW2	35GW3
Lead	8	6	6
Oil and grease	67	2200	40

SURFACE WATER

Two surface water samples were collected from Brinson Creek in 1986, one upstream and one downstream of the site (Figure 35-1). These samples were analyzed for lead, O&G, and ethylene dibromide. No target analytes were detected in either sample.

SEDIMENT

Two sediment samples from Brinson Creek were taken in 1986 at the same locations as the surface water samples. These samples were analyzed for lead, O&G, and ethylene dibromide. Both sediment samples were found to contain lead and O&G, suggesting that episodic contamination of the creek has occurred or is occurring. Levels of both these analytes were higher in the upstream sample, suggesting that the discharge of contaminated groundwater to the creek is occurring at the far northern section of site and that the sample was not taken far enough upstream to truly represent upstream conditions. Another possibility is that the source of O&G and lead may be located upstream of Site 35.

3.10.3 SUMMARY AND CONCLUSIONS

The 1986/87 analytical data indicate that widespread contamination of the shallow aquifer with fuel derived contaminants and VOCs may exist at Site 35. The migration mechanisms by which contaminants have migrated to the upgradient well have not been identified. However, due to the nature of hydrocarbon fuel, a spill would tend to widely disperse on the surface of

groundwater in a sandy medium. This would explain the concentrations of fuel related compounds in Well 35GW4. A second separate source of observed contaminants may be present at the automobile maintenance shop located upgradient of Well 35GW6.

The groundwater contour map (Figure 35-4) indicates that groundwater flow is towards Brinson Creek. Surface water samples contained no detectable target analytes. Sediment samples, however, contained lead and O&G. Because at the time of the fuel release to the environment, fuel reached the creek, it can be assumed that contaminants may be currently discharging to the creek via the groundwater.

3.10.4 RECOMMENDATIONS

The work efforts to date at this AOC have identified the presence of fuel derived contamination in the soils, shallow groundwater, surface water, and sediments. Further investigations should be designed to determine the extent (horizontal and vertical) of the contamination within the soils and groundwater and within Brinson Creek. In addition, investigation of the adjacent automobile hobby shop should be initiated to determine if that facility is a source of VOC contamination. A Risk Assessment should be conducted upon completion of the environmental characterization.

APPENDIX B
COMPREHENSIVE SITE ASSESSMENT REPORT (LAW, 1992)

FINAL REPORT
UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

VOLUME I

CAMP GEIGER FUEL FARM
MARINE CORPS BASE

CAMP LEJEUNE, NORTH CAROLINA

February 8, 1992

Law Engineering Job No. J47590-6014

Law Engineering, Inc.
Raleigh, North Carolina

LAW ENGINEERING

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LAW ENGINEERING

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1.0 INTRODUCTION

1.1 Purpose of Investigation

On September 29, 1990, the Commander of the Atlantic Division Naval Facilities Engineering Command (LANTDIV) in Norfolk, Virginia, contracted with Law Companies Group, Inc. to perform a Comprehensive Site Assessment (CSA) at the Camp Geiger Fuel Farm, Marine Corps Base (MCB), Camp Lejeune, North Carolina (Drawing 1.1). The purpose of the investigation was 1) to identify the presence, magnitude and extent of possible free-product accumulation and ground-water contamination and 2) to assess potential exposure to subsurface contaminants resulting from the release(s) of petroleum fuels. As stated in the CSA Workplan contained in Appendix A, the objective of the investigation was to provide sufficient data to meet the requirements of Sections 280.63 and 280.65 of 40 CFR Part 280, Federal Technical Standards for Underground Storage Tanks. This data should also be sufficient to meet the requirements of Sections .0704 and .0706 of Title 15A, Chapter 2, Subchapter 2N, North Carolina Criteria and Standards Applicable to Underground Storage Tanks.

1.2 Scope of Work

Authorization to proceed with the investigation was granted by the Commander of LANTDIV of Norfolk, Virginia, via Contract/Purchase Order No. N62470-90-D-7625/0002 dated September 29, 1990.

As outlined in the contract and the CSA Workplan, the Scope of Work included preparation of a health and safety plan, collection of ground-water samples using the Hydropunch ground-water sampling system, performance of a soil-gas survey and tracer testing of the underground fuel lines, excavation of soil borings, installation of monitoring wells, collection and analysis of soil and ground-water samples, performance of a preliminary exposure assessment, performance of a preliminary evaluation of remedial alternatives, preparation of a final report of investigation and presentation of data and conclusions. Specific methods employed during performance of the project activities are described within the appropriate sections of this report.

1.3 Previous Investigations

A leaking underground line was reportedly discovered at the Camp Geiger Fuel Farm (Fuel Farm) in 1957-58. Law Engineering could not locate written documentation of

this incident, but found reference to it in a report by Environmental Science & Engineering (ESE) of Plymouth Meeting, Pennsylvania (1990). This report stated that the Camp Lejeune Fire Department estimated that thousands of gallons of fuel was released; the records documenting the exact quantities of the spill have been destroyed. The spill migrated to the east and northeast into Brinson Creek. Gasoline at the top of the surficial aquifer was exposed by digging trenches; the fuel was then ignited and burned. Fuel which reached Brinson Creek was also ignited and burned. Mr. Ron Waters of Direct Support Stock Control of the Logistics Department at Camp Geiger, who has been employed at Camp Geiger for 35 years, stated that a fireman from the Camp Geiger Fire Department had told him that the leak occurred when a dispensing pump was damaged. He was also told that the Fire Chief had to wade through the spilled product to turn off the valve to the pump.

MCB Camp Lejeune is listed on the National Priority List (NPL) and Wastelan Preremedial Report, both of which are compiled by the Environmental Protection Agency (EPA) and monitored by the Division of Solid Waste Management of the North Carolina Department of Environment, Health and Natural Resources. MCB Camp Lejeune was placed on the NPL in 1983, after Water and Air Research, Inc. of Gainesville, Florida performed an Initial Assessment Study of 76 potentially-contaminated sites at the base. Water and Air Research identified 21 of these sites

as warranting further investigation. Camp Geiger Fuel Farm is one of the 21 sites recommended for further investigation. A twenty-second site at Camp Lejeune was later added to this list.

ESE performed Confirmation Studies of the 22 sites requiring further investigation and performed the Fuel Farm study between 1984 and 1987 (ESE, 1990). During this study, ESE advanced three hand-auger borings, collected ground-water and soil samples from each and documented ground water contaminated with lead and soil contaminated with lead, oil and grease. In 1986, ESE collected sediment and surface-water samples from Brinson Creek and installed three monitoring wells, two east of and one west of the Fuel Farm. These wells were sampled after installation and again in 1987. Laboratory analysis did not reveal surface-water contamination, but did document lead, oil and grease in the sediment and soil samples. Ground water from both the upgradient and downgradient wells was found to be contaminated with volatile organic compounds. ESE could not identify a source for the contamination documented in the upgradient well. ESE identified two possible sources for the contamination in the downgradient wells. The first was the fuel spill which occurred at the fuel farm in the 1950's and the second was an automotive maintenance shop located southeast to the Fuel Farm, in Building No. TC-474.

NUS Corporation performed an investigation in the area north of the Fuel Farm in 1990. According to the NUS report (NUS, 1990), fuel was observed in a stormwater drainage ditch. Base personnel constructed an earthen dam in the drainage ditch to contain the fuel and rerouted storm drainage to the south. NUS installed four monitoring wells, three in the vicinity of the ponded stormwater and one in an apparent upgradient position. Results of laboratory tests performed by NUS revealed that ground water in one well and soil from the cuttings of two soil borings in the vicinity of this drainage ditch were contaminated with petroleum-fuel constituents. No free-phase petroleum hydrocarbons (free product) were reportedly observed in the wells. Ms. Amy Hubbard, project manager of the investigation for NUS, stated that NUS personnel did not observe any free product over the 8-week period of their investigation. Ms. Hubbard stated that she believes that the contamination resulted from a one-time surface release of product. Ms. Stephanie del Re-Johnson of the Installation/Restoration Division of the Environmental Management Department (EMD) at Camp Lejeune stated that she had observed a 5-foot thickness of free product on the surface of the ponded water. NUS determined from the four monitoring wells that the local direction of ground-water flow was to the northeast.

During their investigation, NUS also conducted a geophysical survey in an attempt to determine if underground storage tanks (USTs) remained at the site of the former

gasoline station. This gasoline station was located west of the Fuel Farm and south of the headwaters of the drainage ditch in which the fuel was discovered. From the data acquired during this geophysical survey, NUS identified an anomaly to the north of the foundation of the gasoline station.

In addition to the ESE and NUS assessments, the United States Geological Survey (USGS) performed an investigation at MCB Camp Lejeune (Harned et al, 1989). This study is referenced fully in Section 8.0 of this report and includes discussions of the hydrology and hydrogeology of Camp Lejeune.

2.0 DESCRIPTION OF SITE

2.1 Area of Investigation

The Camp Geiger Fuel Farm is located on the north side of Fourth Street at its intersection with G Street at Camp Geiger, Camp Lejeune MCB, Onslow County, North Carolina (Drawing 1.1). The site is situated entirely within the confines of Camp Geiger. The study area is bounded on the west by D Street, on the north by Second Street, on the east by Brinson Creek, and on the south by Building No. TC-474

(Drawing 2.1). Mr. Tom Morris of the Installation/Restoration Division of the EMD and Mr. John Starcalla of the Public Works Department at Camp Lejeune provided numerous site drawings showing the locations of underground utilities and aboveground structures. We have included a list of these drawings in Table 2.1.

2.2 History and Operations of the Site

2.2.1 History of the Site

Construction of Camp Lejeune began in 1941. Construction of Camp Geiger was completed in 1945. We have not been able to identify when Camp Geiger Fuel Farm was constructed, although we have reviewed a site plan for the Fuel Farm which is dated July 17, 1941 (Y. and D. Drawing No. 161783). When constructed, the tanks at the Fuel Farm were used for the storage of No. 6 fuel oil. The tanks were converted for storage of other petroleum products when No. 6 fuel was no longer needed. Law Engineering could not determine when this conversion occurred.

Law Engineering has identified three sites in the study area which once were the sites of structures which have since been demolished. The first site is an ice house, which was located adjacent to the railroad spur on the west side of the Fuel Farm. The ice

house was supplied with ice brought to the site by train. Mr. Morris provided drawings of the ice house (Building No. TC-360, Y. & D. Drawing Nos. 161813 and 161814, dated June 26, 1941). The site drawing does not show underground utilities other than water and water drains. We cannot determine when the ice house was demolished. The foundation and pilings which supported the ice house remain at the site.

The second site is a "filling" (gasoline) station, which was located on the northeast corner of the intersection of F and Fourth Streets, adjacent to the ice-house site. Mr. Morris provided a site drawing of the building which had occupied the site (Building No. 341, P.W. Drawing No. 2816, dated November 12, 1947) but could not locate a site plan showing the location of the storage tanks, distribution lines and dispensing pumps. We cannot determine when the filling station was demolished. The foundation to the filling station remains at the site.

The third site is a mess hall, with an associated boiler and underground storage tank (UST), which was located adjacent to D Street, between Third and Fourth Streets. Mr. Morris provided a drawing (Y. and D. Drawing No. 161873) showing the location of an underground fuel distribution line, which extended from the Fuel Farm to the UST, and the approximate location of the UST. Mr. Morris stated that this UST stored

No. 6 fuel oil when the boiler was in operation. We cannot determine when the mess hall was demolished, although Mr. Morris stated that he believed this occurred in the 1960's.

In Building No. TC-474, south of the Fuel Farm, Law Engineering understands that automotive maintenance was performed until approximately 4 years ago. Although this building is outside of the study area, activities undertaken there may have had an environmental impact on the area around the Fuel Farm.

Mr. Anthony Koonce, civilian-in-charge of fuel dispensing at the fuel farm, discussed with Law Engineering an incident which occurred approximately 4 years ago. Mr. Koonce stated that daily inventory-control records at the Fuel Farm were out of balance by approximately 30 gallons per day. After review, this imbalance was attributed to a leak in the gasoline line which carried gasoline from the pump house to the dispensing island. This line was sealed off at both ends and replaced by a line which runs along the eastern side of the Fuel Farm. A subsurface investigation was not undertaken at the time of the possible release to document soil or ground-water contamination which may have resulted from this leak.

Law Engineering identified a UST located behind and adjacent to Building TC-480 which was installed in 1976. This UST has a capacity of 550 gallons and contains #2 fuel oil, which is used to heat Building TC-480.

2.2.2 Operations of the Site

The Fuel Farm contains aboveground storage tanks (ASTs) which are used to dispense gasoline, diesel and kerosene to government vehicles and to supply USTs in use at Camp Geiger and the Air Station. These ASTs are refilled by trucks which are operated by commercial carrier and which deliver product to fill ports at the southern end of the storage facility. The operation of the Fuel Farm is supervised by two attendants who operate the facility from a small building (Building No. TC-364, Drawing 2.2) at the southern end of the Fuel Farm. There are five ASTs at the Fuel Farm:

- two diesel fuel ASTs, each with a capacity of 15,000 gallons,
- two unleaded gasoline ASTs, each with a capacity of 15,000 gallons, and

- one kerosene AST with a capacity of 15,000 gallons.

According to the site drawing referenced in Section 2.2.1, the initial tanks were placed in service in the early 1940's. Mr. Waters stated that the original tanks have never been replaced.

There are six underground lines used to distribute fuel within the fuel farm (Drawing 2.3). These are:

- an unleaded gasoline line approximately 70 feet long which connects the fill port and pump house;

- an unleaded gasoline line approximately 140 feet long which connects the pump house and vehicle dispensing pump;

- a diesel line approximately 70 feet long which connects the fill port and pump house;

- a diesel line approximately 120 feet long which connects the pump house and both the overhead dispensing pump and the vehicle-dispensing pump on the pump island;

- a kerosene line approximately 80 feet long which connects the fill port and pump house; and

- a kerosene line approximately 110 feet long which connects the pump house and the overhead dispensing pump.

The underground lines now in place are those originally installed, with the exception of the recently-installed gasoline line referenced in Section 2.2.1. Mr. Koonce stated that their standard operating procedures include performing daily inventory-control procedures.

There are also three underground lines at the Fuel Farm which are no longer used and which have been sealed off. These three abandoned lines are:

- a gasoline line approximately 60 feet long which connected an abandoned fill port and the pump house;

- a diesel line approximately 20 feet long which connected an abandoned fill port and the pump house; and
- a gasoline line approximately 120 feet long which connected the pump house and pump island.

Law Engineering has found evidence that there also may be one additional line connecting the Fuel Farm and an underground storage tank (UST). The path of this line is shown on Drawing No. 2.4. As indicated in Section 2.2.1, this line carried No. 6 fuel oil from the Fuel Farm to a UST which may still be located at the site of a former mess hall. Law Engineering could not determine if this line was removed when the UST was abandoned.

2.3 Inventory of Contaminant Sources

USTs identified in and around the Fuel Farm are listed in Table 2.2. The location of USTs with respect to the site are presented in Drawing 2.5. Please note that Table 2.2 includes only those tanks that have been identified during the course of this investigation. The possibility remains, however, that other unidentified USTs are present near or were in the past located near the Camp Geiger Fuel Farm.

In addition to the USTs listed in Table 2.2, nine active and inactive product transmission lines are or have been located in the study area, as identified in Section 2.2.2. These product lines are also presented in Drawing 2.5.

2.4 Inventory of Water Wells

As part of our survey to identify potential receptors of ground-water contaminants, Law Engineering performed a survey of drinking-water wells in the vicinity of Camp Geiger Fuel Farm by reviewing USGS Report 89-4096 and through discussions with Mr. Morris. This report shows the locations of drinking-water wells in Camp Geiger, all of which are located adjacent to A Street and over 2000 feet west of the Fuel Farm (Drawing 2.6). Our survey of wells targeted those located within one-half mile of the project site in order to provide an adequate area of coverage. A discussion of the results of the survey of potential receptors is provided in Section 6.0 of this report.

We have presented a summary of the well inventory in Table 2.3, which provides information on the well depth, casing diameter, well usage and the well's approximate distance from the Fuel Farm. Each of the wells identified was constructed as an open-hole wells in the Castle Hayne Aquifer. The Castle Hayne aquifer and the hydrogeology of the area are introduced and referenced in Section 3.0 of this report.

2.5 Survey of Underground Utilities

Subsurface utility trenches can often provide preferential pathways for migration of contaminants. Therefore, Law Engineering attempted to identify and locate subsurface utilities in the vicinity of Camp Geiger Fuel Farm. Mr. Morris provided plans and drawings showing the locations of subsurface utilities, the locations of which are shown in Drawings 2.7, 2.8 and 2.9. Typically, underground utility lines are buried 2 to 6 feet below land surface (bls). As previously indicated, underground fuel transmission lines are exhibited in Drawing 2.5.

3.0 SITE HYDROGEOLOGIC CHARACTERIZATION

3.1 Site Topography

As indicated by the Jacksonville South, N.C. topographic quadrangle, published by the United States Geological Survey in 1952 and photorevised in 1971 (Drawing 1.1), the elevation of land surface in the vicinity of Camp Geiger Fuel Farm generally ranges from 3 to 17 feet above mean sea level (msl) and the land surface slopes toward the northeast. Most of the study area is not serviced by storm sewers, and runoff

generally travels by sheet flow before entering natural drainage ditches which discharge into Brinson Creek, to the east and northeast of the study area.

3.2 Regional Geology/Hydrogeology

The study area is located within the Lower Coastal Plain Soil System (Wiscomico and Talbot System) and the Coastal Plain/Castle Hayne Limestone hydrologic area. A brief summary of the geologic/hydrogeologic setting at the Camp Geiger Fuel Farm is provided in Section 2.2 of the CSA Workplan (Appendix A). In general, downward movement of ground water is obstructed by the presence of clay layers in Coastal Plain formations and consequently most of the ground-water recharge migrates laterally toward discharge areas through the surficial aquifer (Heath, 1980). Further details of regional geologic/hydrogeologic characteristics are provided in the USGS Water-Resources Investigation previously cited (Harned 1989).

3.3 Site Soils and Geology

Law Engineering performed field activities on August 15-30, 1991, which consisted of the following:

- Advancing 18 soil borings, which were subsequently used for the installation of monitoring wells;

- Advancing 5 soil borings to check for the presence of soil contamination;

- Advancing 3 stratigraphic borings to determine the geology of the subsurface in the study area; and

- Advancing 9 shallow hand-auger borings to check for the presence of soil contamination in suspect areas.

The locations of these borings are shown on Drawing 3.1. We were unable to complete boring B-3 as planned. We attempted this boring six times and each time encountered auger refusal due to steel reinforcing wire in the concrete pad or unidentified obstructions just below the pad.

Law Engineering accomplished all drilling using hollow-stem augers and techniques described in ASTM D-1452. We steam-cleaned our down-hole drilling equipment prior to work at each drilling location. We used augers with an inside diameter of either

3.25 or 3.75 inches for the drilling of a "pilot" hole and for the collection of soil samples. After completing the "pilot" hole, we reentered each monitoring-well borehole using augers with an inside diameter of 8.25 inches to allow the placement of two sets of PVC pipe in the well. We grouted to land surface those soil borings not used for the installation of monitoring wells.

Site geologists collected soil samples from each of the soil borings for field classification, headspace testing and chemical testing. We generally obtained soil samples for field classification at depths of 0 to 1.5 feet, 1.5 to 3 feet, 3 to 4.5 feet and on 5-foot centers thereafter to boring termination. We collected these soil samples with a split-spoon sampler 24 inches long and with an inside diameter of 1.375 inches (outside diameter of 2 inches). We obtained each soil sample by repeatedly allowing a 140-pound hammer to fall free for 30 inches, until the sampler was driven 18 inches into the substrate. We performed split-spoon sampling in general accordance with ASTM D-1586 and recorded on the field boring log the number of blows required to drive the sampler each 6-inch increment. After donning laboratory-grade gloves, we placed representative portions of each sample in two, pre-labeled plastic bags and sealed each bag for subsequent headspace testing.

Site geologists examined in the field the soil collected at each interval using visual/manual techniques described in ASTM D-2487 and ASTM D-2488 and classified the soil in general accordance with the United Soil Classification System. We have included a record of each test boring in Appendix B.

The soil and stratigraphic borings penetrated three distinctive units. The first unit is a fine- to medium-grained, unconsolidated sand. The thickness of this unit ranges from 15 to 30 feet. Law Engineering selected two samples of this unit to be analyzed for grain-size distribution, the results of which are presented in Appendix C. We performed these analyses on samples from MW-23, collected from a depth of 8.5 to 10.5 feet, and from MW-24, collected from a depth of 13.5 to 15.5 feet. These analyses revealed that the samples generally contain 96% sand and 4% silt and clay.

The second unit is a oolitic, fossiliferous limestone which ranges in thickness from 6.5 to 20 feet. The fossils consist of fragments of mollusks; the matrix consists of fine-grained sand, fine-grained phosphate grains and lime mud. Under the Folk classification (Blatt et al, 1972), this unit is a biosparite. Mr. Rick Shiver of the Wilmington Regional Office of the DEM stated that this unit is common in the Jacksonville area and is considered part of the unconfined, surficial aquifer. Law Engineering believes this unit is the River Bend Formation.

The third unit is an unconsolidated, dark gray to black silty, clayey sand. Because this unit may be a confining unit separating the surficial and Castle Hayne aquifers, Law Engineering did not attempt to completely penetrate this clayey sand, and therefore, the thickness is not known. We sampled this unit in SB-1, SB-2, SB-3 and MW-19 and observed this unit up to 4 feet thick in SB-2. Law Engineering selected the sample of this unit from SB-1 to be analyzed for grain-size distribution, the results of which are presented in Appendix C. This analysis revealed that the sample contained 79% fine sand, 9% silt and 12% clay.

This clayey sand is probably the same described by Harned et al (1989) as one of many occurring in the surficial aquifer and the Castle Hayne. These units are reportedly not confining units in the Camp Lejeune area because the units are thin and discontinuous. This report noted, however, that the units appears to be thicker and more continuous in the northwestern part of Camp Lejeune, where the Fuel Farm is located. Law Engineering believes that this clayey sand acts as a confining unit in the study area due to its relatively high percentage of silt and clay. We believe that this unit separates the surficial aquifer from the underlying Castle Hayne aquifer.

Law Engineering developed two cross sections from soil-boring records in order to facilitate lithologic interpretation. The locations of these cross sections are exhibited

in Drawing 3.2; the cross sections are illustrated in Drawings 3.3 and 3.4. As shown in the cross sections, the stratigraphic units encountered within the surficial aquifer consist of the unconsolidated sand, lithified limestone (River Bend Formation) and clayey sand. Law Engineering believes that the upper contact of the River Bend Formation is not a planar surface and we expect its thickness to be highly variable. We observed this variability in SB-3 and MW-19. While only 240 feet apart, the thickness of the River Bend in SB-3 is 20 feet and the thickness in MW-19 is 6.5 feet.

3.4 Site Hydrogeology

Law Engineering installed a total of 18 ground-water monitoring wells, utilizing the materials and installation procedures described in the CSA Workplan. In order to monitor ground water at multiple depths and delineate the vertical extent of ground-water contamination at the Fuel Farm, we installed "paired" monitoring wells in 17 of 18 boreholes, each with a "shallow" screened interval and a "deep" screened interval. There is one well (MW-20) that is not paired; we encountered auger refusal with the large-diameter augers at the top of the River Bend Formation and therefore were not able to set a deep screen. Installing paired wells allowed us to sample the ground water at the water table and at depths of 10 to 20 feet below the water table, thus enabling us to investigate the vertical extent of contamination.

The specifications for each soil boring included decontaminating the drilling equipment and well construction materials with a pressurized steam-cleaning unit, emplacing a silica-sand filter pack and a bentonite seal above the filter pack, grouting the well above the bentonite seal with a cement/bentonite slurry, and developing the well through low-yield pumping. In Tables 3.1 and 3.2, we have listed the approximate volumes of water removed during well development and our observations of turbidity of the development water.

The wells constructed by Law Engineering are protected by a lockable, stick-up cover constructed of steel. This stick-up cover is embedded in a concrete pad and is protected by three steel bollards filled with concrete. Details for the installation of the monitoring wells are included in Appendix D.

During the period September 3-5, 1991, Law Engineering measured depths to ground water in all monitoring wells, the results of which are listed on the Monitoring-well Casing and Water-elevation Worksheets in Appendix E. Elevations of all measuring points were reviewed and certified by a Registered Land Surveyor; these points are also listed in these worksheets.

Based on ground-water elevations measured in the "shallow" monitoring well of each well pair and several of the pre-existing wells, we prepared a water-table contour map, from which we determined the direction of ground-water flow (Drawing 3.5). Ground water in the surficial aquifer generally flows across the project site to the east, towards Brinson Creek. As indicated by comparing water level elevations recorded on September 3, 1991 between "shallow" and "deep" screened intervals, ground water in the surficial aquifer generally moves laterally across the project site with no significant vertical gradient. However, we observed a slight vertical component of upward movement in MW-23 and MW-25, both of which are located near natural discharge points -- Brinson Creek and the intermittent streams which discharge into Brinson Creek. At these locations we would normally expect some upward component of ground-water flow as ground water seeks to discharge into surface drainage features. We did not use the ground-water elevations measured in EMW-6 and EMW-7 because these wells are screened below the water table and the elevations were inconsistent with measurements obtained from nearby wells. Likewise, we did not use the ground-water elevation measured in MW-24 because the measurement was so dissimilar from nearby wells. Law Engineering cannot determine the reason for this dissimilarity.

The rate or average linear velocity of ground-water movement across the project site is a function of the hydraulic conductivity (K) of the aquifer medium, the effective porosity (n) of the aquifer medium and the hydraulic gradient (dh/dl) that exists in the surficial aquifer. We calculated the hydraulic conductivity of the unconsolidated sands in the surficial aquifer at the study area based on results of previous studies performed on unconsolidated sands by F.D. Masch and K.J. Denny (in Freeze and Cherry, 1979). We used the data in the grain-size gradation curves (Appendix C) in these calculations for the samples from MW-23 and MW-24. Based on the results of the calculations, we expect the hydraulic conductivity of the unconsolidated sands within the surficial aquifer to be approximately 28 feet/day (Appendix C). Based on the recharge rate of the wells screened over this unit and a review of hydraulic conductivity estimates published by Freeze and Cherry (1979), we expect that the hydraulic conductivity of the River Bend is at least as great as that of the unconsolidated sand.

We calculated the average, linear velocity of ground-water flow in the unconsolidated sands within the surficial aquifer, using the computer program Water-Vel (1989). This program allows us to predict the general direction and average, linear velocity of ground-water flow based on three values: piezometric (water-table elevation) measurements, calculated value of hydraulic conductivity, and estimated values for effective porosity. Water-Vel calculations are based on Darcy's Law ($q = K\ [dh/dl]$)

and the relationship between Darcy velocity (q) and average, linear, velocity of ground water ($v = q/n$).

Using Water-Vel, we calculated a range of average, linear velocities of between 0.99 feet/day ($n = 25\%$) and 1.66 feet/day ($n = 15\%$) using values for effective porosity of 15% to 25% for fine sand, as estimated by Walton (1984). These calculations are included in Appendix F. The values for effective porosity are an estimate and are based on the predominant soil types encountered during construction of borings at the project site. Please note that this calculated velocity is an average velocity across the entire project site; the actual rate at a specific location at the site may be more or less than the rate calculated herein.

4.0 ASSESSMENT OF SUBSURFACE CONTAMINATION

4.1 Tracer Tight Leak Testing

Law Engineering subcontracted with Tracer Research Corporation of Tucson, Arizona to perform a tracer test of the underground fuel lines within the Fuel Farm, the report of which is included as Appendix G. This test was accomplished by adding a highly-volatile liquid tracer to the fuel in the fuel system and allowing approximately two

weeks for the tracer to become distributed throughout the system. On August 19, 1991, personnel from Tracer Research and Law Engineering installed 29 soil-gas probes along the underground fuel transmission lines at the fuel Farm (Drawing 4.1) to detect tracer gas that may have been released to the surrounding soil.

Tracer gas was not detected in samples collected by the probes. Based on this result, Tracer determined that the tank and pipe systems that were tested at the Fuel Farm passed the precision leak test, which is capable of detecting leaks of 0.05 gallons per hour with a probability of detection of 0.97 and a probability of false alarm of 0.029. However, samples collected by the probes did contain volatile hydrocarbons in three locations, as shown in Figure 2 of the Tracer study. The largest vapor "plume" occurs below the fuel-loading pad and may have resulted from the contamination from the leaking gasoline line referenced in Section 2.2.1. There are two smaller plumes under the fuel tanks which may have resulted from surface spills. We used the results of this study to determine locations of soil borings B-2 and B-3 and hand-auger borings HA-3 and HA-4, which are located in two of the three plumes identified in the Tracer study.

4.2 Soil Contamination

4.2.1 Scanning Procedures

Law Engineering monitored all soil-investigation activities with a photoionization detector (PID) manufactured by HNu Systems (Model PI 101) which had been calibrated to isobutylene. We used the PID to qualitatively measure total volatile organics in the borehole, in ambient air, and in the individual soil samples. Values recorded with the PID are qualitative only and are not directly comparable to actual laboratory analytical results. However, the PID is useful in providing a relative indication of the presence of volatile organics in soil samples.

4.2.2 Hand-auger Borings

Law Engineering advanced hand-auger borings, each to a depth of 5 feet, to accomplish two objectives. The first objective was to check for the presence of USTs in the vicinity of the geophysical anomaly identified during the ESE investigation (Drawing 3.1) at the site of the former gasoline station. We advanced 16 hand-auger borings in this area but did not detect evidence of USTs or soil contamination by volatile organics.

The second objective of the hand-auger borings was to check for the presence of soil contamination and USTs in suspect areas. We performed these borings in four areas (Drawing 3.1). In the first area, we advanced hand-auger borings HA-1 and HA-2 where we suspected the presence of the UST associated with the former mess-hall operations. HA-1 encountered auger refusal at a depth of approximately 2 feet, which may have been due to the presence of this UST. HA-2 was advanced approximately 10 feet east of HA-1 and encountered soils with anomalous PID readings. Based on these readings, we drilled boring B-4 to check for soil contamination.

In the second area of hand-auger borings, we advanced HA-3 and HA-4 near the pump house where we identified data anomalies in the soil-gas survey. We collected soil samples for laboratory analysis from each of these borings.

In the third area of hand-auger borings, we advanced HA-5 and HA-6 behind the gasoline station and to the west of the 16 hand-auger borings, in a location where Mr. Morris had suggested that a UST may remain. We observed no indication of USTs or soil contamination in either of these borings.

In the fourth area of hand-auger borings, we advanced HA-7, HA-8 and HA-9 near where the fuel line extending from the Fuel Farm to the mess-hall UST makes a 90°

turn to the west (Drawing 4.2). We chose this location because it was in the vicinity of the contaminant plume identified by the Hydropunch sampling and because pipe joints are particularly susceptible to leakage. We collected one soil sample from HA-7 based on PID readings.

4.2.3 Soil Borings

Locations of the soil borings (B-1 through B-6, SB-1 through SB-3) and wells constructed from soil borings (MW-8 through MW-25) are shown in Drawing 3.1. Depths of the soil-test borings ranged from 15 to 44.5 feet. Moist soil conditions were generally encountered at a depth of 8 to 10 feet bls. None of the soil borings penetrated the Castle Hayne Formation, which supplies drinking water for Camp Lejeune.

We collected soil samples from each boring for headspace testing and laboratory chemical analysis according to the following procedure:

- The decontaminated split-spoon sampler was driven to the desired depth interval.

- The split-spoon sampler was retrieved and immediately opened. Portions of sample aliquots were quickly removed from the split-spoon sampler and placed into two, pre-labeled, airtight plastic bags. Sample handling was executed carefully in an effort to reduce the loss of the volatile organics. The bags were sealed and placed in a warm location.

- After approximately 10 minutes, the headspace gas in one of the two bags was tested with the PID and the peak value was recorded. This procedure was conducted for the soil sample collected at each sample-depth interval.

- From the soil samples collected from the borings, the two samples that exhibited the highest PID reading were targeted for chemical analysis. For those samples, the paired sample was transferred to a laboratory-supplied glass container, placed into a cooler, packed on ice and shipped to the laboratory for chemical analysis. Law Engineering maintained custody of the samples until shipment at the end of each day.

4.2.4 Results of the Soil Sampling

A summary of headspace analyses are presented in Table 4.1. Results show that volatile organics were detected in samples collected from 19 of the 24 boreholes. In general, concentrations of contamination were greatest in the samples collected at depths of 8.5 to 10 feet, near or just below the water table. Therefore, we suspect that lateral movement of the dissolved-phase plume and seasonal fluctuations of the water table has resulted in adsorbed-hydrocarbon contamination in the capillary-fringe area.

A summary of the results of laboratory analyses of the soil samples are presented in Table 4.2. The laboratory analyses are included in Appendix H. The soil samples were tested for total petroleum hydrocarbons (TPH) using EPA Methods 3550 (semi-volatile) and 5030 (volatile) and for lead using EPA Method 6010. We also analyzed 10 soil samples for ignitability using EPA Method 1010. Although the headspace testing indicated the presence of volatile organics in a majority of the boreholes, laboratory testing for total petroleum hydrocarbons (TPH) indicated the presence of primarily high-boiling-point hydrocarbons in samples from 13 of the boreholes. We have combined the measured values of both high- and low-boiling-point hydrocarbons from samples collected above the water table and presented these data in an isopleth

map of total petroleum hydrocarbons (Drawing 4.3). This map illustrates three areas of soil contamination, all of which correlate to areas of known or suspected USTs or transmission lines. These areas are:

- the vicinity of boring no. B-4, which was installed near the location of the UST adjacent to the site of the former mess hall;

- the vicinity of the UST behind Building No. 480 and extending to the northeast towards the ponded stormwater (the area of contamination documented in the NUS report); and

- the AST and fuel-dispensing area of the Fuel Farm, in support of the results of the tracer testing discussed in Section 4.1 and in concurrence with the verbal report of the 4-year-old release of gasoline. However, soil contamination in this area appears to be concentrated at depths below the water table.

Based on this data, it appears that there have been releases of fuel in at least three separate locations within the study area. The plume of contamination originating behind Building No. 480 may have resulted from two releases, one from the UST

system at Building No. 480 and one from a possible surface release, northeast of that site, which was investigated by NUS (Section 1.3). The pattern of soil contamination corresponds with the direction of ground-water flow. Therefore, it appears that petroleum fuel was released at these source locations and subsequently migrated through the soil towards Brinson Creek partly as a free-phase liquid hydrocarbon prior to dispersion, adsorption and dissolution into the ground water.

Law Engineering also analyzed each soil sample for lead. There was one sample (HA-4) which exhibited concentrations of lead in excess of the laboratory detection limit. This sample was collected from a location adjacent to the pump house. Because this sample was not contaminated with petroleum hydrocarbons, it appears that this lead did not originate from a discharge of leaded fuel.

Law Engineering also analyzed 10 soil samples for ignitibility. Based on the laboratory results, we determined that the flashpoint of each of the ten samples is in excess of 200°F.

4.3 Occurrence of Free Product

The monitoring wells were constructed to allow for detection of free product in the capillary-fringe area. As indicated on the Monitoring-well Casing and Water-elevation Worksheets (Appendix E), we did not detect free product using probe measurement in the wells. Therefore, Law Engineering has no evidence to indicate that free product remains in the subsurface in the study area. However, our experience reveals that, given ample time, free product can accumulate in wells which initially showed no signs of free product.

4.4 Dissolved Ground-Water Contamination

4.4.1 Hydropunch Ground-water Sampling

From August 5-7, 1991, as the initial phase of our investigation, Law Engineering collected ground-water samples using the Hydropunch ground-water sampling system, utilizing the materials and installation procedures described in the CSA Workplan. We collected these ground-water samples at locations indicated on Drawing 4.4 to evaluate the lateral extent of ground-water contamination and to determine the optimal locations for the monitoring wells. This initial phase of investigation indicated

two areas of ground-water contamination, one near the Fuel Farm and one northeast of Building No. 480.

4.4.2 Monitoring-well Sampling Procedures

As stated in Section 3.4, Law Engineering installed 18 wells during the investigation to complement the seven installed during previous investigations. Prior to sampling each well, Law Engineering measured and recorded the depth to ground water using an electronic, water-level probe. We recorded the data collected and observations made on the Monitoring Well and Sampling Field Data Worksheets (Appendix I).

We evacuated all monitoring wells prior to collecting ground-water samples in order to remove stagnant water from the well casing and sand pack. We performed this task in an effort to collect samples representative of the water quality in the surficial aquifer. To evacuate the wells, we used decontaminated, Teflon bailers attached to new nylon cord. We measured and recorded specific conductance, pH, and water temperature throughout the evacuation process. We evacuated the wells of at least three standing well volumes and until indicator parameters had stabilized (or until the well exhibited dryness).

We collected ground-water samples from the 18 monitoring wells installed by Law Engineering, 17 of which were "paired" wells, and from the seven "single-cased" wells that had been installed during previous investigations. Prior to sampling the wells, Law Engineering personnel donned laboratory-grade gloves. We collected the water samples and immediately decanted the samples from the bailer into pre-labeled sample containers.

We sealed the containers, stored the containers in chilled coolers, and maintained custody of the samples until shipment at the end of each day. Chain-of-custody forms are included in Appendix J.

4.4.3 Results of the Ground-water Sampling

We have presented a summary of laboratory analyses of the ground-water samples from the Hydropunch sampling in Table 4.3. Reports of laboratory analyses are included in Appendix H. The ground-water samples were tested for purgeable aromatics by EPA Method 602, modified to include methyl tertiary butyl ether (MTBE).

We have presented isopleth maps for the combined total concentrations of benzene, toluene, ethylbenzene and total xylenes (BTEX) (Drawing 4.5) and for MTBE

concentrations (Drawing 4.6) documented in the Hydropunch ground-water samples. This map shows two plumes of contamination, one in the vicinity of the Fuel Farm and one extending from the area just north of Building No. 480 to the northeast. This preliminary identification of contaminant plumes allowed us to effectively place permanent monitoring wells.

We have presented a summary of laboratory analyses of the ground-water samples collected from the monitoring wells in Table 4.4 for the shallow screened intervals and in Table 4.5 for the deep screened intervals. The laboratory analyses are included in Appendix H. We tested these ground-water samples for purgeable halocarbons by EPA Method 601, for purgeable aromatics by EPA Method 602 modified to include MTBE, and for lead by EPA Method 7000. We also tested samples from four wells (MW-8S, MW-14S, MW-24S and MW-25S) for polynuclear aromatic hydrocarbons by EPA Method 610.

The laboratory results, when compared with the results of the soil analyses, show what appears to be at least two separate plumes of ground-water contamination. We have presented an isopleth map (Drawing 4.7) for the combined total concentrations of benzene, toluene, ethylbenzene and total xylenes (BTEX) in the shallow screened interval which shows these two plumes. We have presented a second isopleth map

(Drawing 4.8) for the combined total concentrations of BTEX in the deep screened interval. The isopleth map of the lower screened interval shows significantly lower levels of ground-water contamination, in the areas which generally correspond to the plumes observed in the shallow screened interval.

The first plume of the shallow screened interval is in the vicinity of the Fuel Farm. The ground water has been contaminated with hydrocarbons typically related to petroleum fuel including BTEX. The hydrocarbon contamination appears to be originating within the fuel storage and transmission area, in agreement with the results of the Tracer study, which indicated petroleum vapors beneath the Fuel Farm. Contaminants appear to be migrating to the northeast, the predominant direction of ground-water flow.

The second plume of the shallow screened interval is in the vicinity of the UST located behind Building No. 480 and extends to the northeast, towards the ponded stormwater. The ground water has been contaminated with BTEX and other petroleum-related constituents (heavier hydrocarbons) including fluorene, naphthalene, 1-methylnapthalene and 2-methylnapthalene.

Law Engineering has also identified three areas of ground water contaminated with chlorinated compounds from samples collected over the shallow screened interval. The first is in the vicinity of MW-10 and EMW-5, the second is in the vicinity of EMW-7 and MW-19 and the third is in the vicinity of MW-14 (Drawing 4.9). Laboratory analyses of the ground-water samples from these wells document contamination by trichloroethene and tetrachloroethane, constituents commonly found in solvents and degreasers.

The source of contamination in MW-10 is apparently outside the study area and is unknown at this time. The contamination found in and downgradient of MW-14 may be related to the gasoline station formerly located adjacent to the ice house. Solvents and degreasers are commonly used at gasoline stations and maintenance facilities, and it is possible that the waste solvents from these sites were disposed of onto the ground. Over an extended period of time, continual disposal of these solvents in this manner could result in ground-water contamination.

Law Engineering could not identify a source of the chlorinated compounds detected in samples collected from EMW-7 and MW-19, although these compounds may be related to activities of the former automotive maintenance shop in Building No. TC-474, south of the study area. Law Engineering recommends identifying the source of this contamination.

Law Engineering also identified ground water contaminated with chlorinated compounds in the deep screened interval (Drawing 4.10). The areas of contamination generally correspond to those observed in the shallow screened intervals of wells.

Law Engineering cannot identify a consistent pattern of lead concentrations in either the shallow or deep screened intervals at the study area (Drawings 4.11 and 4.12). The well with the highest concentration of lead, EMW-5, is upgradient of known or suspected contaminant sources, while wells within the two contaminant plumes (for example, MW-20, MW-21, MW-22, MW-25) often exhibit relatively low levels of lead contamination. We also observed wells near the boundaries of the BTEX plumes with low levels of contamination (for example, MW-17, MW-23, MW-14) and levels of lead contamination similar to those wells with high levels of contamination. In summary, we are not able to draw any conclusions regarding the probable relationship between lead concentrations detected at the Fuel Farm and migration patterns of water-borne lead resulting from petroleum-fuel releases.

Law Engineering has documented concentrations of MTBE, an unleaded gasoline additive, below the state interim standard in five wells, four in the shallow screened interval (Drawing 4.13) and one (MW-18) in the deep screened interval. MTBE is highly soluble in water, and often is the first contaminant observed at the leading edge

of a plume. The levels of MTBE documented in EMW-6, MW-17 and MW-18, all of which are downgradient of the Fuel Farm, are likely the result of the leaking gasoline line referenced in Section 2.2.1. Law Engineering has not identified a likely source for the MTBE documented in MW-9.

Law Engineering documented ground water containing levels of chloroform in excess of the state ground-water quality standard in MW-14. Law Engineering collected a sample of the potable water at the base from the spigot adjacent to Building No. TC-364 and tested the sample for purgeable halocarbons and purgeable aromatic hydrocarbons. The laboratory analysis of this water sample (identified as "potable water" in Table 4.4) revealed concentrations of chloroform, bromoform, bromodichloromethane, and dibromochloromthane in excess of the laboratory detection limits and of state ground-water standards. These compounds may often be found in municipal water supplies as a result of the chlorination process.

In summary, Law Engineering has documented ground-water contamination both in the upper portion of the surficial aquifer and, to a lesser extent, at depths 10 to 15 feet below the water table. We have identified a confining layer within the surficial aquifer which may act as a barrier to the vertical migration of these contaminants.

The rate at which these contaminants migrate through the subsurface is affected by several geohydrochemical processes including molecular diffusion, mechanical mixing, sorption-desorption, ion-exchange, hydrolysis and biodegradation. Because the resources involved in attempting to model the effects of these processes at the project site are significant, we have chosen to apply a relatively simple analytical technique (USEPA, 1985b) with which to arrive at conservative (greater than anticipated) estimates of contaminant-migration rates at the study area. This analytical technique takes into account only sorption-desorption of the contaminant constituent (expressed in terms of the "retardation factor") and the average, linear velocity of ground-water flow at the site.

For purposes of these calculations, we selected an average linear velocity of ground-water flow of 1.33 feet/day (the mean value of those reported in Section 3.5). The resulting calculations, contained in Appendix K, show that the rate of benzene movement is estimated at 0.44 feet/day. By comparison, naphthalene (a relatively hydrophobic compound) is estimated to migrate at a rate of 0.029 feet/day. With the exception of MTBE, the migration rates of remaining organic constituents detected in the study area are likely to fall within the range bounded by benzene and naphthalene. Please note that these migration rates are only gross estimates which may vary considerably from actual field-migration rates.

5.0 PROCEDURES FOR QUALITY CONTROL

5.1 Decontamination of Equipment

The CSA Workplan details the quality-control procedures followed for handling and decontaminating equipment in the field. As outlined in the Workplan, we decontaminated our drilling equipment in an open area just south of Fourth Street, opposite the Fuel Farm.

5.2 Collection and Shipment of Samples

The CSA Workplan details the quality-control procedures followed for collecting, handling and shipping samples. We employed three quality-control measures to provide checks on the integrity and quality of our ground-water sampling program: rinse blanks, trip blanks and duplicate samples.

Law Engineering submitted equipment rinse blanks to the laboratory for evaluation of procedures which we used to decontaminate the Teflon bailers. Law Engineering also submitted trip blanks to the laboratory to check the integrity of the sample containers, to determine if contaminants may have entered the sample containers during shipment

to and from the job site, and to check for laboratory-induced contamination. Each of the blanks was analyzed for purgeable aromatics. The two rinse blanks and four trip blanks submitted with the Hydropunch ground-water samples did not contain contaminant levels above the laboratory detection limit. Six of the ten blanks submitted with the monitoring-well ground-water samples exhibited contamination with xylenes and, in one instance, MTBE in excess of, but near, the laboratory detection limits (Table 5.1).

Law Engineering collected two duplicate ground-water samples as a check on our sampling technique and on the reproducibility of laboratory-testing procedures. For this test, we collected a sample from MW-14S, which we labelled as MW-26S, and a sample from MW-24S, which we labelled as MW-27S. Laboratory analyses of these duplicates are included in Table 4.4.

Analysis of our procedures revealed that bailer decontamination was successful in eliminating the introduction of contaminants through the sampling equipment. Based on the relatively low concentrations of xylenes (2.0 ug/l) detected in the blanks, Law Engineering believes that no significant petroleum-hydrocarbon contamination of ground-water samples occurred as a result of contaminated sampling equipment.

5.3 Evaluation of Chemical Data

In order to assess the quality of laboratory-produced data, our laboratory performed an evaluation of the chemical data. This evaluation included reviews of surrogate failures, calibration verification, holding times, organic-blank contamination, documentation and sample condition. In summary, the evaluation results indicate that reported discrepancies between actual results/procedures and standard results/procedures are not considered to have major impact on the data reported. A copy of the analytical data review report is included in Appendix L.

6.0 SURVEY OF POTENTIAL RECEPTORS

Fuel contamination in any one of four physical states or "phases"' (residual, vapor, liquid, dissolved) may be transmitted to receptors through ingestion, inhalation, or absorption. As petroleum fuel seeps into the subsurface, it will undergo a transformation process that results in adsorption of hydrocarbons onto soil particles (residual phase) and release of volatile hydrocarbons into pore spaces (vapor phase). If any product remains after adsorption and volatilization take place, it will continue to move vertically downward (in the absence of preferred lateral routes of migration)

until reaching the capillary-fringe area or a relatively impermeable barrier if one is located above the capillary fringe. At this point, the fuel (liquid phase) will tend to spread throughout the capillary fringe and the transformation process will continue with the dissolution of hydrocarbons into ground water (dissolved phase). An evaluation of the relationship between contaminated media and exposure pathways at the project site is summarized in Table 6.1.

Receptors may be potentially exposed to the hydrocarbons found in the soil primarily through inhalation of volatilized compounds and dermal contact with soil at sites contaminated with hydrocarbons. However, based on headspace and laboratory tests results, petroleum contamination is not generally present in near-surface soil at the Fuel Farm. As indicated in Section 4.2, soil contamination is generally present only at depths below approximately 4 feet. As a result, exposure to these soils is contingent upon site disturbance through construction or remediation activities.

In the event that soil remediation is required, there may be some inhalation exposure from volatilization of the hydrocarbons found in the soil. Volatile components will be released and the potential for exposure will occur at this time. Dermal exposure from soil contact by personnel may also occur if remediation activities include excavation. Since this is an occupational exposure, the receptor analysis for these exposure pathways should be considered as part of the design plan for site remediation.

Exposure through ingestion most commonly occurs from consumption of drinking water obtained from contaminated wells or contaminated public-water supplies. The active water-supply wells at Camp Geiger supply water from the Castle Hayne aquifer and are located to the west of the Fuel Farm, upgradient of the documented contamination. Due to the presence of an apparent confining unit separating the contaminated surficial aquifer from the Castle Hayne, and the distance between the Fuel Farm and the supply wells, it is unlikely that contamination in the surficial aquifer at the Fuel Farm has affected the water-supply wells at Camp Geiger. The study by Harned et al (1989) did not include chemical testing of water samples from the water-supply wells.

Subsurface contaminants have been known to find their way into buried water-supply lines primarily through direct contact with free product. Law Engineering did not receive a complete set of site maps showing the locations of all the water lines in the study area. However, because free product was not observed in the study area, potential exposure to contaminants in this manner is unlikely.

Law Engineering observed three access points to the subsurface. The first is the manway providing access to the sanitary sewer, which is located just southeast of the Fuel Farm. The second is the storm sewer and oil/water separator which collects

stormwater on the concrete pad adjacent to the ASTs. The third is a collapsing storm-sewer manway behind the former site of the filling station; due to its condition, this manway appeared inaccessible. Law Engineering performed a vapor-phase survey at these access points using the PID and did not detect volatile organics. Inspection of Building No. 480 revealed no means of access to the subsurface (manways, vaults, etc.) within the buildings. This was confirmed by Mr. Blake, who fills the UST behind this building and who is familiar with its design.

The results of the survey of potential receptors indicate that the presence of contaminants in the subsurface at the Fuel Farm does not constitute an imminent or near-future health threat to potential receptors. However, it is possible that organic vapors may be present along portions of subsurface utilities which may possibly result in exposure during maintenance and repair activities.

7.0 REMEDIAL ALTERNATIVES AND RECOMMENDATIONS

This discussion of remedial alternatives and preliminary recommendations is directed primarily toward the contamination by petroleum hydrocarbons encountered at the Camp Geiger Fuel Farm. However, these alternatives and recommendations may also be applicable to chlorinated hydrocarbon contamination.

Due to the spatial distribution of petroleum-hydrocarbon contamination in the soil (adsorbed phase) and water samples (dissolved phase) collected from the Fuel Farm, it appears that at least two separate releases of petroleum fuel have occurred at the project site. The first release occurred approximately four years ago from the gasoline line in the vicinity of the Fuel Farm. Contamination of the soil and ground-water remain in this area from this release. The second release, from the UST behind Building No. 480, may still be occurring and has resulted in soil and ground-water contamination. Therefore, as an initial step in the remedial process, we recommend thoroughly evaluating the integrity of this UST system.

7.1 Soil Remediation

7.1.1 Overview and Objectives of Soil Remediation

Protection of public health and ground-water quality are the primary reasons for soil remediation at sites involving leaking UST systems. As discussed in Section 6.0 of this report, the potential for exposure to contaminated soil at the Camp Geiger Fuel Farm is minimal as long as the subsurface remains undisturbed. However, guidelines for remediation of soil contaminated by petroleum have been established by the Groundwater Section of the Division of Environmental Management, DEHNR (1990).

TABLES

TABLE 2.1
LIST OF DRAWINGS

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

DRAWING NUMBER	DESCRIPTION	DATE
2816	Filling Station/Fire Station Plans	11/12/47
161813	Ice Storage House	6/26/41
161814	Ice Storage House	6/26/41
161821	Mess Hall UST Fuel Line	10/28/41
161870	Drinking Water Well Locations	8/25/41
161873	Fuel Farm/Mess Hall UST	7/17/41
162072	Fuel Farm	2/2/42
267402	Storm Sewer/Fire Hydrant/Sanitary Sewer Lines	Unknown
267403	Barracks Plan	10/29/43
4009116	Building No. 480	6/18/75
4714380	Piping Plan/Fuel Farm	Not Dated
4174381	Demolition Plan/Fuel Farm	Not Dated
4174383	Fuel Farm	Not Dated
417439?	Electrical Plan/Fuel Farm	Not Dated
Unnumbered	Steam Lines	7/31/84
Unnumbered	Wastewater Lines	7/31/84
Unnumbered	Electrical Lines	7/31/84

TABLE 2.2
INVENTORY OF POTENTIAL CONTAMINANT SOURCES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

TANK LOCATION	PRODUCT TYPE	TANK TYPE	INSTALL DATE	SIZE OF TANK	TANK STATUS
Building No. 480	No. 2 Fuel Oil	UST	1976	550 Gallons	Active
Former Mess Hall	No. 6 Fuel Oil	UST	1941?	Unknown	Abandoned
Building No. 474	Waste Oil	UST	1946	550 Gallons	Abandoned

Underground lines associated with these tanks, the aboveground tanks and the oil-water separator located southeast of the Fuel Farm are also potential contaminant sources.

TABLE 2.3
LIST OF WATER-SUPPLY WELLS

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

LAW ENGINEERING JOB NO. J47590-6014

USGS WELL NO.	CAMP GEIGER WELL LETTER	TOTAL WELL DEPTH (Ft.)	CASING LENGTH (Ft.)	CASING DIAMETER (INCHES)	APPROX. DISTANCE FROM FUEL FARM (FEET)	STATUS
TC104	A	Unknown	Unknown	Unknown	2600	Abandoned
TC100	B	Unknown	Unknown	Unknown	2600	Abandoned
TC202	I	Unknown	Unknown	Unknown	2600	Abandoned
TC325	C	70'	20'	18"	2600	Abandoned
TC502	D	184'	110'	10"	2600	Drinking
TC600	E	170'	21'	20"	2600	Drinking
TC700	F	76'	27.5'	18"	3300	Drinking
TC901	G	76'	25'	18"	3900	Abandoned

TABLE 3.1
SUMMARY OF DEVELOPMENT OF "SHALLOW" MONITORING WELLS

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

MONITORING WELL IDENTIFICATION NUMBER	FINAL TURBIDITY (SUBJECTIVE)*	APPROXIMATE VOLUME OF WATER REMOVED (GAL)
MW-8S	1	50
MW-9S	1	50
MW-10S	1	45
MW-11S	1	40
MW-12S	1	50
MW-13S	1	60
MW-14S	1	45
MW-15S	1	30
MW-16S	1	40
MW-17S	1	40
MW-18S	1	45
MW-19S	1	45
MW-20S	1	30
MW-21S	1	60
MW-22S	1	30
MW-23S	1	35
MW-24S	1	30
MW-25S	1	25

Note:

* (1) Clear; (2) Slight; (3) Moderate; (4) High

TABLE 3.2
SUMMARY OF DEVELOPMENT OF "DEEP" MONITORING WELLS

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

MONITORING WELL IDENTIFICATION NUMBER	FINAL TURBIDITY (SUBJECTIVE)*	APPROXIMATE VOLUME OF WATER REMOVED (GAL)
MW-8D	1	70
MW-9D	1	60
MW-10D	1	60
MW-11D	1	50
MW-12D	1	50
MW-13D	1	55
MW-14D	1	50
MW-15D	1	60
MW-16D	1	50
MW-17D	1	55
MW-18D	1	50
MW-19D	1	60
MW-21D	1	55
MW-22D	1	60
MW-23D	1	60
MW-24D	1	50
MW-25D	1	50

Note:

* (1) Clear; (2) Slight; (3) Moderate; (4) High

TABLE 4.1
SUMMARY OF HEADSPACE ANALYSES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft.)	PID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
MONITORING WELL SOIL BORINGS			
MW-8	1.5 - 2	8	
	3.5 - 4	3	
	5.5 - 6	55	
	7.5 - 8	85	*
	9.5 - 10	42	
	11.5 - 12	4	
	13.5 - 14	32	
	15.5 - 16	65	*
	17.5 - 18	5	
	19.5 - 20	2.5	
MW-9	1.5 - 2	0	
	3.5 - 4	0	
	5.5 - 6	0	
	7.5 - 8	0	*
	9.5 - 10	0	
	11.5 - 12	0	
	13.5 - 14	0	
	15.5 - 16	0	
	17.5 - 18	0	*
	19.5 - 20	0	
	25 - 25.5	0	

TABLE 4.1
SUMMARY OF HEADSPACE ANALYSES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft.)	PID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
MW-10	1.5 - 2	>2000	*
	3.5 - 4	220	*
	5.5 - 6	105	
	10 - 10.5	40	
	15 - 15.5	6	
	20 - 20.5	<1	
MW-11	1.5 - 2	0	
	3.5 - 4	1.5	
	5.5 - 6	30	*
	10 - 10.5	31	*
	15 - 15.5	7.3	
	20 - 20.5	<1	
MW-12	0 - 1.5	>2000	*
	1.5 - 3	75	
	3 - 4.5	200	*
	8.5 - 10	45	
	13.5 - 15	<1	
	18.5 - 20	0	
MW-13	1.5 - 2	<1	
	3.5 - 4	<1	
	5.5 - 6	<1	
	10 - 10.5	<1	*
	15 - 15.5	<1	
	20 - 20.5	<1	*

TABLE 4.1
SUMMARY OF HEADSPACE ANALYSES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft.)	PID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
MW-14	0 - 1.5	<1	
	1.5 - 3	3	
	3 - 4.5	60	•
	8.5 - 10	16	
	13.5 - 15	3	
	18.5 - 20	145	•
MW-15	1.5 - 2	<1	
	3.5 - 4	<1	
	5.5 - 6	<1	•
	10 - 10.5	65	•
	15 - 15.5	<1	
	20 - 20.5	<1	
MW-16	0 - 1.5	30	
	1.5 - 3	110	
	3 - 4.5	200	•
	8.5 - 10	155	
	13.5 - 15	200	
	18.5 - 20	250	•
MW-17	1.5 - 2	<1	
	3.5 - 4	<1	
	5.5 - 6	<1	•
	10 - 10.5	<1	
	15 - 15.5	<1	
	20 - 20.5	<1	•

TABLE 4.1
SUMMARY OF HEADSPACE ANALYSES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft.)	PID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
MW-19	1.5 - 2	<1	
	3.5 - 4	<1	*
	5.5 - 6	<1	
	10 - 10.5	<1	*
	15 - 15.5	<1	
	20 - 20.5	<1	
	25 - 25.5	<1	
MW-20	0 - 1.5	40	
	1.5 - 3	65	
	3 - 4.5	300	*
	8.5 - 10	220	*
	13.5 - 15	75	
	18.5 - 20	55	
	23.5 - 25	110	
MW-21	1.5 - 2	<1	
	3.5 - 4	60	*
	5.5 - 6	75	*
	10 - 10.5	35	
	15 - 15.5	17	
	20 - 20.5	<1	
	25 - 25.5	<1	

TABLE 4.1
SUMMARY OF HEADSPACE ANALYSES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft.)	PID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
MW-22	0 - 1.5	10	
	1.5 - 3	2	
	3 - 4.5	150	•
	9.5 - 11	90	•
	14.5 - 16	5	
	19.5 - 21	4	
	24.5 - 26	0	
	29.5 - 31	0	
MW-23	1.5 - 2	<1	•
	3.5 - 4	<1	
	5.5 - 6	<1	
	10 - 10.5	<1	
	15 - 15.5	<1	•
	20 - 20.5	<1	
MW-24	1.5 - 2	<1	
	3.5 - 4	<1	•
	5.5 - 6	0	
	10 - 10.5	3	•
	15 - 15.5	0	
	20 - 20.5	<1	
MW-25	1.5 - 2	22	
	3.5 - 4	45	•
	5.5 - 6	45	•
	10 - 10.5	2.5	
	15 - 15.5	25	

TABLE 4.1
SUMMARY OF HEADSPACE ANALYSES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft.)	PID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
SOIL BORINGS			
B-1	0 - 1.5	200	
	1.5 - 3	160	*
	3 - 4.5	40	
	8.5 - 10	140	*
	13.5 - 15	4	
B-2	2 - 2.5	3	
	3 - 3.5	2	
	4 - 4.5	8	
	5 - 5.5	7.5	
	5.5 - 6	12	*
	8.5 - 10	51	*
	13.5 - 15	6.2	
B-3	ATTEMPTED 6 TIMES, ABANDONED		
B-4	0 - 1.5	0	
	1.5 - 3	11	
	3 - 4.5	22	*
	8.5 - 10	50	*
	13.5 - 15	18	
B-5	2" - 1.5'	<1	
	1.5 - 3	0	
	3 - 4.5	20	*
	8.5 - 10	2	*
	13.5 - 15	0	

LAW ENGINEERING

TABLE 4.1
SUMMARY OF HEADSPACE ANALYSES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft.)	PID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
B-6	2" - 1.5'	2	
	1.5 - 3	<1	
	3 - 4.5	<1	*
	8.5 - 10	50	*
	13.5 - 15	8	
STRATIGRAPHIC BORINGS			
SB-1	0 - 20	See MW-8	
	23.5 - 25	<1	
	28.5 - 30	150	
	33.5 - 35	<1	
	38.5 - 40	200	
SB-3 (formerly MW-18)	0 - 1.5	<1	
	1.5 - 3	<1	
	3 - 4.5	9	*
	8.5 - 10	10	*
	13.5 - 15	5	
	17 - 18	<1	
	18.5 - 20	<1	
	20 - 21.5	<1	
	21.5 - 23	<1	
	23 - 24.5	<1	
	24.5 - 26	<1	
	26 - 27.5	<1	

LAW ENGINEERING

TABLE 4.1
SUMMARY OF HEADSPACE ANALYSES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft.)	PID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
SB-3 (formerly MW-18)	27.5 - 29	<1	
	29 - 30.5	<1	
	30.5 - 32	<1	
	32 - 33.5	<1	
	33.5 - 35	<1	
	35 - 36.5	<1	
	36.5 - 38	200	
	38 - 39	155	
HAND-AUGER BORINGS			
HA-3	2'	2	*
	4'	5	
HA-4	2'	4	*
	5'	3	
HA-7	3'	10	
	5'	60	*
HA-8	5'	8	
HA-9	3'	<1	
	5'	8	

LAW ENGINEERING

KEY TO SYMBOLS

SUMMARY OF LABORATORY ANALYSES

* Numerical standard has not been established; substances not allowed in detectable concentrations.

** Interim standard

N.D. = Not detected: see laboratory reports for applicable detection limits.

- = Sample not analyzed for this parameter.

LAW ENGINEERING

TABLE 4.2 (Page 1 of 3)
SUMMARY OF LABORATORY ANALYSES OF SOIL SAMPLES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft)	TOTAL PETROLEUM HYDROCARBONS		IGNITABILITY (Degrees F)	LEAD (ug/L)
		VOLATILES (mg/kg)	SEMI-VOLATILES (mg/kg)		
HA-3	4	N.D.	17	--	N.D.
HA-4	2	N.D.	N.D.	--	42
HA-7	5	N.D.	5700	--	N.D.
B-1A	1.5 - 3.0	N.D.	N.D.	--	N.D.
B-1B	8.5 - 10.0	N.D.	N.D.	--	N.D.
B-2	5.5 - 6.0	N.D.	N.D.	--	N.D.
B-2	8.5 - 10.5	630	7600	--	N.D.
B-4A	3 - 4.5	N.D.	8400	--	N.D.
B-4B	8.5 - 10	N.D.	5100	--	N.D.
B-5A	3 - 4.5	N.D.	980	--	N.D.
B-5B	8.5 - 10	N.D.	280	--	N.D.
B-6A	3 - 4.5	N.D.	7	--	N.D.
B-6B	8.5 - 10	N.D.	6200	--	N.D.
MW-8	6.0 - 8.0	N.D.	9100 /	>200	N.D.
MW-8	14.0 - 16.0	N.D.	14,600 /	>200	N.D.
MW-9	6.0 - 8.0	N.D.	N.D.	>200	N.D.
MW-9	16.0 - 18.0	N.D.	N.D.	>200	N.D.
MW-10	0 - 1.5	N.D.	N.D.	--	N.D.

TABLE 4.2 (Page 2 of 3)
SUMMARY OF LABORATORY ANALYSES OF SOIL SAMPLES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft)	TOTAL PETROLEUM HYDROCARBONS		IGNITABILITY (Degrees F)	LEAD (ug/L)
		VOLATILES (mg/kg)	SEMI-VOLATILES (mg/kg)		
MW-10	1.5 - 3.0	N.D.	N.D.	--	N.D.
MW-11	4.0 - 6.0	N.D.	2100	>200	N.D.
MW-11	8.5 - 10.5	N.D.	4	>200	N.D.
MW-12	0 - 1.5	N.D.	N.D.	--	N.D.
MW-12	3.0 - 4.5	N.D.	N.D.	--	N.D.
MW-13	8.5 - 10.0	N.D.	N.D.	--	N.D.
MW-13	18.5 - 20.5	N.D.	N.D.	--	N.D.
MW-14	3.0 - 4.5	0.3	N.D.	--	N.D.
MW-14	18.5 - 20.0	N.D.	N.D.	--	N.D.
MW-15	4.0 - 6.0	N.D.	N.D.	--	N.D.
MW-15	8.5 - 10.5	N.D.	3500	--	N.D.
MW-16	3.0 - 4.5	N.D.	N.D.	--	N.D.
MW-16	18.5 - 20.0	1	8	--	N.D.
MW-17	4.0 - 6.0	N.D.	N.D.	--	N.D.
MW-17	18.5 - 20.5	N.D.	N.D.	--	N.D.
MW-18	3.0 - 4.5	N.D.	N.D.	--	N.D.
MW-18	8.5 - 10.0	N.D.	N.D.	--	N.D.
MW-19	2.0 - 4.0	N.D.	N.D.	--	N.D.

TABLE 4.2 (Page 3 of 3)
SUMMARY OF LABORATORY ANALYSES OF SOIL SAMPLES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	SAMPLE DEPTH (ft)	TOTAL PETROLEUM HYDROCARBONS		IGNITABILITY (Degrees F)	LEAD (ug/L)
		VOLATILES (mg/kg)	SEMI-VOLATILES (mg/kg)		
MW-19	8.5 - 10.5	N.D.	N.D.	--	N.D.
MW-20	3.0 - 4.5	N.D.	14	--	N.D.
MW-20	8.5 - 10.0	N.D.	22,000	>200	N.D.
MW-21	2.0 - 4.0	N.D.	5,200	>200	N.D.
MW-21	4.0 - 6.0	N.D.	21,000	>200	N.D.
MW-22	3.0 - 4.5	N.D.	5	--	N.D.
MW-22	9.5 - 11.0	540	8900	>200	N.D.
MW-23	0 - 2.0	N.D.	N.D.	--	N.D.
MW-23	13.5 - 15.5	N.D.	N.D.	--	N.D.
MW-24	2.0 - 4.0	N.D.	N.D.	--	N.D.
MW-24	8.5 - 10.5	N.D.	21	--	N.D.
MW-25	2.0 - 4.0	N.D.	8700	--	N.D.
MW-25	4.0 - 6.0	N.D.	5700	--	N.D.

TABLE 4.3 (Page 1 of 2)
SUMMARY OF LABORATORY ANALYSES
HYDROPUNCH GROUND-WATER SAMPLES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER FUEL FORM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	DATE SAMPLED	LABORATORY RESULTS (ug/l)				
		BENZENE	ETHYLBENZENE	TOLUENE	XYLENES (TOTAL)	METHYL TERT BUTYL ETHER
HP-1	8/5/91	N.D.	N.D.	N.D.	N.D.	N.D.
HP-2	8/7/91	N.D.	N.D.	N.D.	N.D.	N.D.
HP-3	8/7/91	0.7	N.D.	N.D.	N.D.	0.6
HP-4	8/6/91	0.2	1	N.D.	13	N.D.
HP-5	8/6/91	610	520	130	1900	N.D
HP-6	8/7/91	240	14	N.D.	N.D.	410
HP-7	8/6/91	8	1	N.D.	1	83
HP-8	8/7/91	N.D.	N.D.	N.D.	N.D.	N.D.
HP-9	8/7/91	N.D.	N.D.	N.D.	N.D.	3
HP-10	8/7/91	11	0.6	N.D.	2	N.D.
HP-11	8/6/91	350	350	N.D.	540	N.D.
HP-12	8/6/91	100	350	170	820	N.D.
HP-13	8/6/91	N.D.	N.D.	N.D.	N.D.	N.D.
HP-14	8/6/91	0.4	32	N.D.	24	N.D.
HP-15	8/6/91	N.D.	N.D.	N.D.	N.D.	N.D.
HP-16	8/6/91	N.D.	N.D.	N.D.	N.D.	N.D.
HP-17	8/6/91	N.D.	N.D.	2	N.D.	N.D.
HP-18	8/6/91	260	310	N.D.	740	N.D.

TABLE 4.3 (Page 2 of 2)
SUMMARY OF LABORATORY ANALYSES
HYDROPUNCH GROUND-WATER SAMPLES

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER FUEL FORM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE LOCATION	DATE SAMPLED	LABORATORY RESULTS (ug/l)				
		BENZENE	ETHYLBENZENE	TOLUENE	XYLENES (TOTAL)	METHYL TERT BUTYL ETHER
HP-19	8/6/91	N.D.	N.D.	N.D.	N.D.	N.D.
HP-20	8/6/91	N.D.	N.D.	N.D.	N.D.	N.D.
HP-21	8/7/91	N.D.	N.D.	N.D.	N.D.	N.D.

TABLE 4.4 (Page 1 of 3)
SUMMARY OF LABORATORY ANALYSES
MONITORING WELL GROUND-WATER SAMPLES
SHALLOW SCREENED INTERVAL

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

	WELL NUMBER	NC GROUND WATER STANDARD	EMW-1 (CGMW-1)	EMW-2 (CGMW-2)	EMW-3 (CGMW-3)	EMW-4 (CGMW-4)	EMW-5 (35GW-4)	EMW-6 (35GW-5)	EMW-7 (35GW-6)	MW-8S	MW-9S	MW-10S
	DATE SAMPLED		9/3/91	9/5/91	9/5/91	9/5/91	9/4/91	9/5/91	9/5/91	9/4/91	9/3/91	9/3/91
PARAMETER (ug/l)	SCREENED INTERVAL (Feet)		8.5-17.5	1.87-10.87	3.06-12.06	2.61-11.61	10.5-24.5	10.5-24.5	10.5-24.5	4.5-13.5	3.5-12.5	4.5-13.5'
BENZENE		1	ND	40	ND	13	0.4	0.3	ND	52	45	3
TOLUENE		1000	ND	12	ND	ND	ND	ND	ND	ND	ND	5
ETHYLBENZENE		29	ND	41	ND	0.7	ND	ND	ND	73	ND	7
XYLENES TOTAL		400	ND	76	ND	2	ND	ND	ND	420	4	ND
METHYL TERTIARY BUTYL ETHER (MTBE)		50**	ND	ND	ND	ND	ND	3	ND	ND	46	ND
LEAD		50	14	ND	2	28	75	ND	12	5	ND	3
TRANS-1,2-DICHLOROETHENE		70	ND	ND	2	ND	0.7	ND	18	ND	ND	17
TRICHLOROETHENE		2.8	ND	ND	8	0.6	3	0.6	59	ND	ND	170
1-METHYLNAPTHALENE		•	-	-	-	-	-	-	-	450	-	-
2-METHYLNAPTHALENE		•	-	-	-	-	-	-	-	460	-	-

LAW ENGINEERING

TABLE 4.4 (Page 2 of 3)
SUMMARY OF LABORATORY ANALYSES
MONITORING WELL GROUND-WATER SAMPLES
SHALLOW SCREENED INTERVAL

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

	WELL NUMBER	NC GROUND WATER STANDARD	MW-11S	MW-12S	MW-13S	MW-14S	MW-15S	MW-16S	MW-17S	MW-18S	MW-19S	MW-20S
	DATE SAMPLED		9/4/91	9/4/91	9/4/91	9/4/91	9/4/91	9/5/91	9/5/91	9/5/91	9/4/91	9/4/91
PARAMETER (ug/l)	SCREENED INTERVAL (Feet)		4.5'-13.5'	5'-14'	5.5'-14.5'	3.5'-12.5'	4.5'-13.5'	5.0'-14.0'	7.5'-16.5'	3.0'12.0'	4.5'-13.5'	3.0'-12.0'
BENZENE		1	ND	ND	ND	0.6	4	40	0.5	52	ND	140
TOLUENE		1000	ND	ND	ND	ND	ND	230	ND	ND	ND	280
ETHYLBENZENE		29	80	ND	ND	ND	3	76	ND	ND	ND	320
XYLENES TOTAL		400	170	ND	ND	ND	29	800	ND	ND	ND	930
METHYL TERTIARY BUTYL ETHER (MTBE)		50**	ND	ND	ND	ND	ND	ND	1	32	ND	ND
LEAD		50	ND	16	7	2	5	6	6	9	36	ND
CHLOROFORM		0.19	ND	ND	ND	3	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE		70	ND	ND	ND	44	ND	ND	ND	ND	5	ND
TRICHLOROETHENE		2.8	ND	ND	ND	110	ND	ND	0.6	ND	31	ND
1,2-DICHLOROETHANE		*	ND	ND	ND	ND	ND	ND	1	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE		*	ND	ND	ND	ND	ND	ND	ND	ND	12	ND
TETRACHLOROETHENE		*	ND	ND	ND	ND	ND	ND	ND	ND	1	ND

LAW ENGINEERING

TABLE 4.4 (Page 3 of 3)
SUMMARY OF LABORATORY ANALYSES
MONITORING WELL GROUND-WATER SAMPLES
SHALLOW SCREENED INTERVAL

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

	WELL NUMBER	NC GROUND WATER STANDARD	MW-21S	MW-22S	MW-23S	MW-24S	MW-25S	MW-26S (MW-14S)	MW-27S (MW-24S)	POTABLE WATER
	DATE SAMPLED		9/4/91	9/4/91	9/5/91	9/5/91	9/4/91	9/4/91	9/5/91	5/29/91 8/5/91
PARAMETER (ug/l)	SCREENED INTERVAL (Feet)		4.5-13.5	5.5'-14.5'	2.5-9.5	8.5-17.5	4.5-13.5	3.5-12.5	8.5-17.5	-
BENZENE		1	220	2300	ND	11	26	0.6	12	ND
TOLUENE		1000	ND	ND	ND	ND	160	ND	ND	ND
ETHYLBENZENE		29	590	560	ND	10	190	ND	10	ND
XYLENES TOTAL		400	1100	740	ND	43	500	ND	43	ND
METHYL TERTIARY BUTYL ETHER (MTBE)		50**	ND	ND	ND	ND	ND	ND	ND	ND
LEAD		50	4	3	2	5	1	2	7	ND
CHLOROFORM		0.19	ND	ND	ND	ND	ND	3	ND	9
TRANS-1,2-DICHLOROETHENE		70	ND	ND	ND	ND	ND	51	ND	ND
TRICHLOROETHENE		2.8	ND	ND	0.6	ND	ND	120	ND	ND
TRICHLOROFLUOROMETHANE		*	ND	ND	0.9	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE		*	ND	ND	ND	ND	ND	ND	ND	14
BROMOFORM		0.19	ND	ND	ND	ND	ND	ND	ND	16
DIBROMOCHLOROMETHANE		*	ND	ND	ND	ND	ND	ND	ND	27
ACENAPTHENE		*	-	-	-	ND	ND	ND	0.7	-
FLUORENE		*	-	-	-	1	ND	ND	ND	-
1-METHYLNAPTHALENE		*	-	-	-	64	190	ND	42	-
2-METHYLNAPTHALENE		*	-	-	-	63	270	ND	42	-
NAPTHALENE		*	-	-	-	41	220	ND	31	-

LAW ENGINEERING

TABLE 4.5 (Page 1 of 2)

SUMMARY OF LABORATORY ANALYSES
MONITORING WELL GROUND-WATER SAMPLES
DEEP SCREENED INTERVAL

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

	WELL NUMBER	NC GROUND WATER STANDARD	MW-8D	MW-9D	MW-10D	MW-11D	MW-12D	MW-13D	MW-14D	MW-15D
	DATE SAMPLED		9/4/91	9/3/91	9/3/91	9/4/91	9/4/91	9/4/91	9/4/91	9/4/91
PARAMETER (ug/l)	SCREENED INTERVAL (Feet)		20.5-29.5	25.5-29.5	25.5-29.5	25.5-29.5	24-28	25.5-29.5	24.5-28.5	25.5-29.5
BENZENE		1	1	0.3	3	ND	ND	ND	0.8	ND
TOLUENE		1000	3	ND	2	ND	ND	ND	ND	ND
ETHYLBENZENE		29	26	ND	1	ND	ND	ND	ND	ND
XYLENES (TOTAL)		400	52	ND	ND	9	ND	ND	ND	ND
METHYL TERTIARY BUTYL ETHER (MTBE)		50**	ND	ND	ND	ND	ND	ND	ND	ND
LEAD		50	8	14	11	10	9	3	14	5
TRANS-1,2-DICHLOROETHENE		70	ND	0.9	110	ND	ND	ND	7	ND
TRICHLOROETHENE		2.8	0.7	14	810	ND	ND	ND	13	ND
VINYL CHLORIDE		*	ND	ND	6	ND	ND	ND	ND	ND

LAW ENGINEERING

TABLE 4.5 (Page 2 of 2)

SUMMARY OF LABORATORY ANALYSES
MONITORING WELL GROUND-WATER SAMPLES
DEEP SCREENED INTERVAL

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

	WELL NUMBER	NC GROUND WATER STANDARD	MW-16D	MW-17D	MW-18D	MW-19D	MW-21D	MW-22D	MW-23D	MW-24D	MW-25D
	DATE SAMPLED		9/5/91	9/5/91	9/5/91	9/4/91	9/4/91	9/4/91	9/5/91	9/5/91	9/4/91
PARAMETER (ug/l)	SCREENED INTERVAL (Feet)		24.5'-28.5'	25-29	20.5-24.5	22.5-24.5	25.5-27	32'-35'	17.5-20	26.5-29	27.5-30
BENZENE		1	12	ND	ND	ND	0.4	50	ND	0.7	ND
TOLUENE		1000	23	ND	ND	ND	13	1	ND	ND	33
ETHYLBENZENE		29	21	ND	ND	ND	17	10	ND	1	110
XYLENES (TOTAL)		400	100	ND	ND	ND	93	8	ND	3	290
METHYL TERTIARY BUTYL ETHER (MTBE)		50**	ND	ND	1	ND	ND	ND	ND	ND	ND
LEAD		50	9	7	5	9	3	10	2	7	ND
TRANS-1,2-DICHLOROETHENE		70	ND	0.6	ND	92	2	ND	ND	ND	ND
TRICHLOROETHENE		2.8	ND	ND	0.9	630	6	ND	0.7	0.6	ND

LAW ENGINEERING

TABLE 5.1
SUMMARY OF LABORATORY ANALYSES
RINSE AND TRIP BLANKS

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

SAMPLE NUMBER	TYPE OF BLANK	DATE COLLECTED	DATE SUBMITTED	RESULTS (mg/l)
HYDROPUNCH SAMPLES				
AA11637	Trip		8/6	ND
AA11677	Trip		8/8	ND
AA11685	Rinse	8/6	8/8	ND
AA11686	Trip		8/8	ND
AA11740	Rinse	8/7	8/9	ND
AA11741	Trip		8/9	ND
MONITORING WELL SAMPLES				
AA12927	Trip		9/6	ND
AA12939	Rinse	9/4	9/6	Total Xylenes 2 MTBE 1
AA12940	Trip		9/6	Total Xylenes 2
AA12951	Rinse	9/4	9/6	Total Xylenes 2
AA12952	Trip		9/6	Total Xylenes 2
AA12985	Rinse	9/5	9/6	Total Xylenes 1
AA12986	Rinse	9/5	9/6	ND
AA12987	Trip		9/6	ND
AA12992	Rinse	9/5	9/6	Total Xylenes 1
AA12993	Trip		9/6	ND

TABLE 6.1
SUMMARY OF EXPOSURE PATHWAYS

REPORT OF UNDERGROUND FUEL INVESTIGATION
COMPREHENSIVE SITE ASSESSMENT

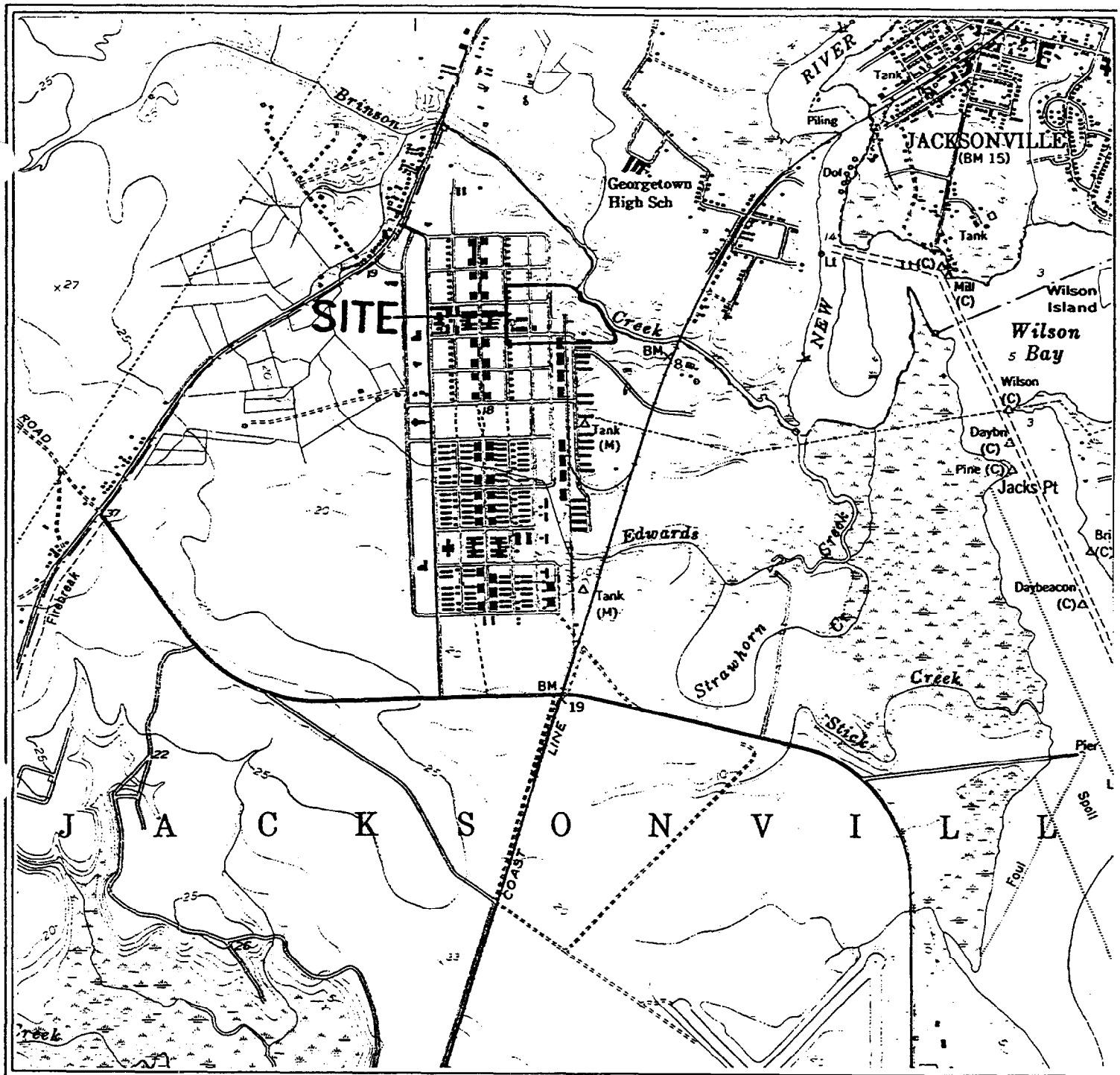
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. J47590-6014

CONTAMINATED MEDIUM	INGESTION (EATING)	INGESTION (DRINKING)	INHALATION	ABSORPTION
Free Product	NA	No Exposure (1)	NA	No Exposure (1)
Soil	Contingent Exposure (2)	NA	NA	Contingent Exposure (2)
Ground Water	Exposure Unlikely (3)	Exposure Unlikely (3)	NA	Exposure Unlikely (3)
Surface Water	No Exposure (4)	No Exposure (4)	NA	No Exposure (4)
Vapor	NA	NA	Possible Exposure (5)	NA

Notes:

(1) No free product detected in surface waters; water supply wells draw from Castle Hayne aquifer.
(2) Potential for exposure only if subsurface below 8 feet BLS is disturbed.
(3) Through use of Camp Geiger water-supply wells for drinking, cooking, and bathing.
(4) Ground-water sampling results indicate that plume does not extend to surface waters.
(5) Potential for exposure during maintenance/repair work in subsurface utility confinements.

DRAWINGS



NORTH

JACKSONVILLE SOUTH, N.C.
NW/4 NEW RIVER 15' QUADRANGLE
N3437.5–W7722.5/7.5

1952

PHOTOINSPECTED 1971
AMS 5553 II NW–SERIES V 842

CONTOUR INTERVAL 5 FEET

GRAPHIC SCALE FEET

2000 1000 0 2000 4000

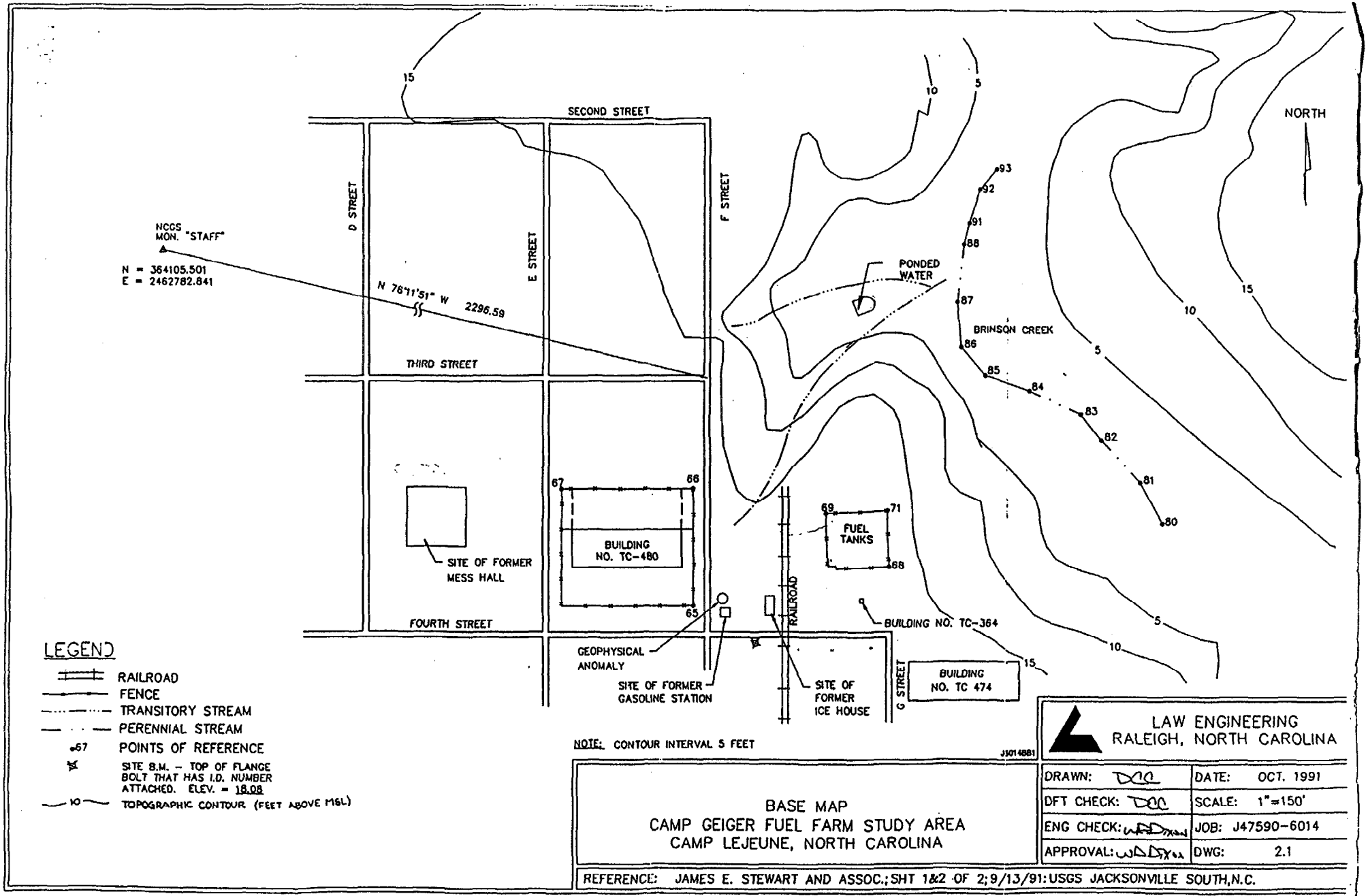
QUADRANGLE LOCATION

NOTE: SITE LOCATIONS ARE APPROXIMATE.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

TOPOGRAPHIC SITE MAP
UNDERGROUND FUEL INVESTIGATION
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: OCT. 1991
DFT CHECK: SL	SCALE: 1:24000
ENG CHECK: WDD	JOB: J47590-6014
APPROVAL: WDD	DWG: 1.1



LEGEND

- RAILROAD
- FENCE
- TRANSITORY STREAM
- PERENNIAL STREAM
- •67 POINTS OF REFERENCE
- SITE B.M. – TOP OF FLANGE BOLT THAT HAS I.D. NUMBER ATTACHED. ELEV. = 18.08
- 10 TOPOGRAPHIC CONTOUR (FEET ABOVE MSL)

NOTE: CONTOUR INTERVAL 5 FEET

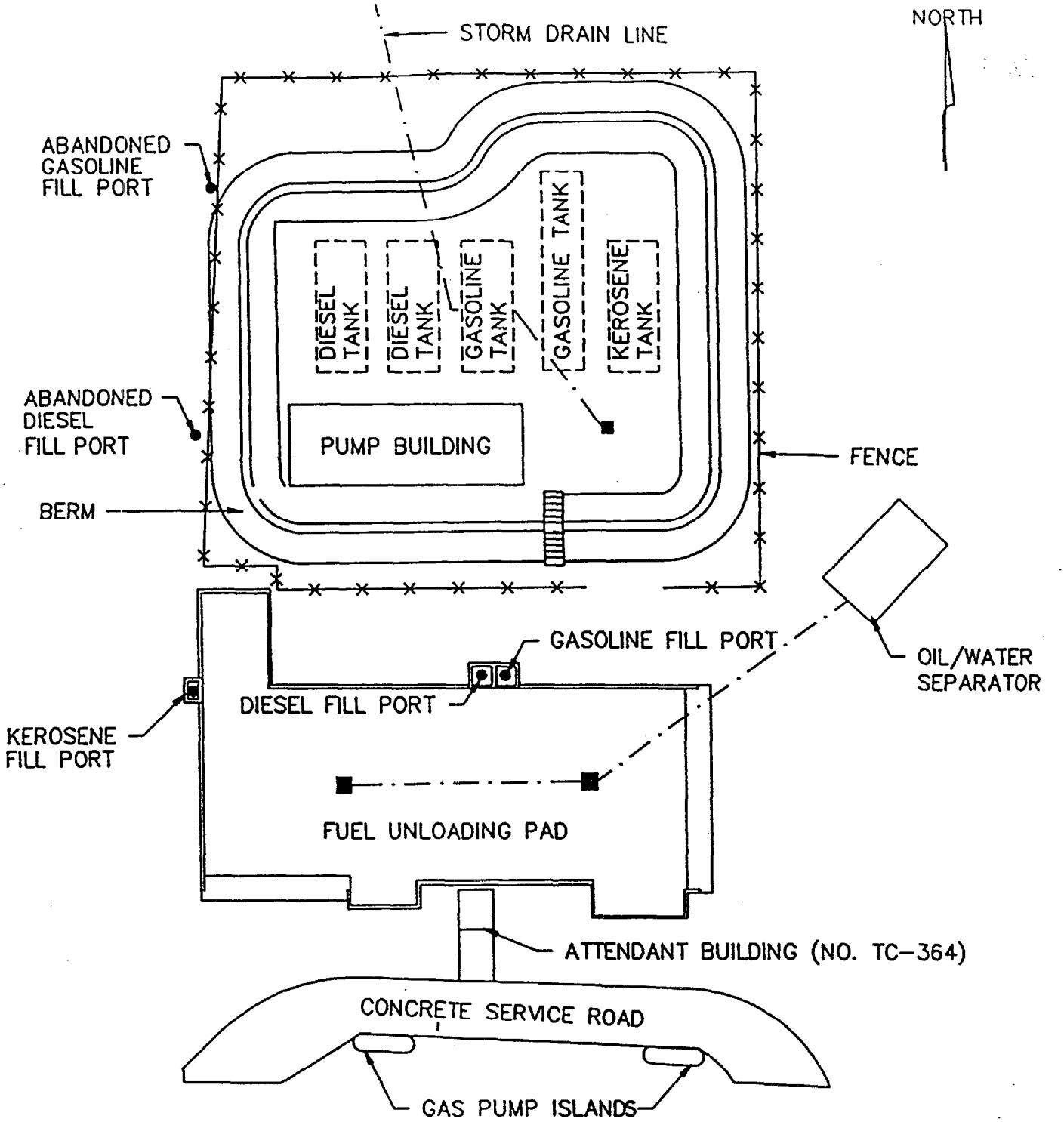
J3014881

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

BASE MAP
CAMP GEIGER FUEL FARM STUDY AREA
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: OCT. 1991
DFT CHECK: DCC	SCALE: 1"=150'
ENG CHECK: WDD	JOB: J47590-6014
APPROVAL: WDD	DWG: 2.1

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.



LEGEND

■ GRATES

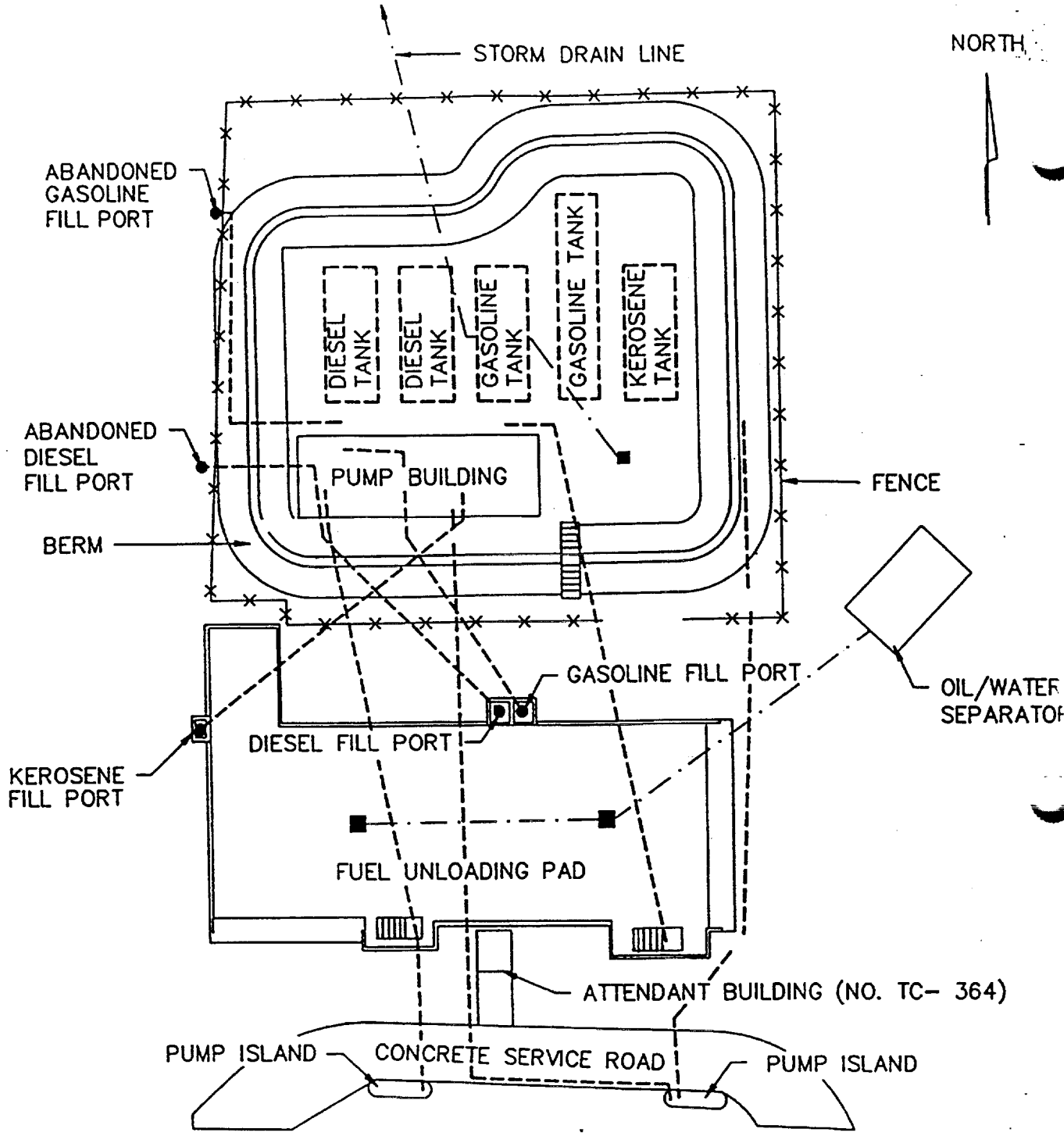
J6014BZ5 1:3

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

BASE MAP
FUEL FARM AREA
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: OCT. 1991
DFT CHECK: DCC	SCALE: 1"=30'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 2.2

REFERENCE: NAVFAC DWG. NO. 4174383



LEGEND

■ GRATES

------- LOCATION OF UNDERGROUND FUEL LINES

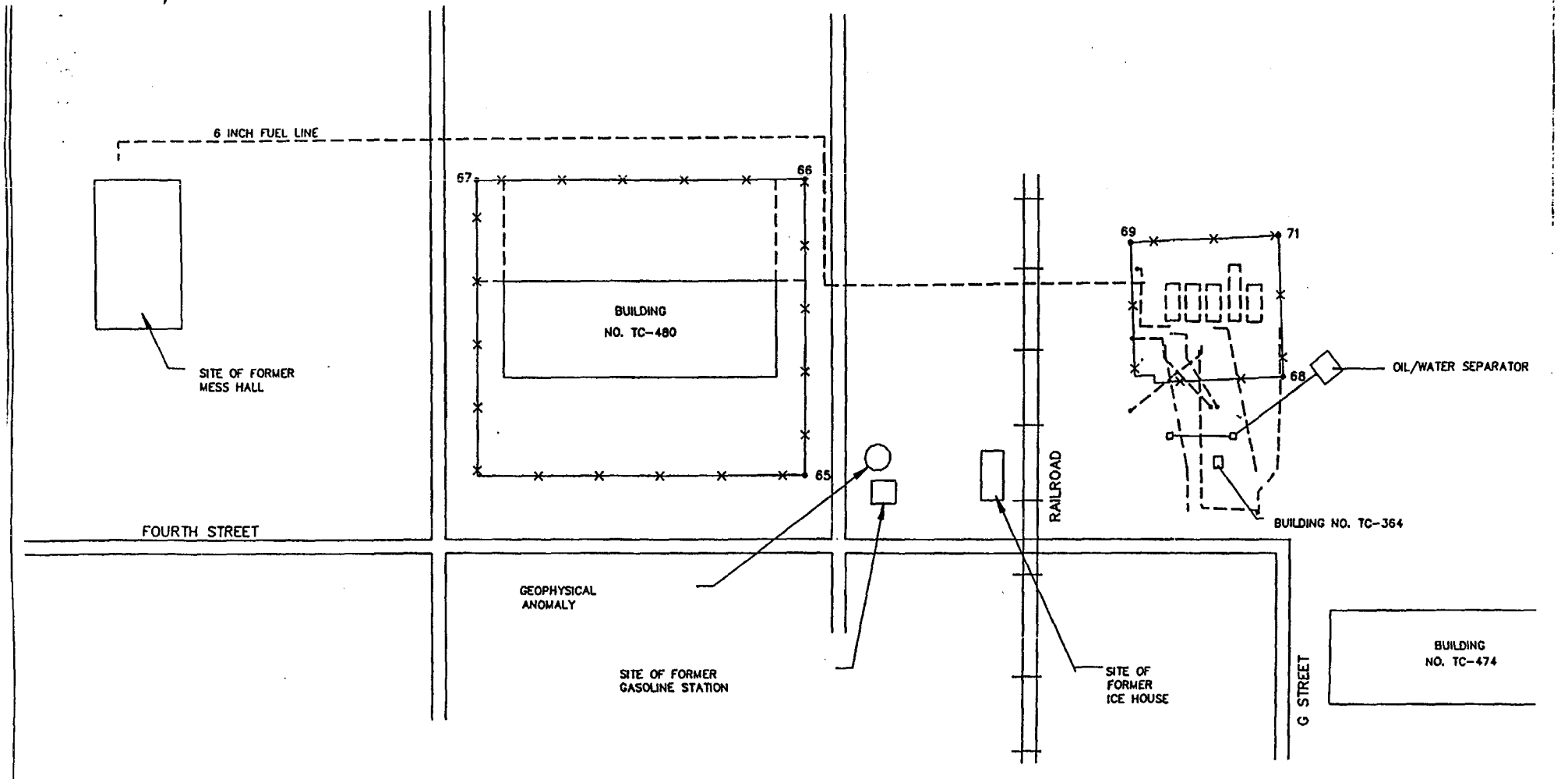
6014BZ6A 1:3

LAW ENGINEERING
RALEIGH, NORTH CAROLIN.

UNDERGROUND FUEL LINES
FUEL FARM AREA
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: OCT. 1991
DFT CHECK: DCC	SCALE: 1"=30'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 2.3

REFERENCE: NAVFAC DWG. NO. 4174383; TRACER RES. CORP. REPORT NO. 2-91-425T.



LEGEND

LOCATION OF UNDERGROUND FUEL LINES

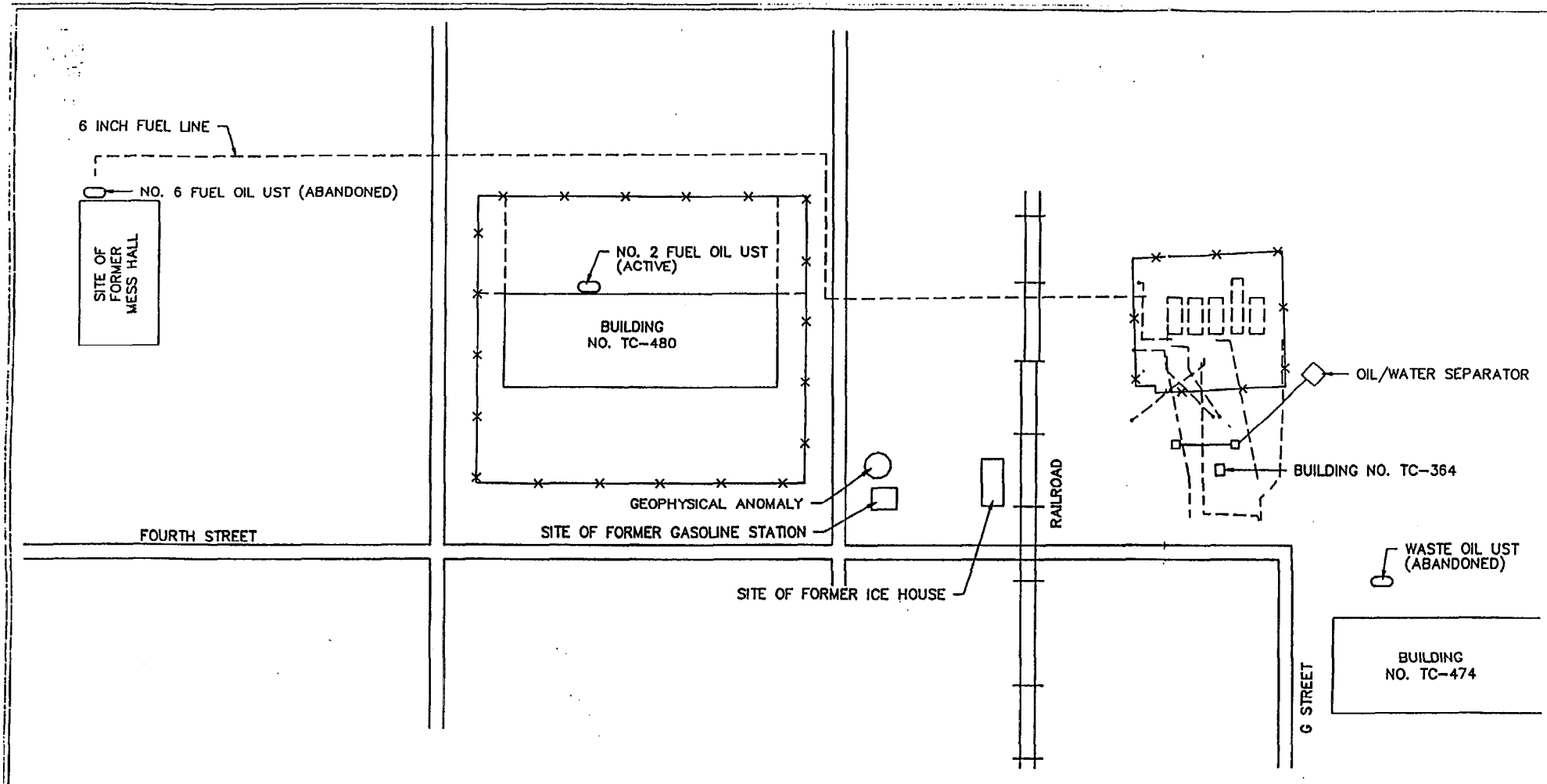
J8014Z83

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

UNDERGROUND FUEL LINES
CAMP GEIGER FUEL FARM STUDY AREA
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: NOV. 1991
DFT CHECK:	SCALE: 1"=70'
ENG CHECK: WBD JWW	JOB: 47590-6014
APPROVAL: WBD	DWG: 2.4

REFERENCE: JAMES E. STEWART & ASSOC. SHT 1&2 OF 2; NAVFAC DWG. 4174383; TRACER RES. #2-91-425T.



LEGEND

LOCATION OF UNDERGROUND FUEL LINES

APPROXIMATE LOCATION OF UNDERGROUND STORAGE TANKS

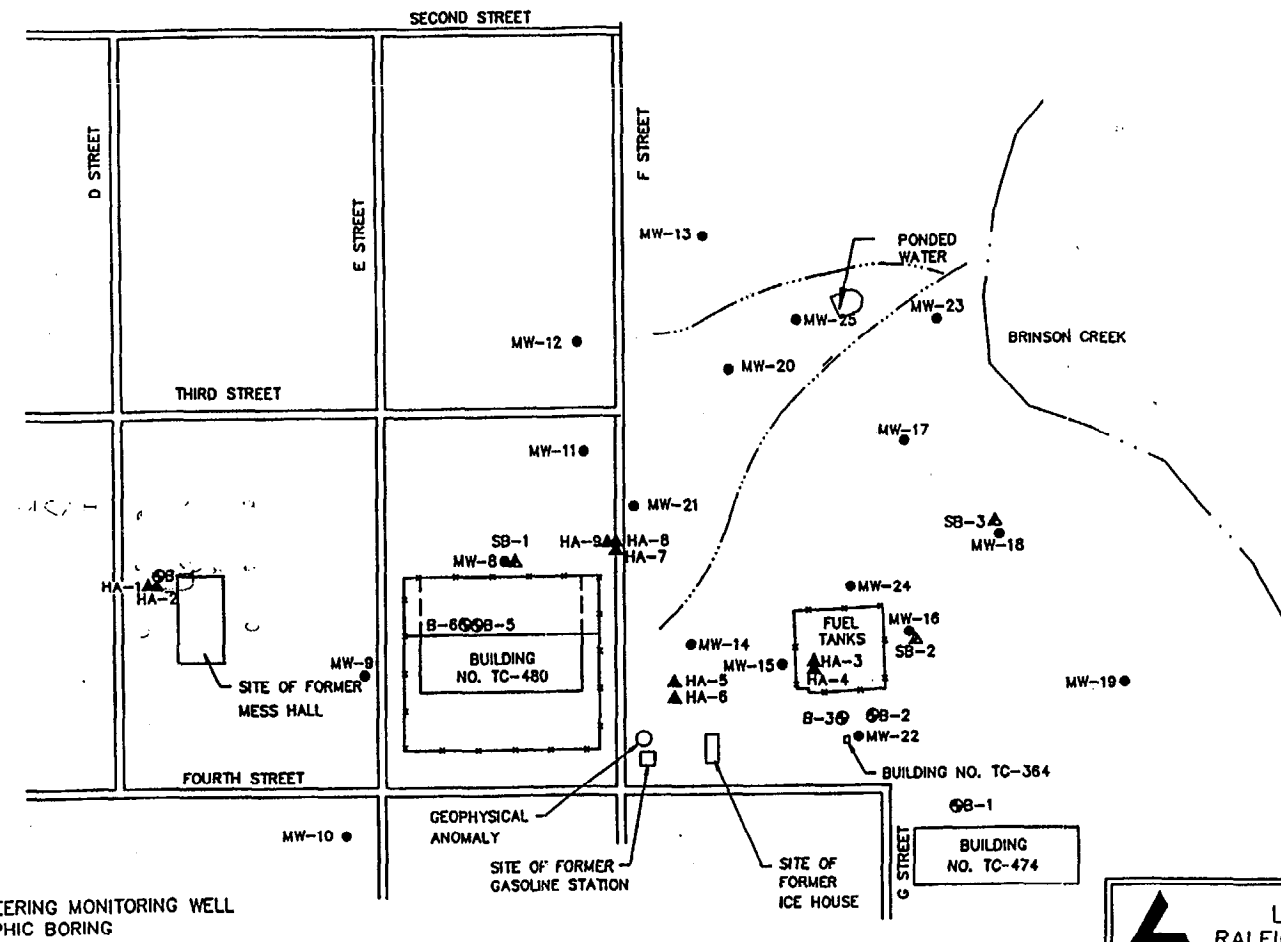
J5014Z24

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

LOCATION OF POTENTIAL CONTAMINANT SOURCES
CAMP GEIGER FUEL FARM STUDY AREA
CAMP LEJEUNE, NORTH CAROLINA

DRAWN:	DATE: FEB. 1992
DFT CHECK:	SCALE: 1"=70'
ENG CHECK:	JOB: 475-06014-01
APPROVAL:	DWG: 2.5

REFERENCE: JAMES E. STEWART & ASSOC. SHT 1&2 OF 2; NAVFAC DWG.4174383; TRACER RES.#2-91-425T.



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- ▲SB-1 LOCATION OF STRATIGRAPHIC BORING
- ⊕B-1 LOCATION OF SOIL BORING
- ▲HA-1 LOCATION OF HAND-AUGER BORING
- TRANSITORY STREAM
- PERENNIAL STREAM

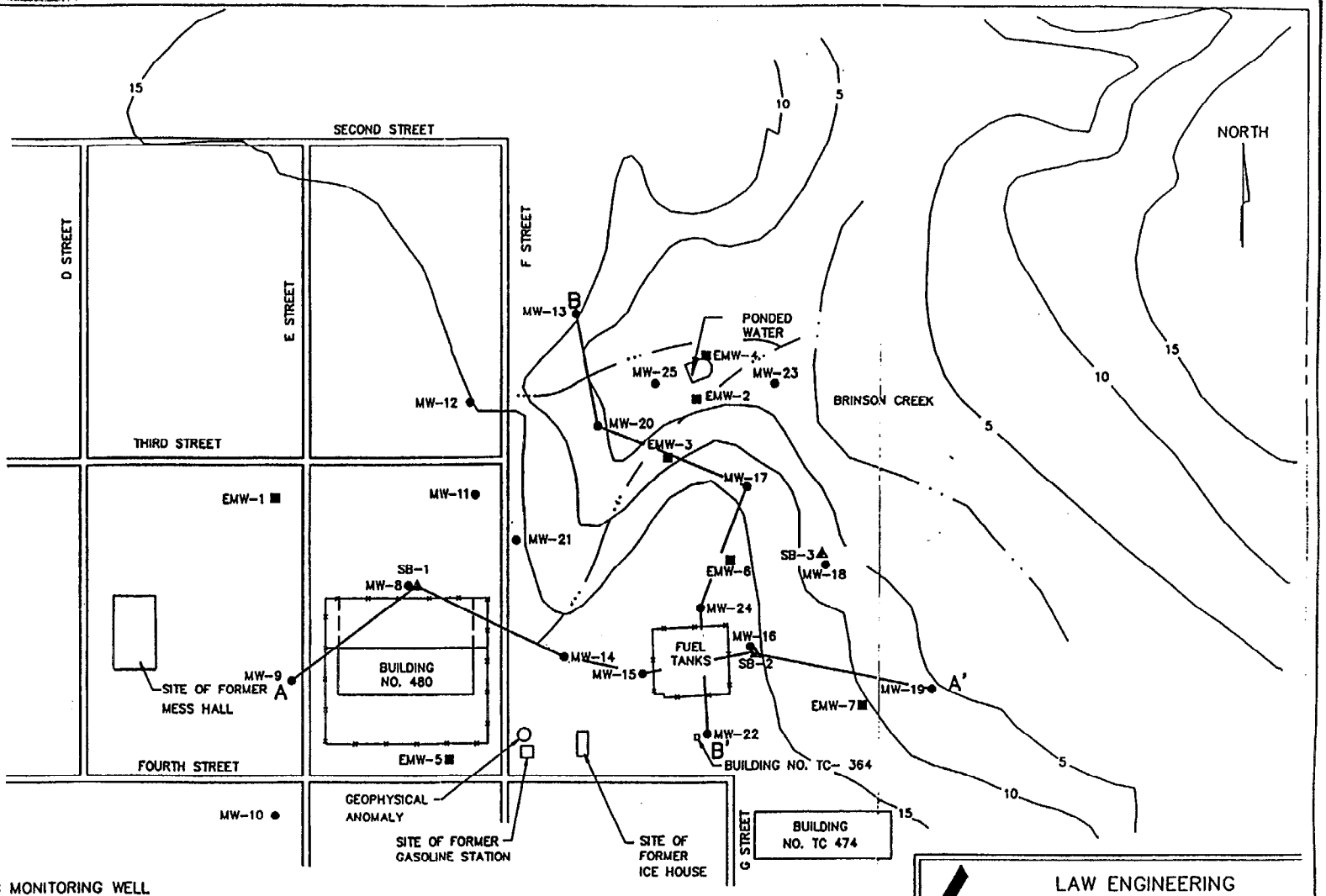
JC014Z21

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

LOCATION OF SOIL BORINGS
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: NOV. 1991
DFT CHECK: DCC	SCALE: 1"=150'
ENG CHECK: WADSM	JOB: J47590-6014
APPROVAL: WADSM	DWG: 3.1

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.



LEGEND

- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- ▲SB-1 LOCATION OF STRATIGRAPHIC BORING
- LINE OF CROSS SECTION
- TRANSITORY STREAM
- PERENNIAL STREAM
- 10 TOPOGRAPHIC CONTOUR (FEET ABOVE MSL)

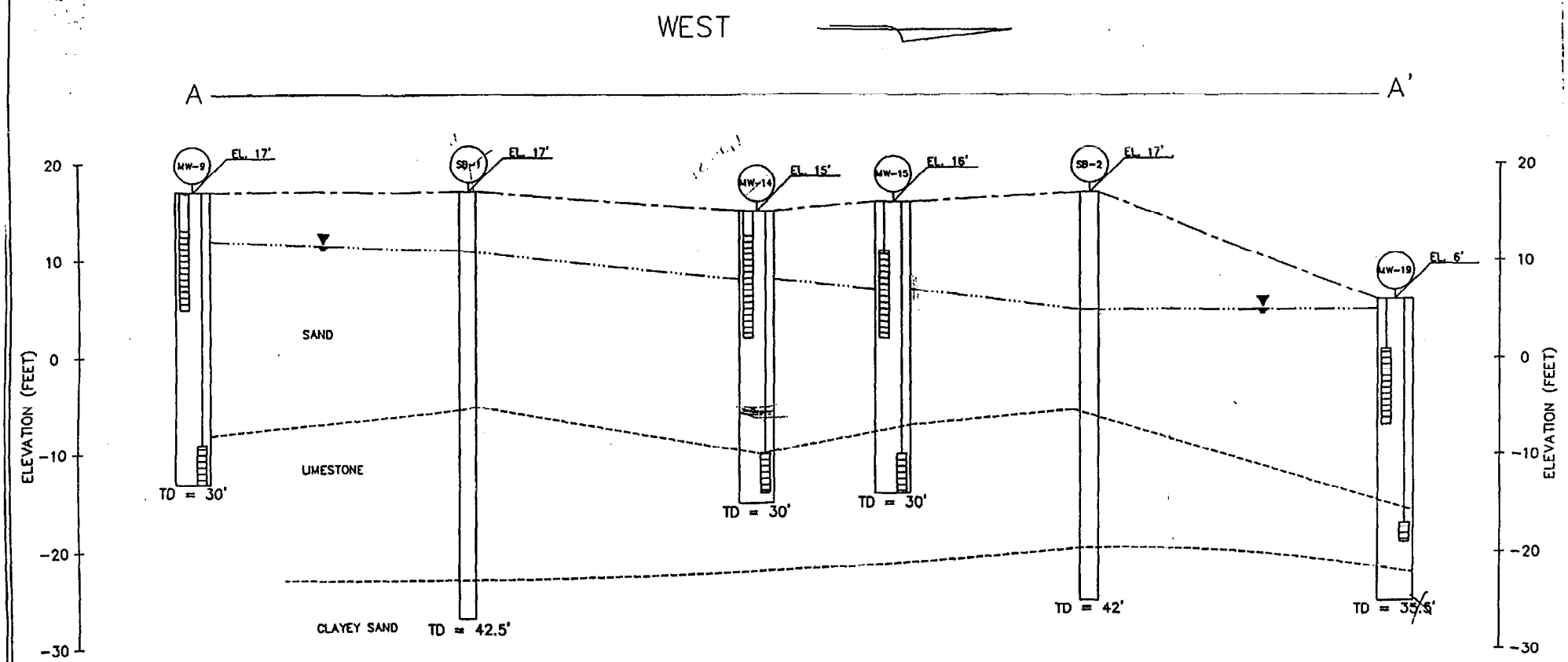
JE014218

PLAN VIEW OF CROSS SECTIONS
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DCL	DATE: NOV. 1991
DFT CHECK: DCL	SCALE: 1"=150'
ENG CHECK: RAKoll	JOB: J47590-6014
APPROVAL: [illegible]	DWG: 3.2



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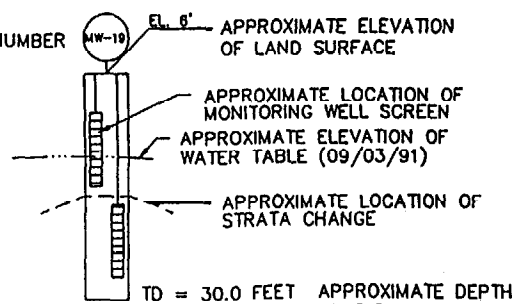


J6014B01

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

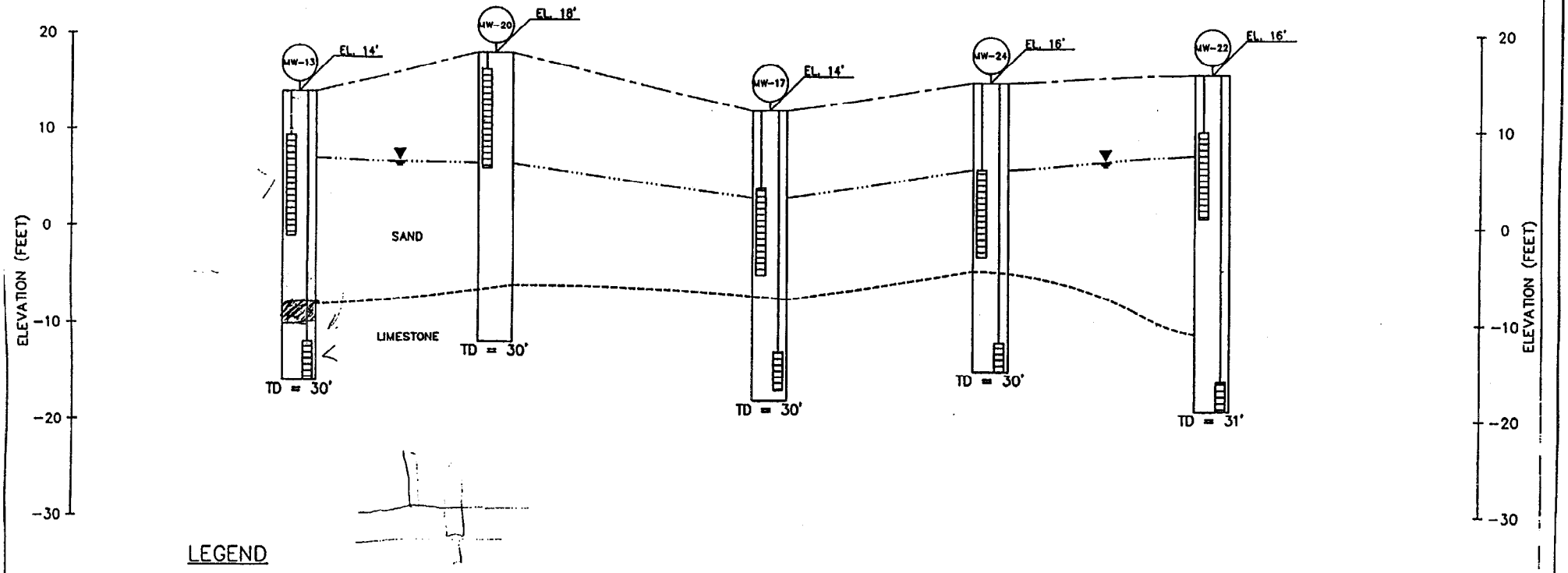
CROSS SECTION A–A'
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCG	DATE: NOV. 1991
DFT CHECK:	SCALE: VERT. 1"=10' HORIZ. 1"=80'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 3.3

REFERENCE: FIELD NOTES

SOUTH

B — B'



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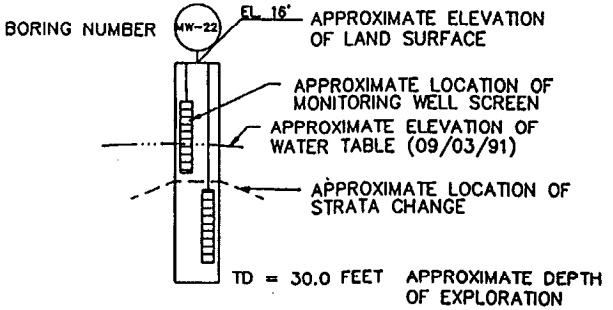


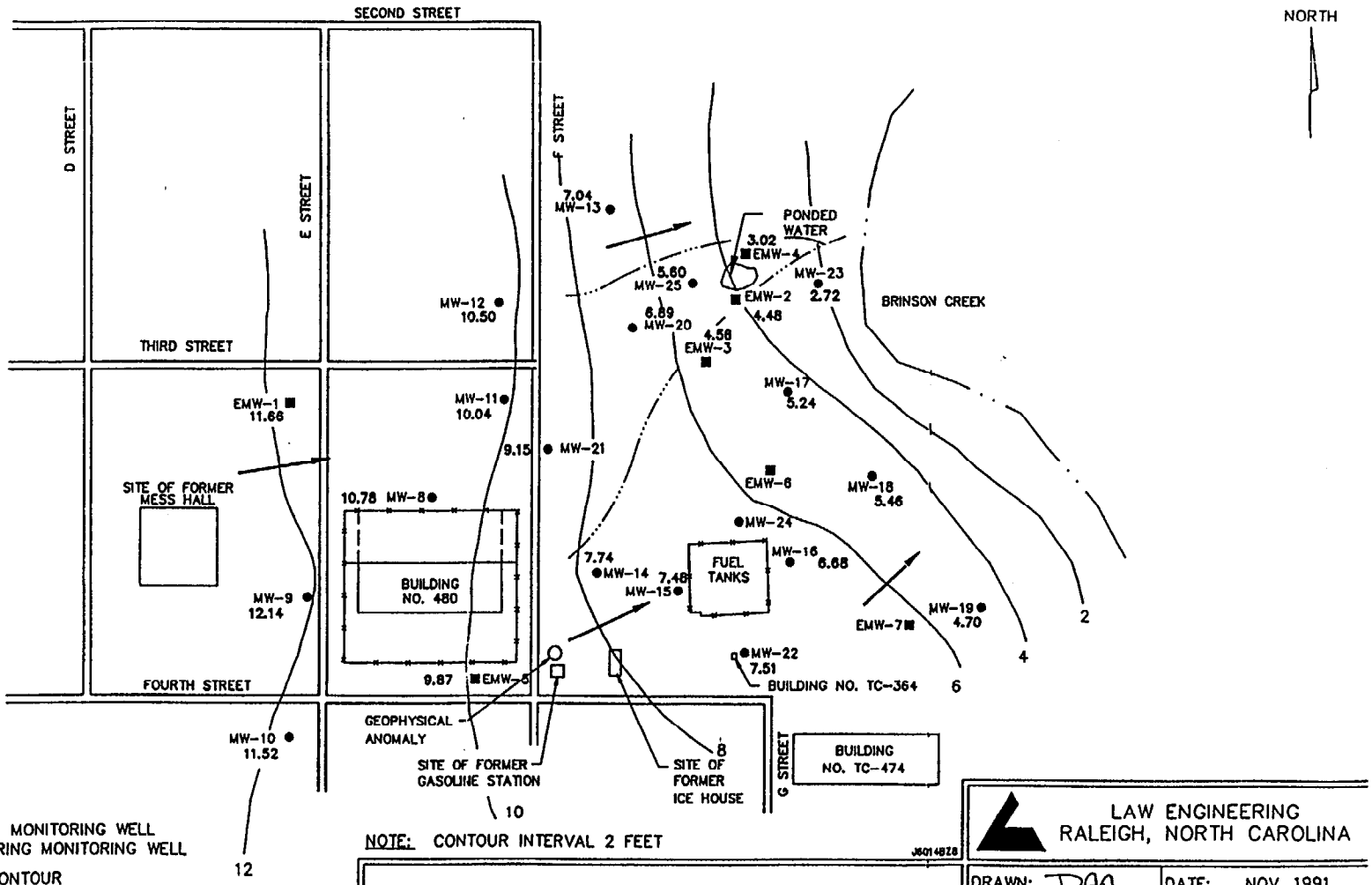
J6014802

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

CROSS SECTION B-B'
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: NOV. 1991
DFT CHECK: DCC	SCALE: VERT. 1"=10' HORIZ. 1"=80'
ENG CHECK: WAD	JOB: J47590-6014
APPROVAL: WAD	DWG: 3.4

REFERENCE: FIELD NOTES



LEGEND

- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 10 ESTIMATED WATER TABLE CONTOUR
- 5.60 GROUND WATER ELEVATION IN FEET
- DIRECTION OF GROUND WATER FLOW
- TRANSITORY STREAM
- PERENNIAL STREAM

NOTE: ELEVATIONS OF EMW-6,7,AND 24 NOT USED.

NOTE: CONTOUR INTERVAL 2 FEET

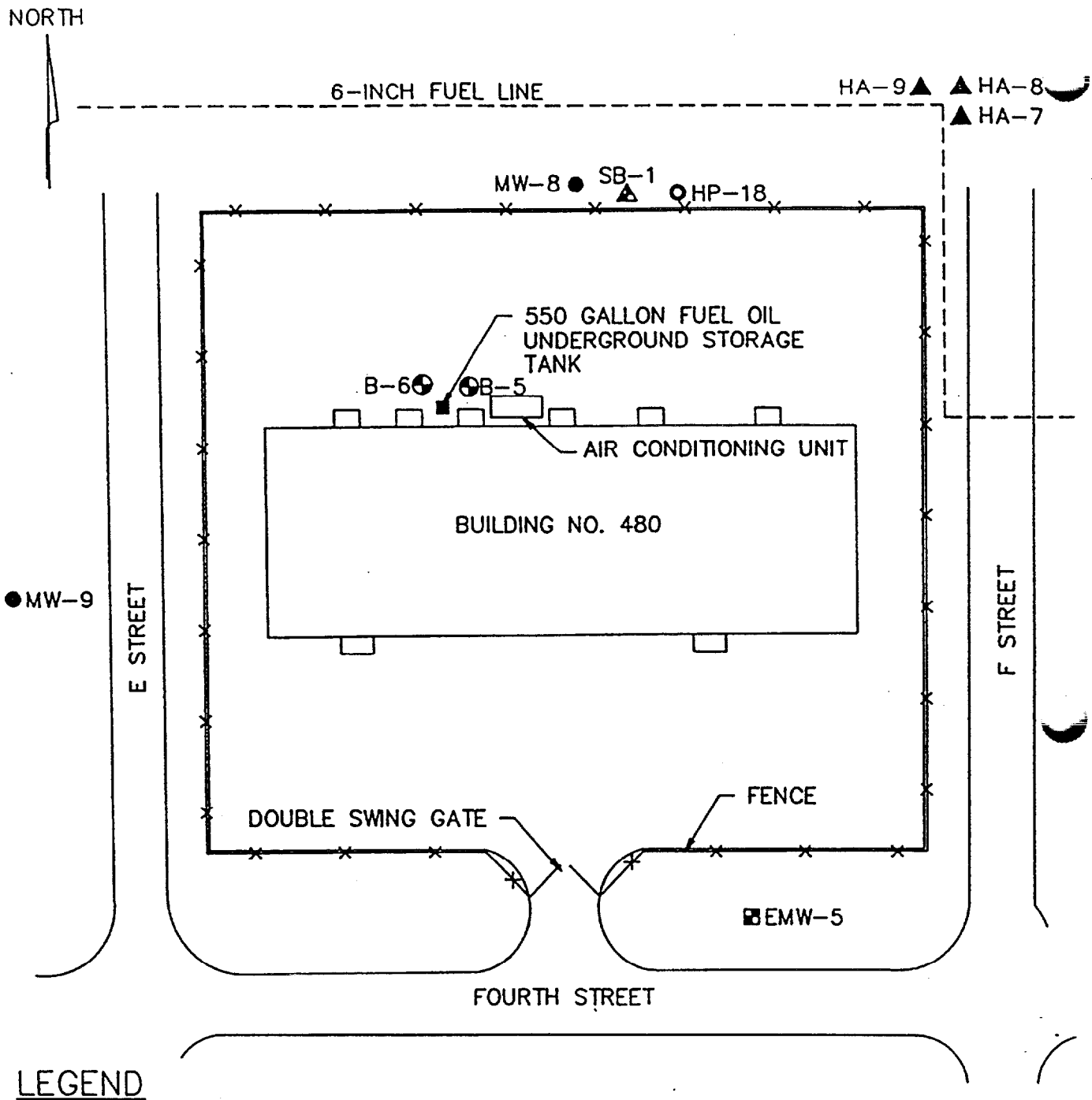
J6014BZ8

WATER-TABLE CONTOUR MAP
SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DAH	DATE: NOV. 1991
DFT CHECK:	SCALE: 1"=150'
ENG CHECK: WDixon	JOB: J47590-6014
APPROVAL: WDixon	DWG: 3.5



LEGEND

EMW-5	LOCATION OF PRE-EXISTING MONITORING WELL
MW-8	LOCATION OF MONITORING WELL
SB-1	LOCATION OF STRATIGRAPHIC BORING
B-5	LOCATION OF SOIL BORING
HA-8	LOCATION OF HAND-AUGER BORING
HP-18	LOCATION OF HYDROPUNCH BORING

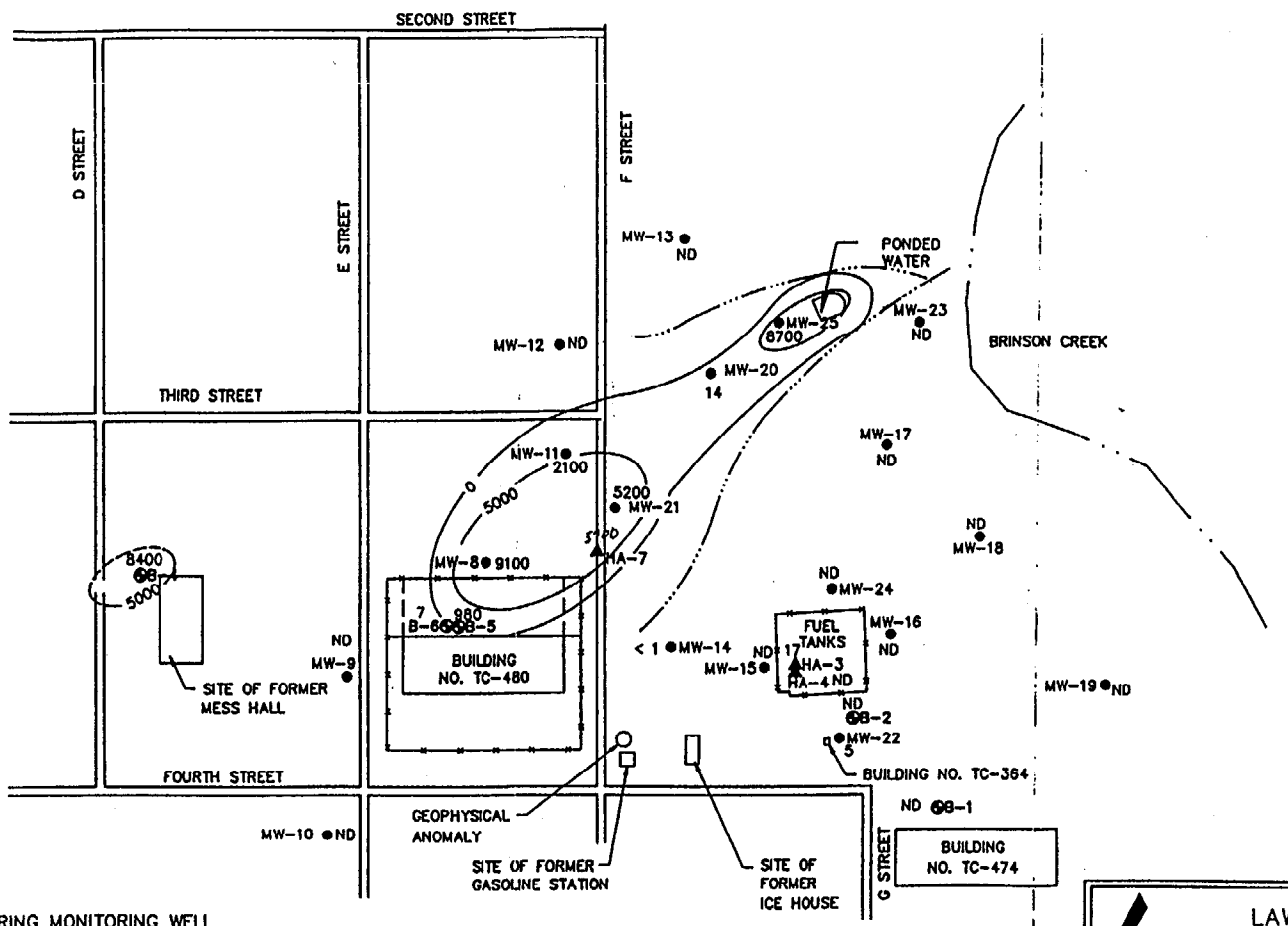
J6014BZ7 1:5

LAW ENGINEERING
RALEIGH, NORTH CAROLIN

BUILDING NO. 480 SITE PLAN
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: OCT. 1991
DFT CHECK: DCC	SCALE: 1"=50'
ENG CHECK:	JOB: J47590-6014
APPROVAL: WDD, JCW	DWG: 4.2

REFERENCE NAVFAC DRAWING NO. 4000116



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- SB-1 LOCATION OF SOIL BORING
- ▲HA-1 LOCATION OF HAND-AUGER BORING
- TRANSITORY STREAM
- PERENNIAL STREAM
- 8400 CONCENTRATION OF TPH IN ug/L
- ND NONE DETECTED

NOTE: CONTOUR INTERVAL 5000 ug/L

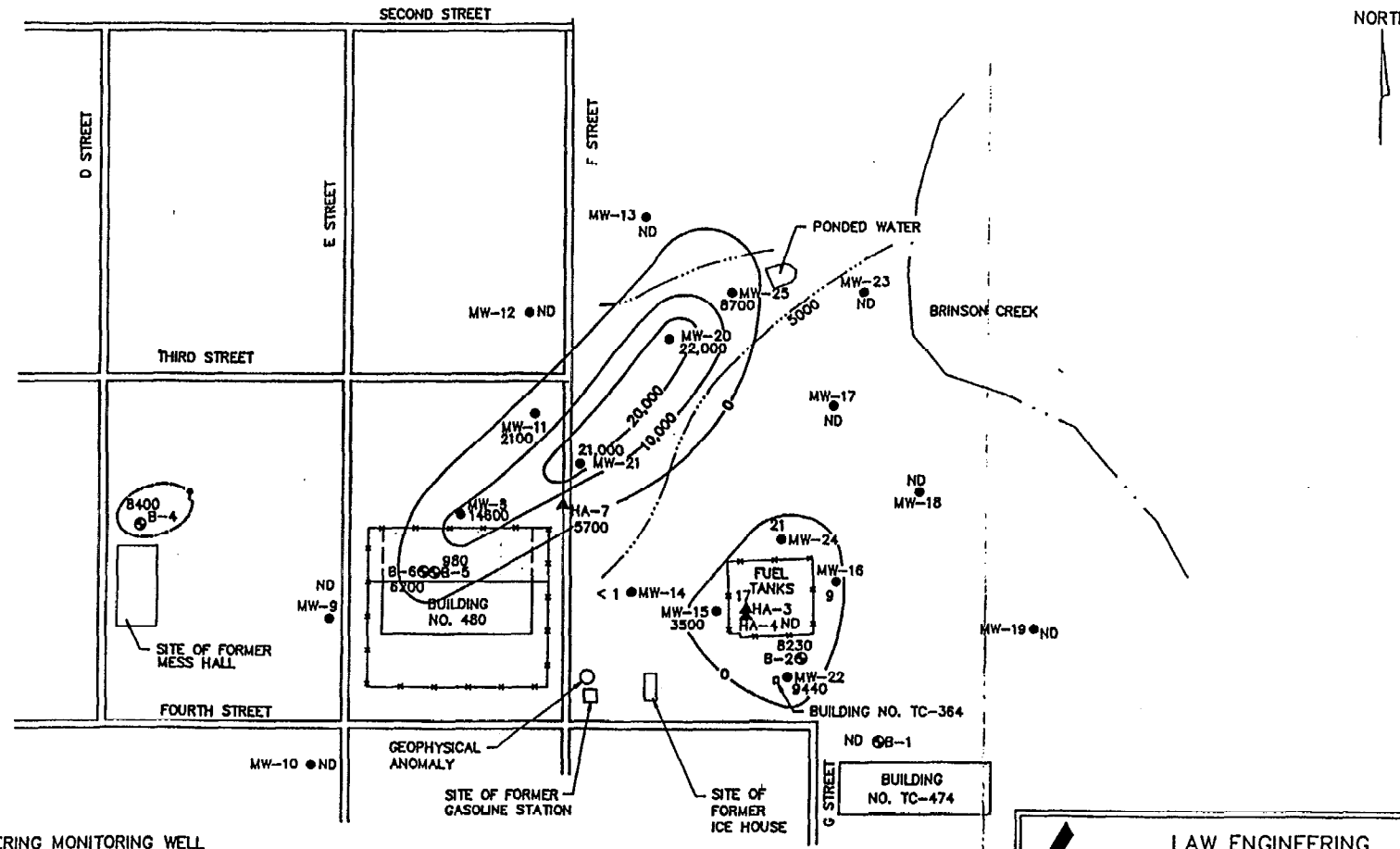
J8014Z17

ISOPLETH MAP – TPH CONCENTRATIONS COMBINED VOLATILES AND SEMI-VOLATILES SOIL SAMPLES ABOVE THE WATER TABLE CAMP GEIGER FUEL FARM CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DCG	DATE: NOV. 1991
DFT CHECK:	SCALE: 1"=150'
ENG CHECK: WPD	JOB: J47590-6014
APPROVAL: WPD	DWG: 4.3



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- ⊕B-1 LOCATION OF SOIL BORING
- ▲HA-1 LOCATION OF HAND-AUGER BORING
- TRANSITORY STREAM
- PERENNIAL STREAM
- 8400 CONCENTRATION OF TPH IN mg/kg
- ND NONE DETECTED

CONTOUR INTERVAL 10,000 mg/kg

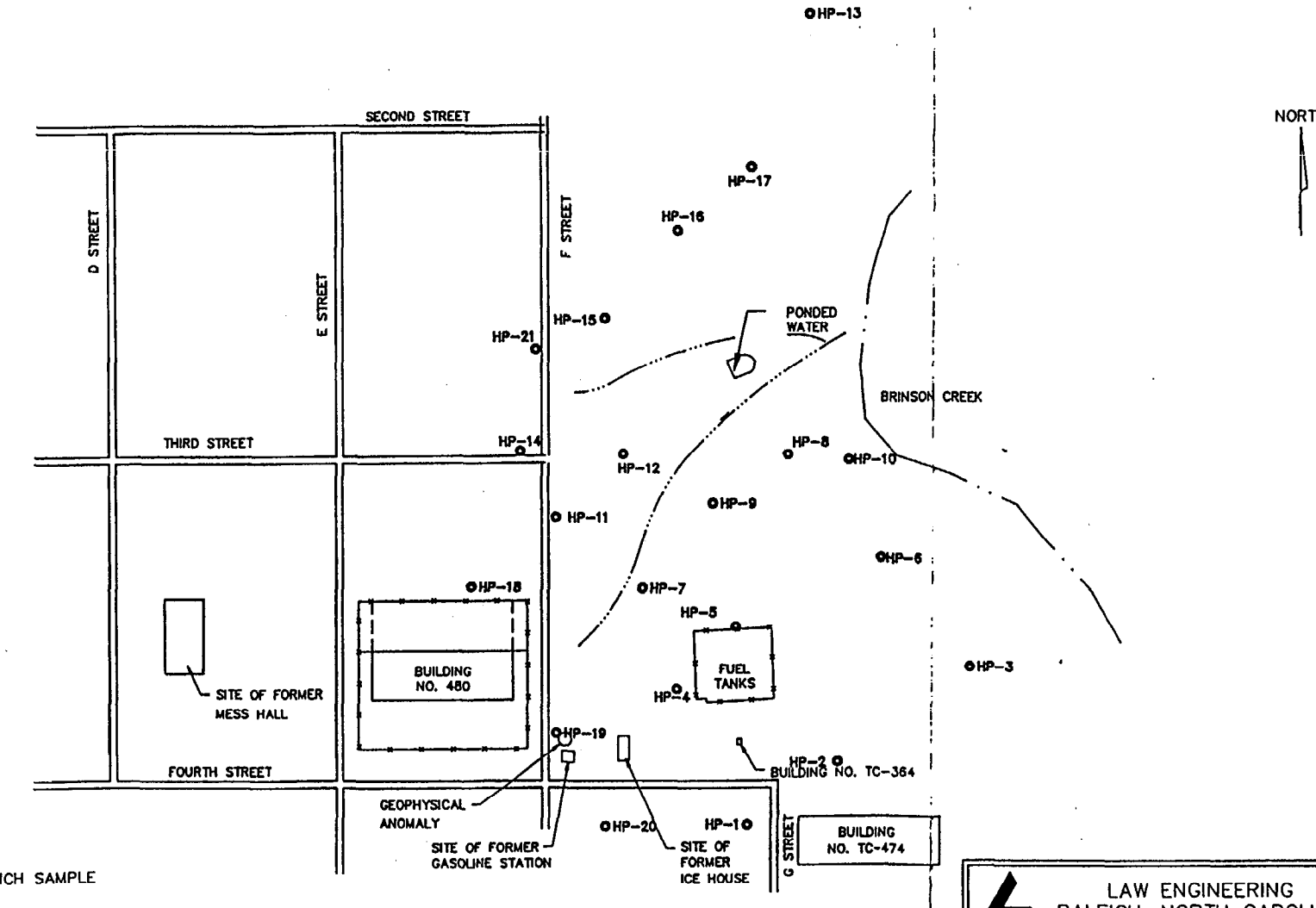
J6014809

ISOPLETH MAP – TPH CONCENTRATIONS COMBINED VOLATILES AND SEMI-VOLATILES SOIL SAMPLES WITH HIGHEST TPH CONCENTRATIONS CAMP GEIGER FUEL FARM CAMP LEJEUNE, NORTH CAROLINA

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DCC	DATE: FEB. 1992
DFT CHECK:	SCALE: 1"=150'
ENG CHECK: RALaw	JOB: J47590-6014
APPROVAL: WDDixon	DWG: 4.3.1

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.



LEGEND

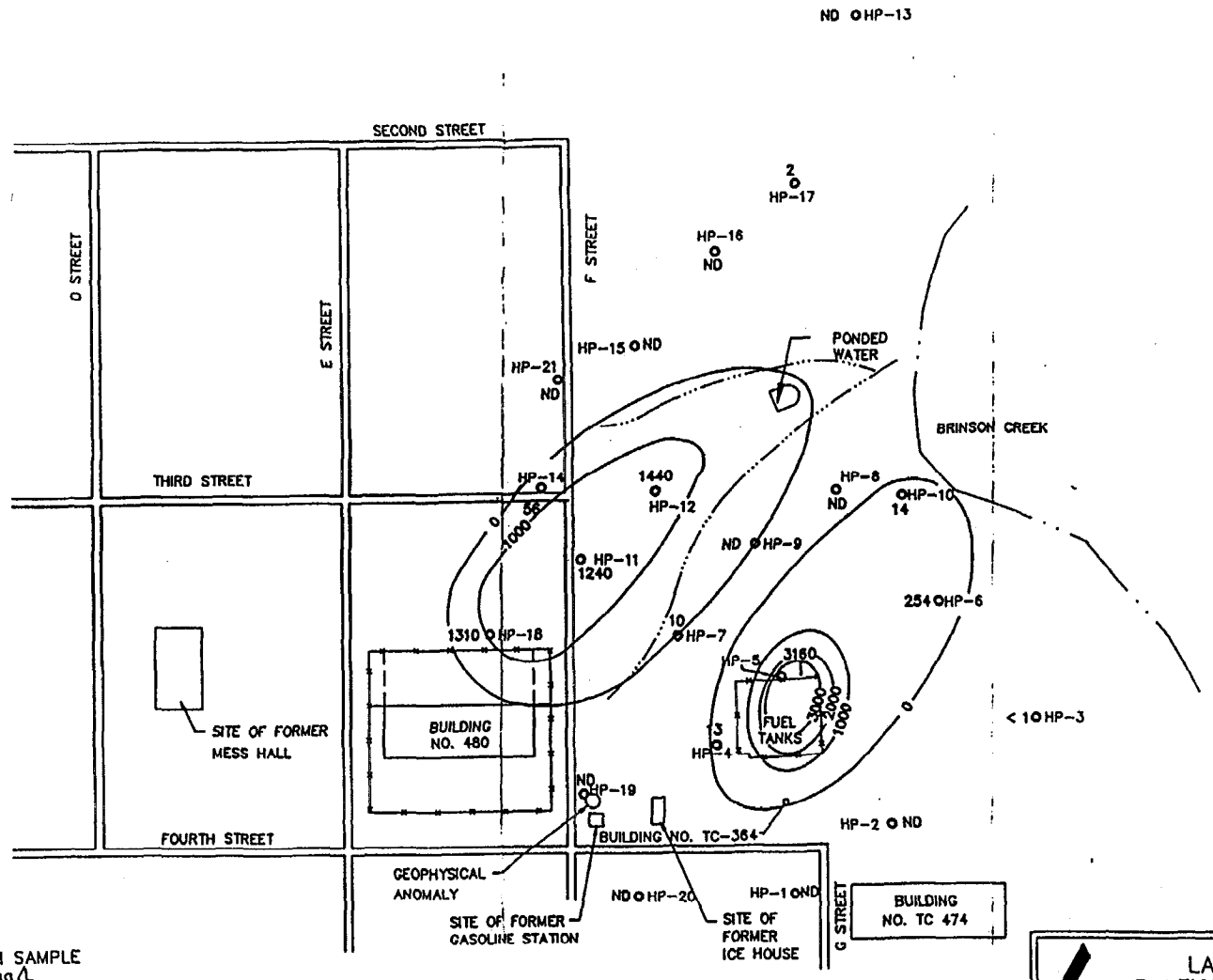
- FENCE
- HP-1 LOCATION OF HYDROPUNCH SAMPLE
- TRANSITORY STREAM
- PERENNIAL STREAM

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

LOCATION OF HYDROPUNCH GROUND-WATER SAMPLES
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: NOV. 1991
DFT CHECK: DCC	SCALE: 1"=150'
ENG CHECK: WDD	JOB: J47590-6014
APPROVAL: WDD	DWG: 4.4

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91



LEGEND

- FENCE
- OHP-1 LOCATION OF HYDROPUNCH SAMPLE
- 3160 BTEX CONCENTRATION IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

NOTE: CONTOUR INTERVAL 1000 ug/L

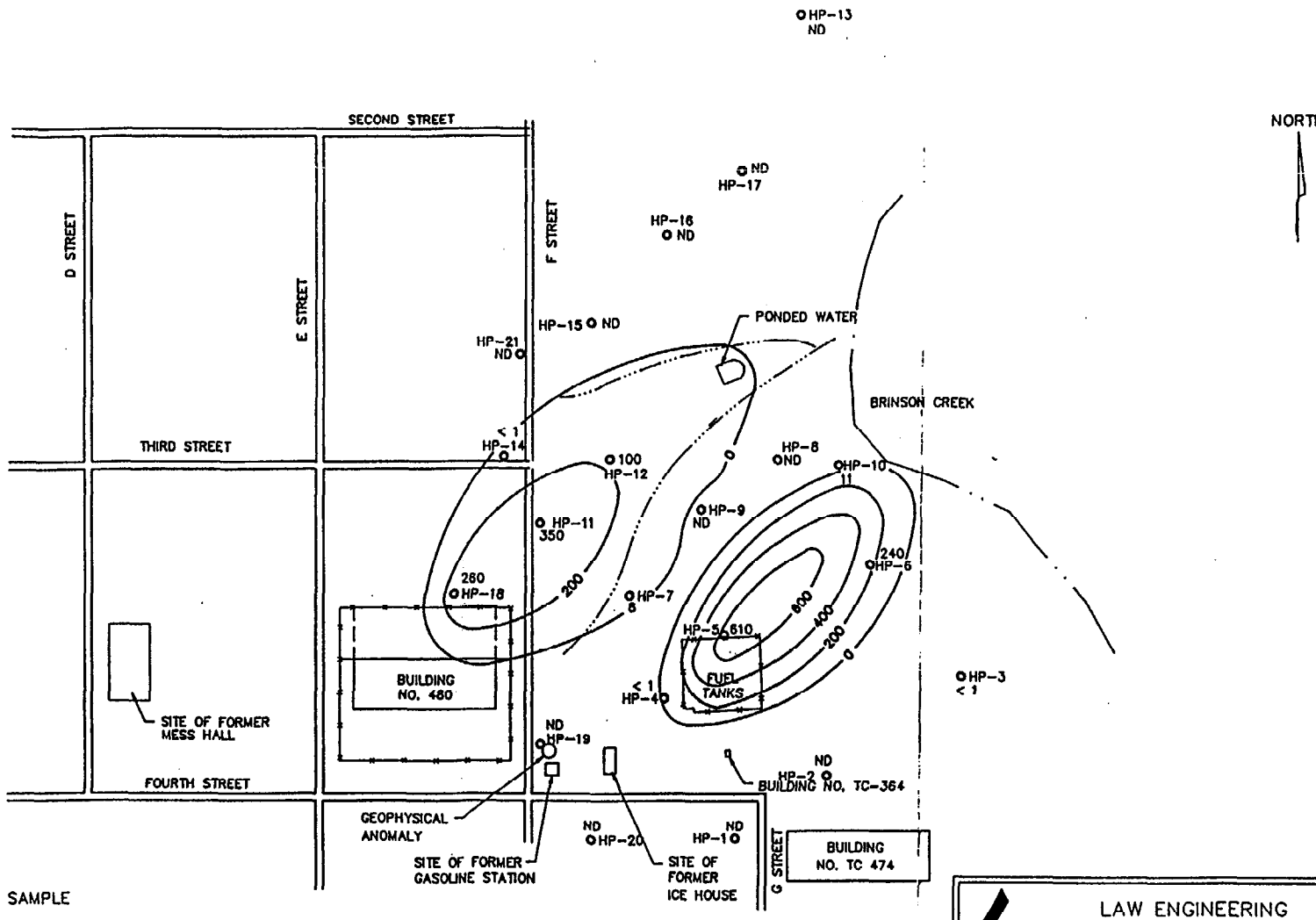
J6014820

ISOPLETH MAP
COMBINED BTEX CONCENTRATIONS
HYDROPUNCH GROUND-WATER SAMPLES
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DC	DATE: OCT. 1991
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.5



LEGEND

- FENCE
- HP-1 LOCATION OF HYDROPUNCH SAMPLE
- TRANSITORY STREAM
- PERENNIAL STREAM
- 8905 BENZENE CONCENTRATION IN ug/L
- ND NONE DETECTED

CONTOUR INTERVAL = 200 ug/L

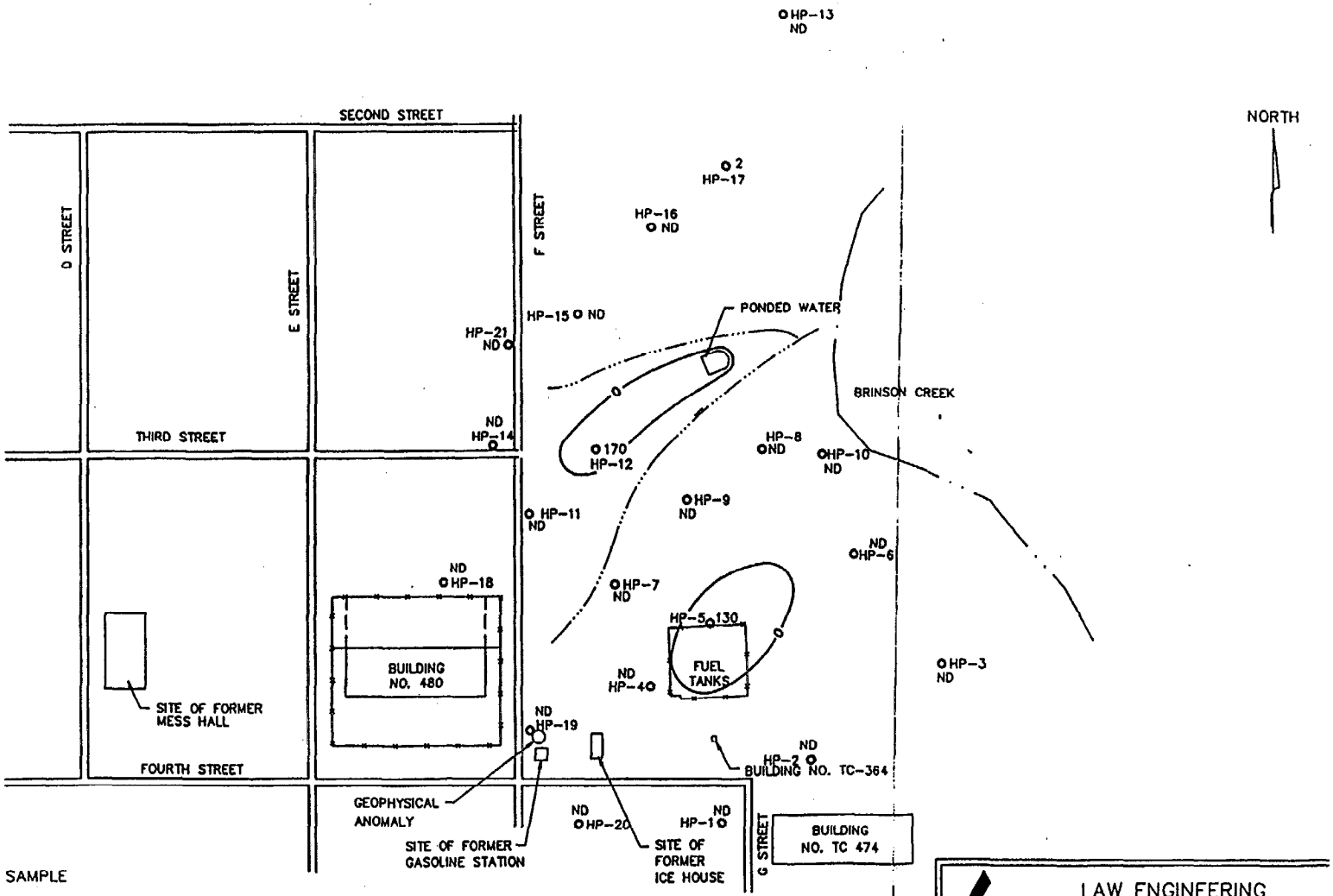
J8014810

ISOPLETH MAP – BENZENE CONCENTRATIONS
HYDROPUNCH GROUND-WATER SAMPLES
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2; 9/13/91.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN:	DATE: NOV. 1991
DFT CHECK: CCC	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.5.1



LEGEND

- FENCE
- OHP-1 LOCATION OF HYDROPUNCH SAMPLE
- TRANSITORY STREAM
- PERENNIAL STREAM
- 8905 TOLUENE CONCENTRATION IN ug/L
- ND NONE DETECTED

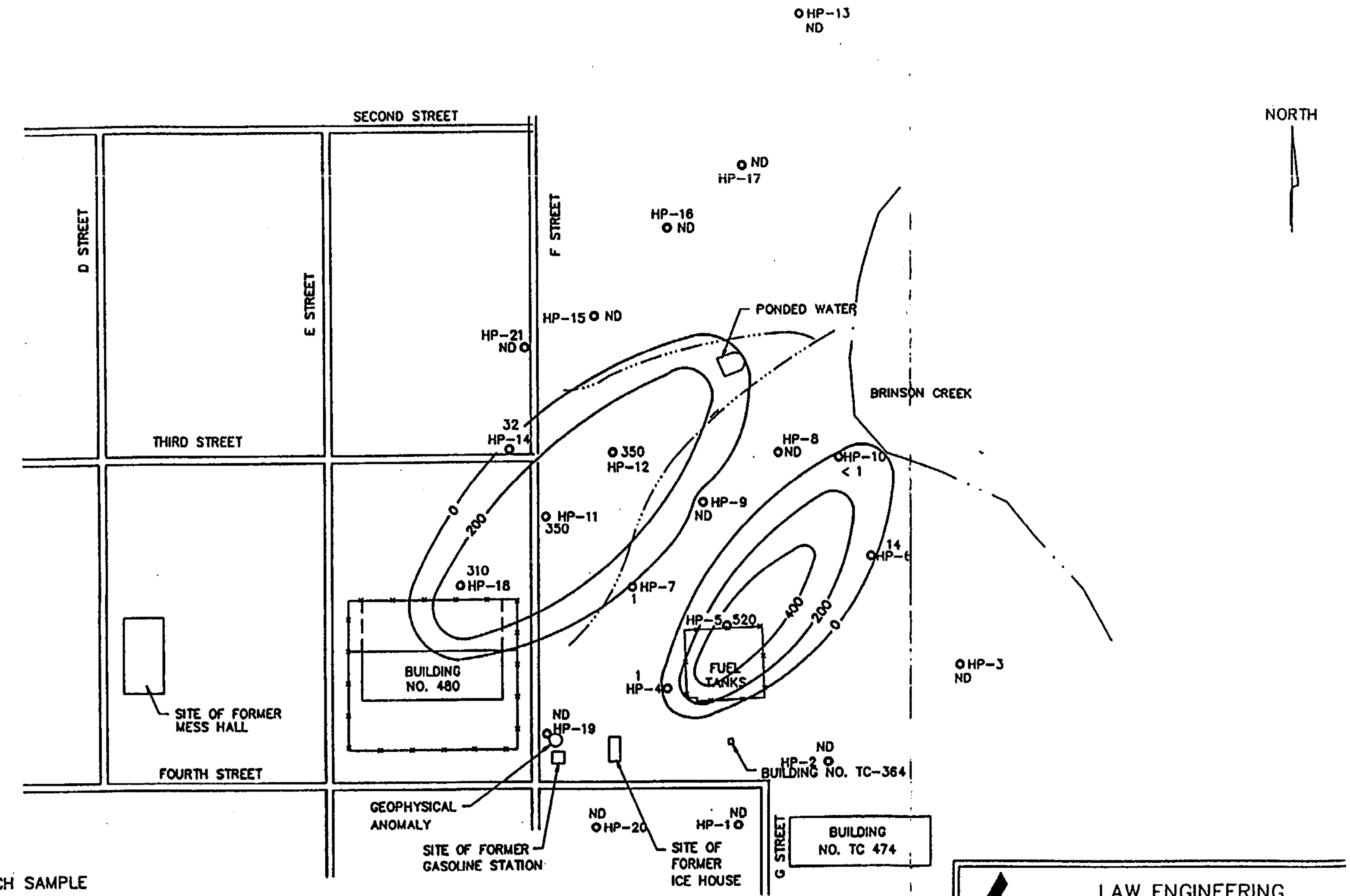
J014B12

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP – TOLUENE CONCENTRATIONS
HYDROPUNCH GROUND-WATER SAMPLES
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN:	DATE: NOV. 1991
DFT CHECK: CCC.	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.5.2

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2; 9/13/91.



LEGEND

- FENCE
- HP-1 LOCATION OF HYDROPUNCH SAMPLE
- TRANSITORY STREAM
- PERENNIAL STREAM
- 8905 ETHYLBENZENE CONCENTRATION IN ug/L
- ND NONE DETECTED

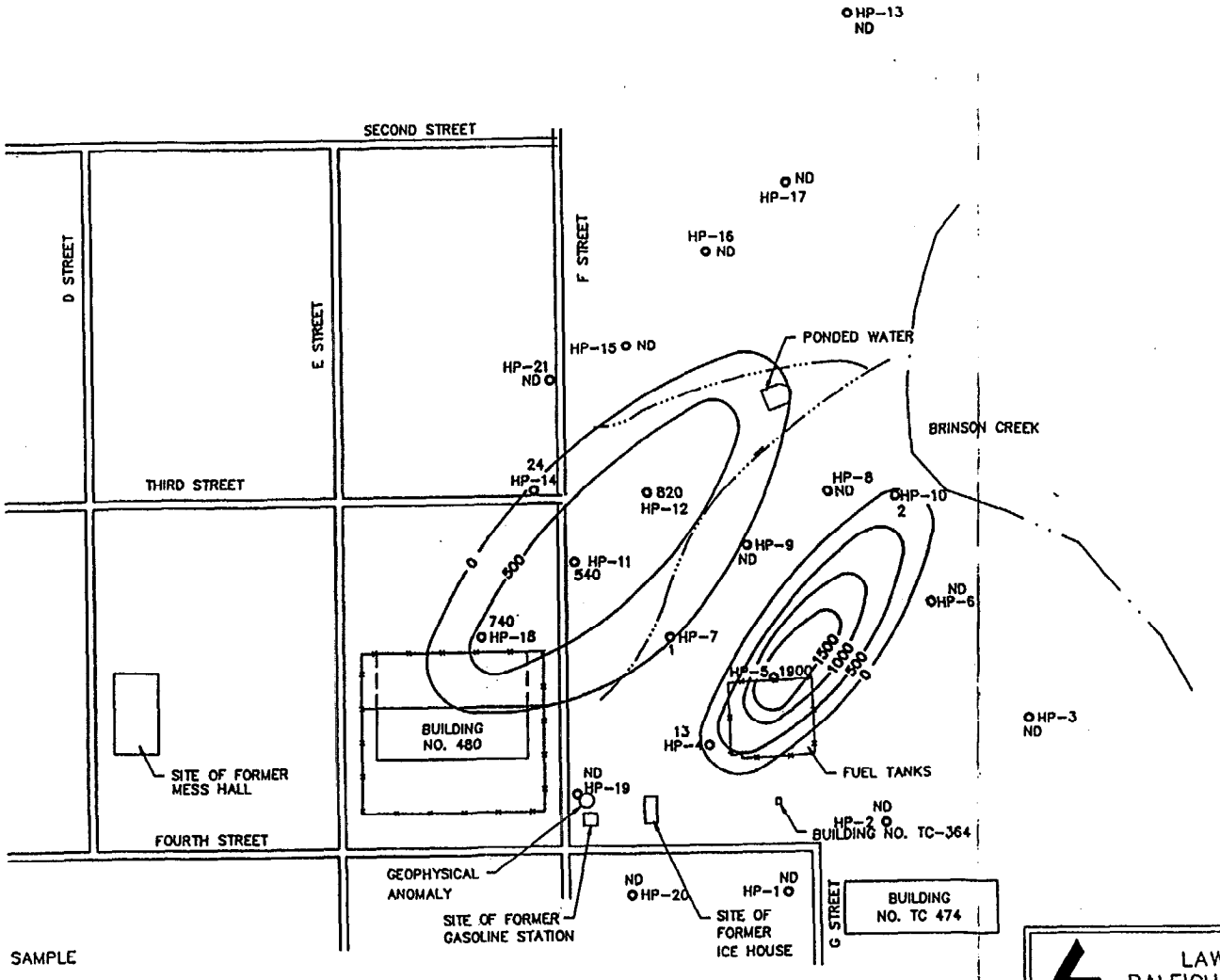
CONTOUR INTERVAL = 200 ug/L

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP – ETHYLBENZENE CONCENTRATIONS
HYDROPUNCH GROUND-WATER SAMPLES
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN:	DATE: NOV. 1991
DFT CHECK: CCC	SCALE: 1"=150'
ENG CHECK: RAC	JOB: J47590-6014
APPROVAL:	DWG: 4.5.3

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2; 9/13/91.



LEGEND

- FENCE
- HP-1 LOCATION OF HYDROPUNCH SAMPLE
- TRANSITORY STREAM
- PERENNIAL STREAM
- 8905 XYLENES CONCENTRATION IN ug/L
- ND NONE DETECTED

CONTOUR INTERVAL = 500 ug/L

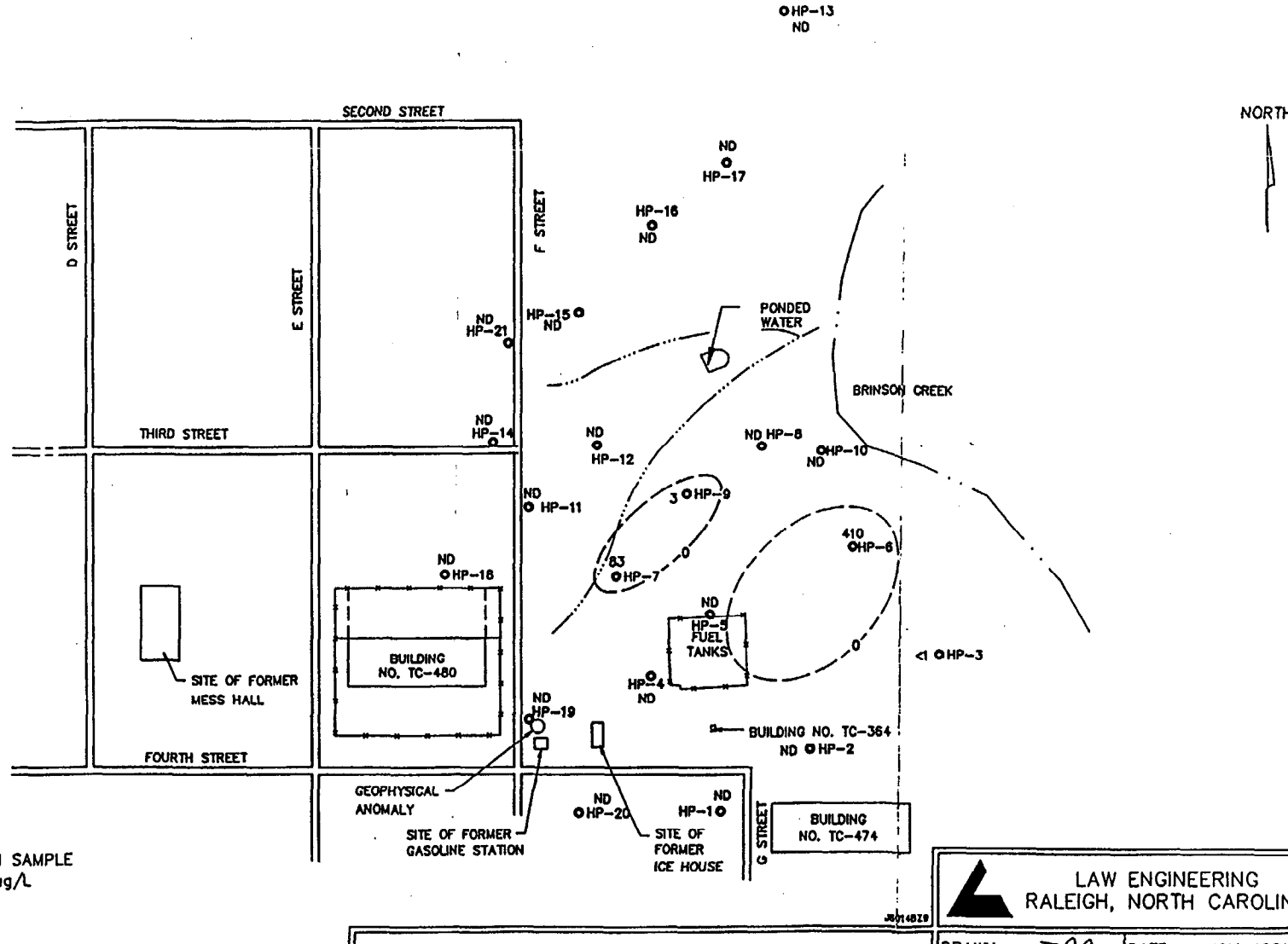
J4014813

ISOPLETH MAP – TOTAL XYLENES CONCENTRATIONS
HYDROPUNCH GROUND-WATER SAMPLES
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2; 9/13/91.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN:	DATE: NOV. 1991
DFT CHECK: CCC	SCALE: 1"=150'
ENG CHECK: JBR	JOB: J47590-6014
APPROVAL: WDD	DWG: 4.5.4



LEGEND

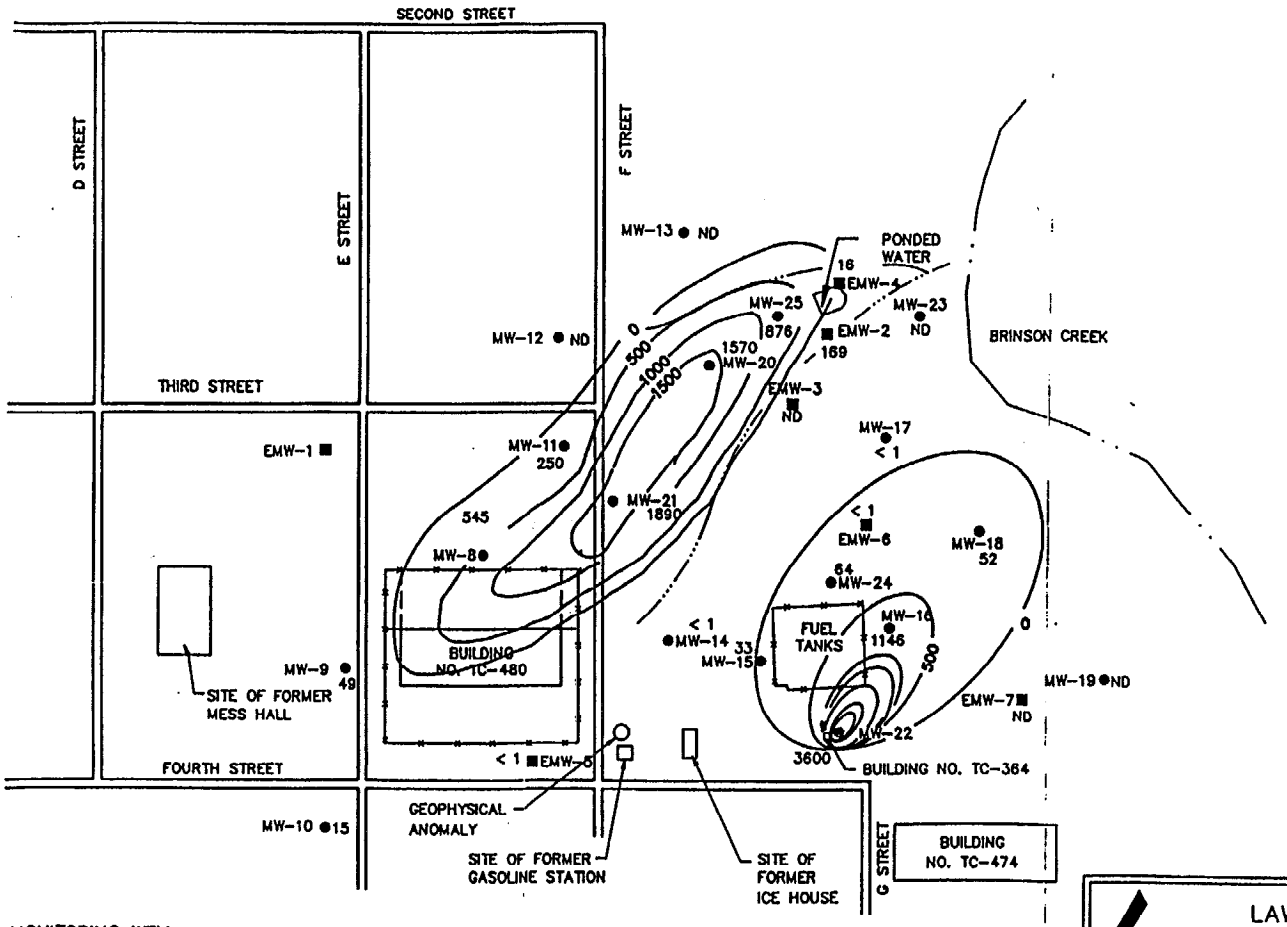
- FENCE
- HP-1 LOCATION OF HYDROPUNCH SAMPLE
- 56 MTBE CONCENTRATION IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP - MTBE CONCENTRATIONS
HYDROPUNCH GROUND-WATER SAMPLES
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCM	DATE: NOV. 1991
DFT CHECK:	SCALE: 1"=150'
ENG CHECK: WDD	JOB: J47590-6014
APPROVAL: WDD	DWG: 4.6

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91; USGS JACKSONVILLE SOUTH, N.C.



LEGEND

- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 8905 BTEX CONCENTRATION IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

CONTOUR INTERVAL = 500 ug/L

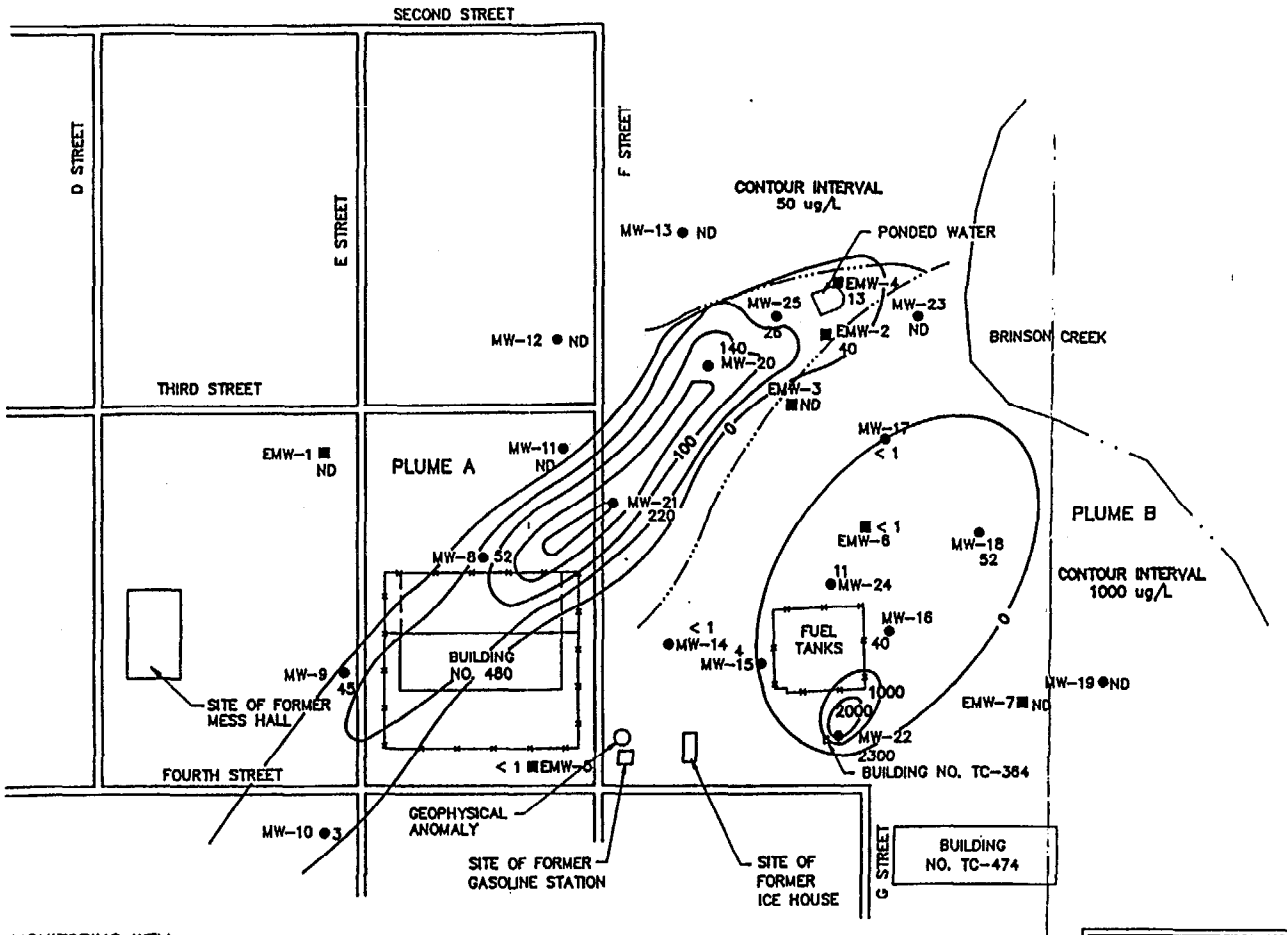
J6019Z19

ISOPLETH MAP – COMBINED BTEX CONCENTRATIONS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DAC	DATE: NOV. 1991
DFT CHECK:	SCALE: 1"=150'
ENG CHECK: WAD	JOB: J47590-6014
APPROVAL: WAD	DWG: 4.7



LEGEND

- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 8905 BENZENE CONCENTRATION IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

PLUME A CONTOUR INTERVAL 50 ug/L
PLUME B CONTOUR INTERVAL 1000 ug/L

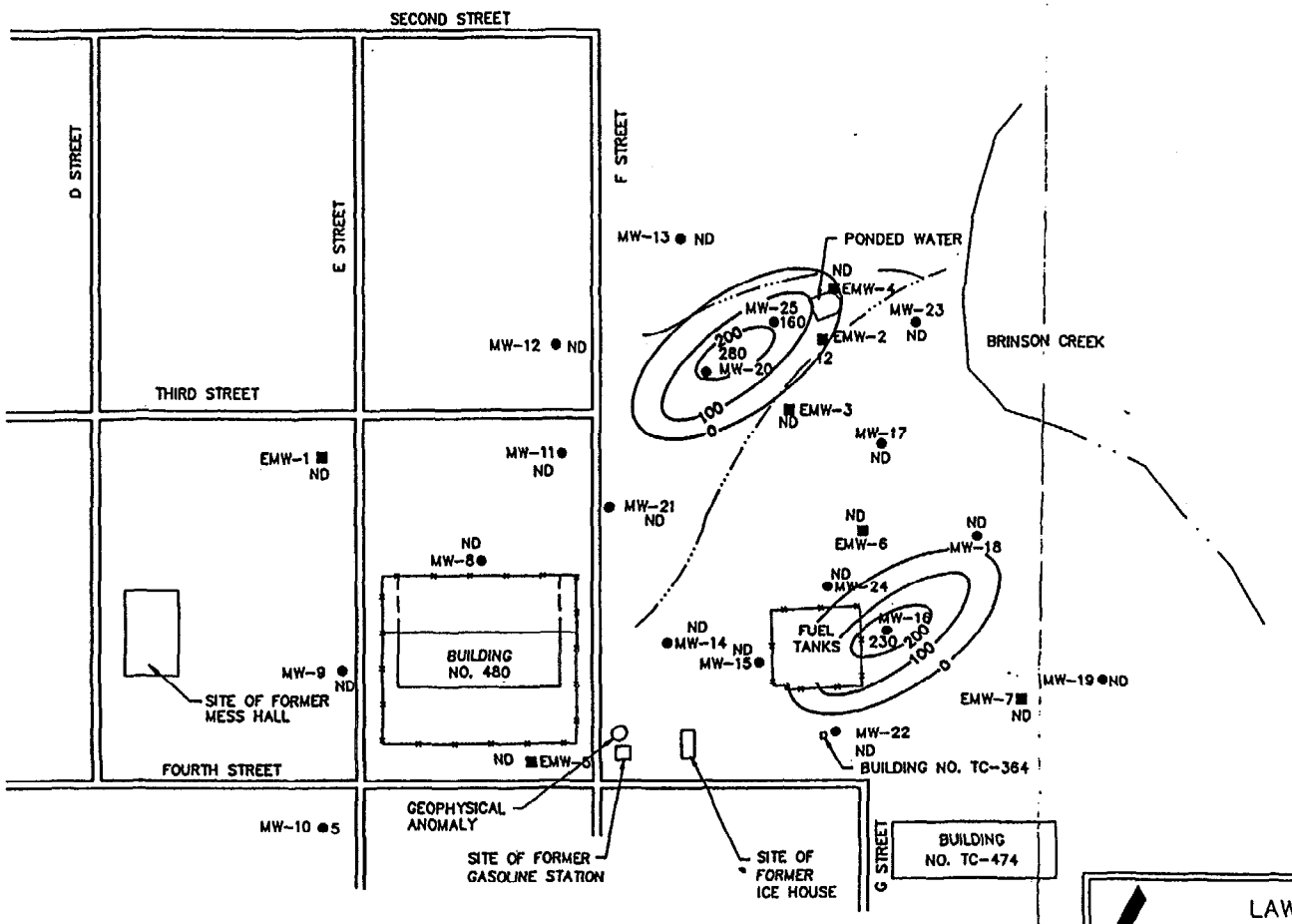
J60 4805

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP – BENZENE CONCENTRATIONS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: FEB. 1992
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.7.1

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91



LEGEND

- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 8905 TOLUENE CONCENTRATION IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

CONTOUR INTERVAL = 100 ug/L

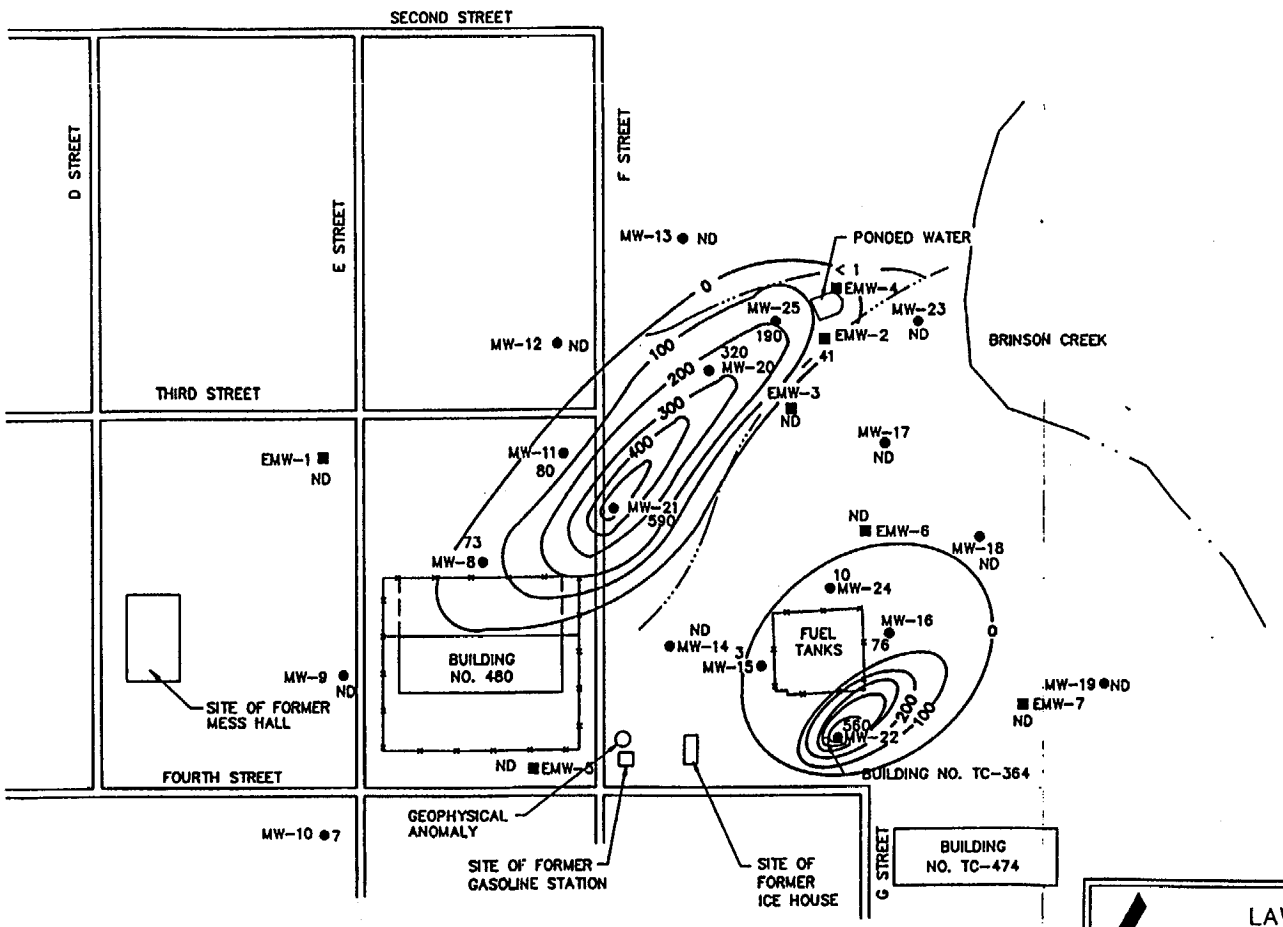
J6014806

ISOPLETH MAP – TOLUENE CONCENTRATIONS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN:	DATE: NOV. 1991
DFT CHECK: ECC	SCALE: 1"=150'
ENG CHECK: RAC	JOB: J47590-6014
APPROVAL: WHD	DWG: 4.7.2



CONTOUR INTERVAL = 100 ug/L

J0714807

LEGEND

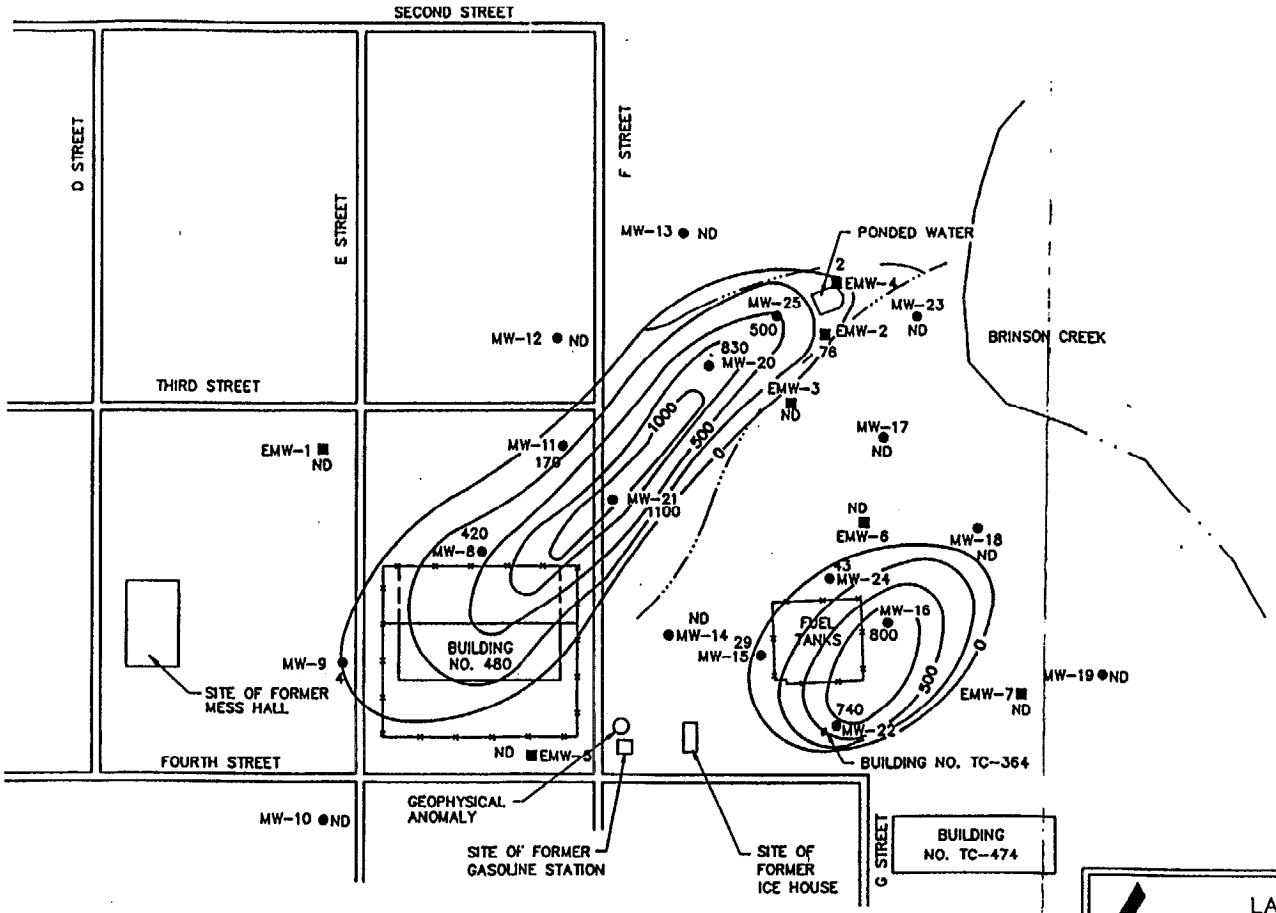
- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 8905 ETHYLBENZENE CONCENTRATION IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

ISOPLETH MAP – ETHYLBENZENE CONCENTRATIONS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN:	DATE: NOV. 1991
DFT CHECK: CCC	SCALE: 1"=150'
ENG CHECK: PAC	JOB: J47590-6014
APPROVAL: WSD	DWG: 4.7.3



LEGEND

- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 8905 XYLENES CONCENTRATION IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

CONTOUR INTERVAL = 250 ug/L

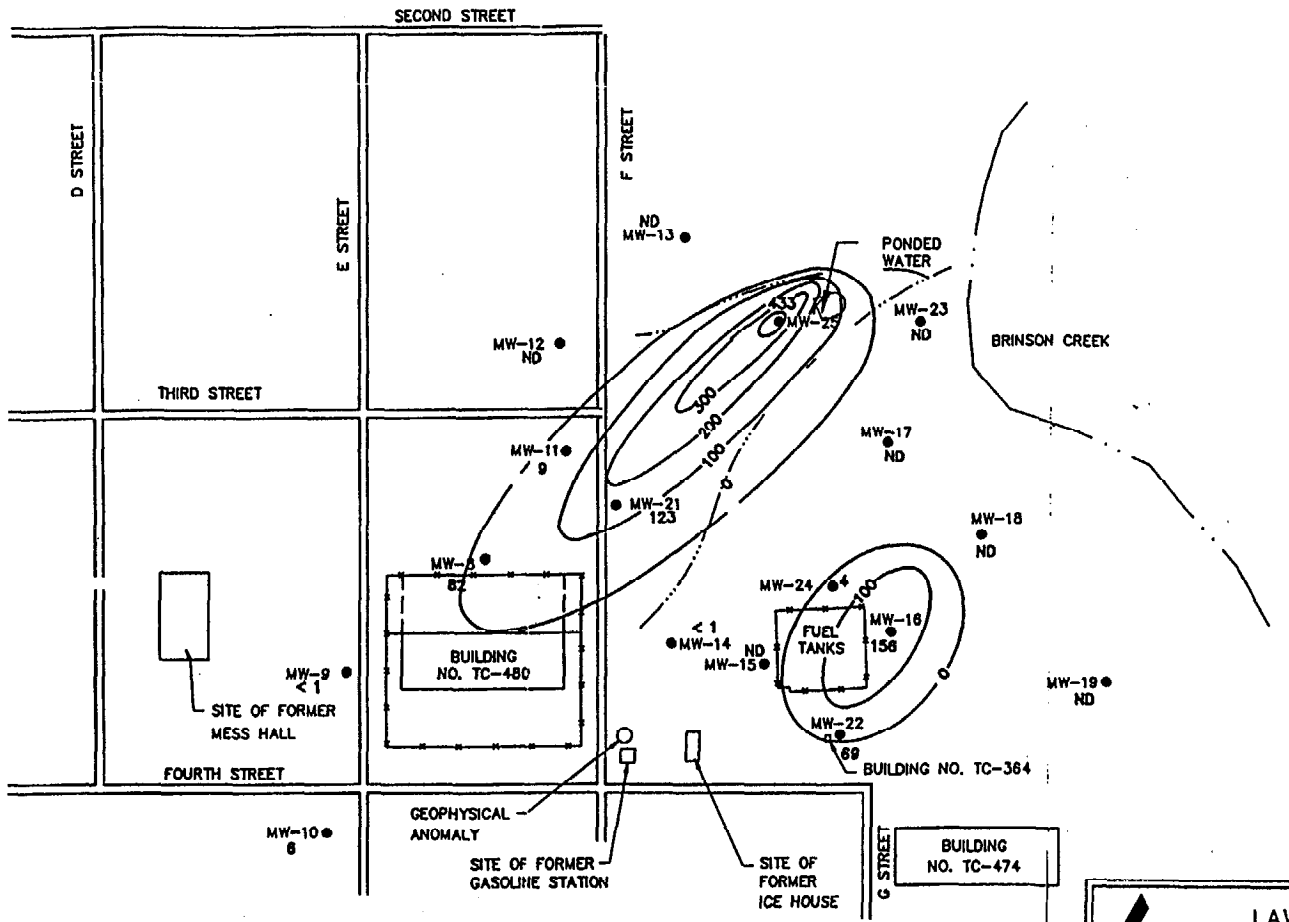
J6019606

ISOPLETH MAP
TOTAL XYLENES CONCENTRATIONS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN:	DATE: NOV. 1991
DFT CHECK: CCC	SCALE: 1"=150'
ENG CHECK: BAC	JOB: J47590-6014
APPROVAL:	DWG: 4.7.4

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 123 CONCENTRATION OF BTEX IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

NOTE: CONTOUR INTERVAL 100 ug/L.

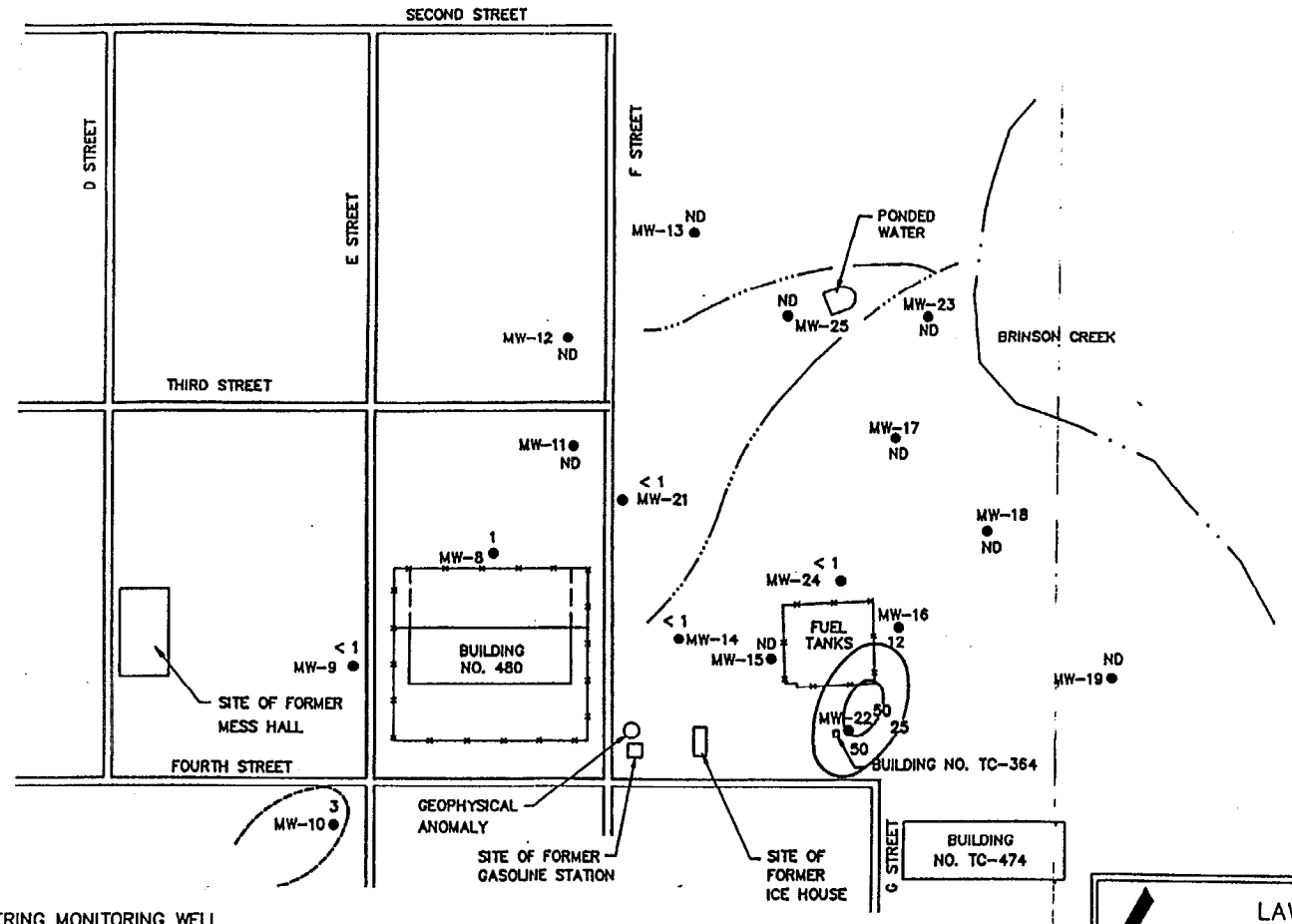
J6014Z11

ISOPLETH MAP – COMBINED BTEX CONCENTRATIONS
WATER SAMPLES FROM DEEP SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DGC	DATE: NOV. 1991
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.8

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 123 CONCENTRATION OF BENZENE IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

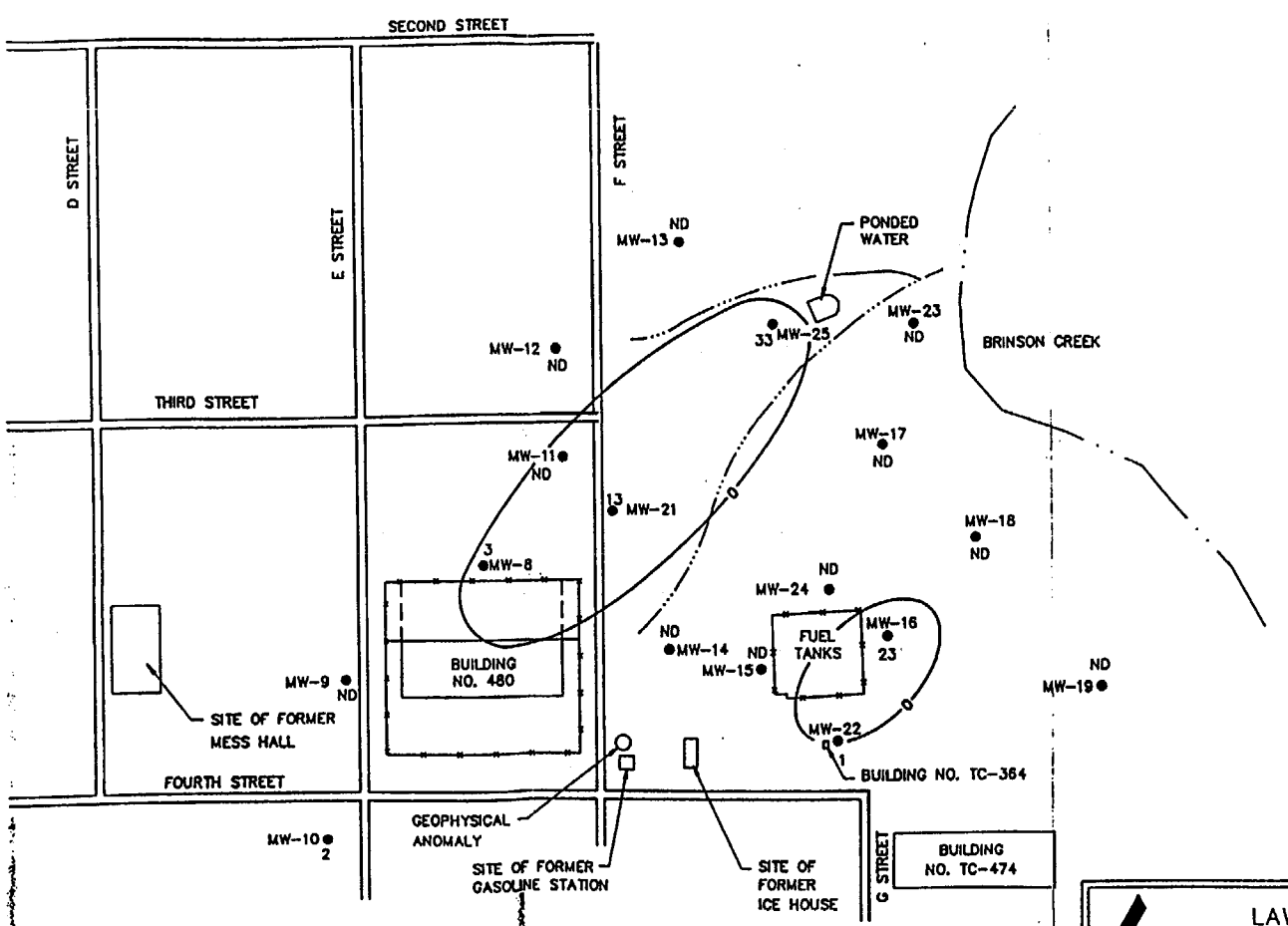
J6014401

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP – BENZENE CONCENTRATIONS
WATER SAMPLES FROM DEEP SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: FEB. 1992
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.8.1

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 123 CONCENTRATION OF TOLUENE IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

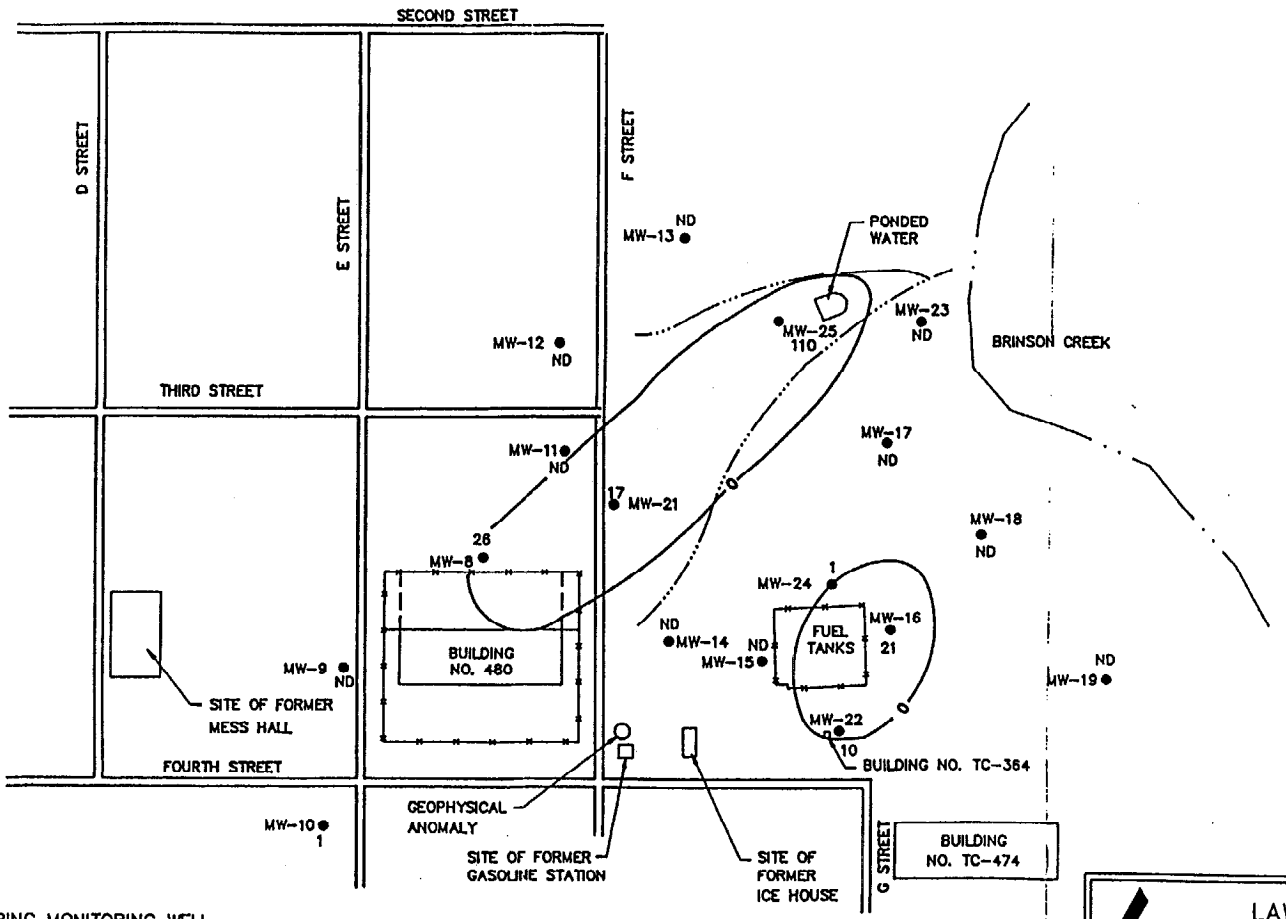
J601-4402

ISOPLETH MAP – TOLUENE CONCENTRATIONS
WATER SAMPLES FROM DEEP SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN:	DATE: NOV. 1991
DFT CHECK: CCC.	SCALE: 1"=150'
ENG CHECK: BAC	JOB: J47590-6014
APPROVAL: WSDixon	DWG: 4.8.2



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 123 CONCENTRATION OF ETHYLBENZENE IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

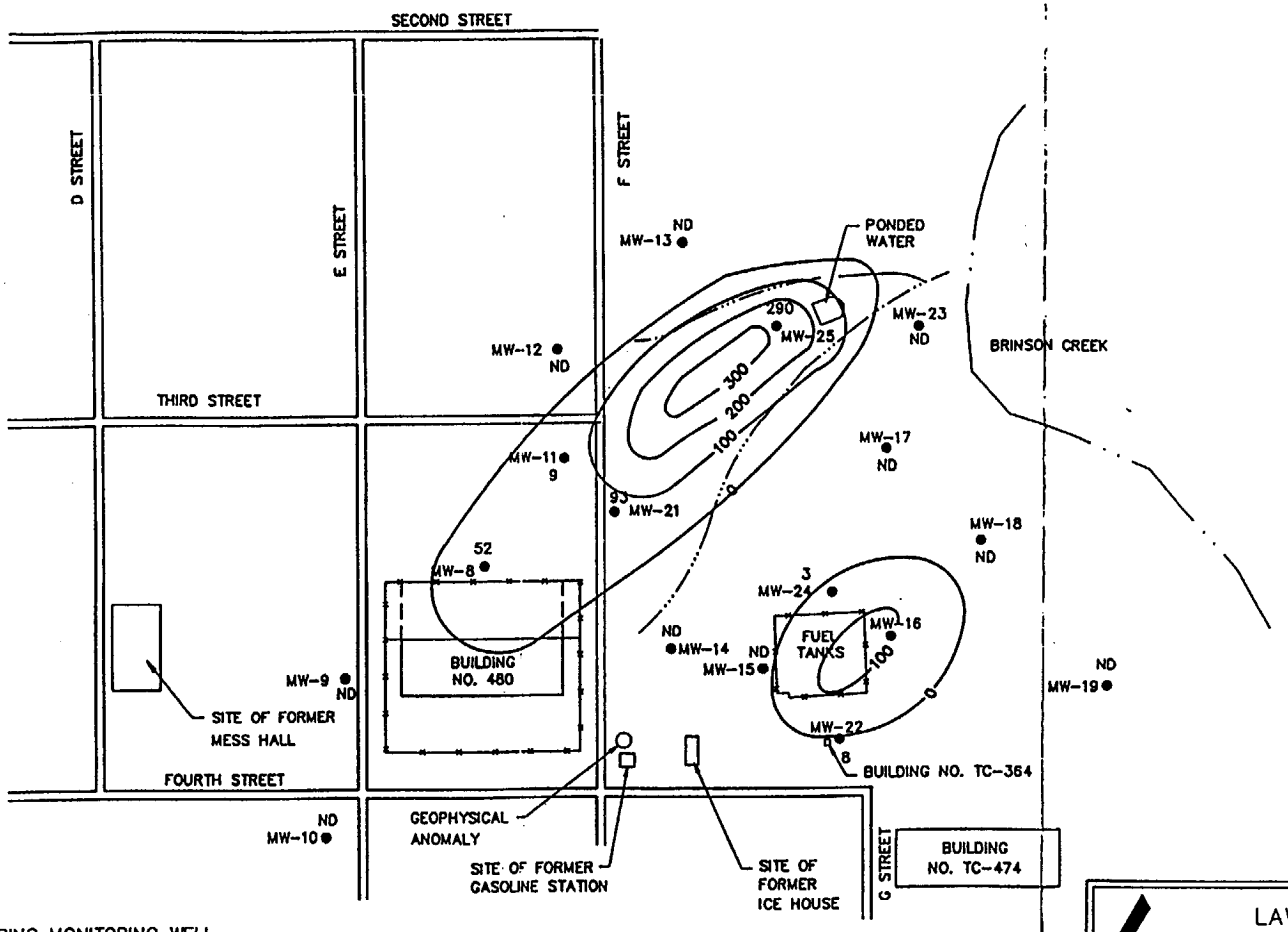
J6014403

ISOPLETH MAP – ETHYLBENZENE CONCENTRATIONS
WATER SAMPLES FROM DEEP SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DCC	DATE: FEB. 1992
DFT CHECK:	SCALE: 1"=150'
ENG CHECK: DPTall	JOB: J47590-6014
APPROVAL: WJD	DWG: 4.8.3

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 123 CONCENTRATION OF TOTAL XYLENES IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

CONTOUR INTERVAL 100 ug/L.

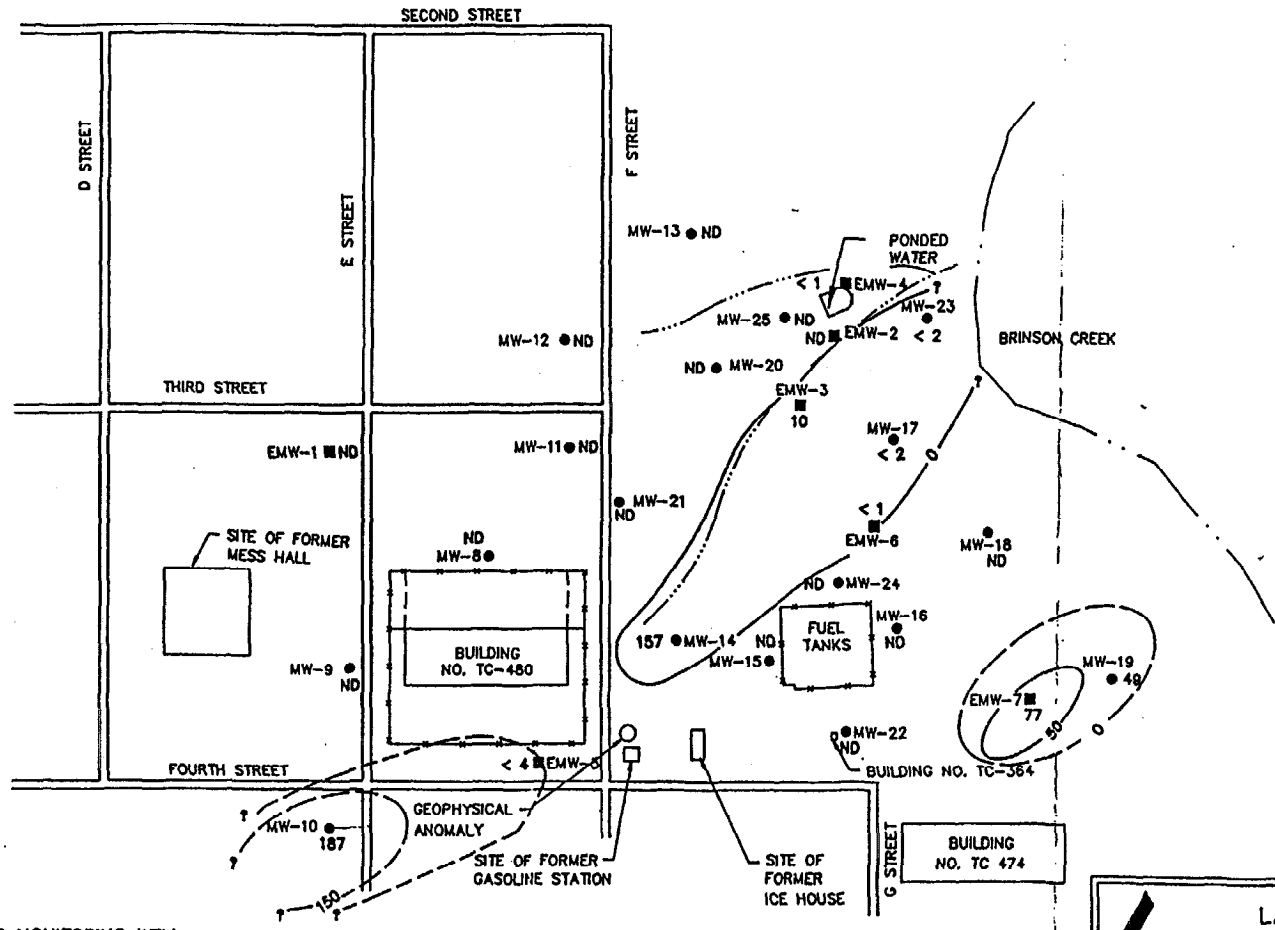
J2014404

ISOPLETH MAP – TOTAL XYLENES CONCENTRATIONS WATER SAMPLES FROM DEEP SCREENED INTERVAL CAMP GEIGER FUEL FARM CAMP LEJEUNE, NORTH CAROLINA

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN:	DATE: NOV. 1991
DFT CHECK: CCC	SCALE: 1"=150'
ENG CHECK: RAH	JOB: J47590-6014
APPROVAL: WRDixon	DWG: 4.8.4

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91; USGS JACKSONVILLE SOUTH, N.C.



LEGEND

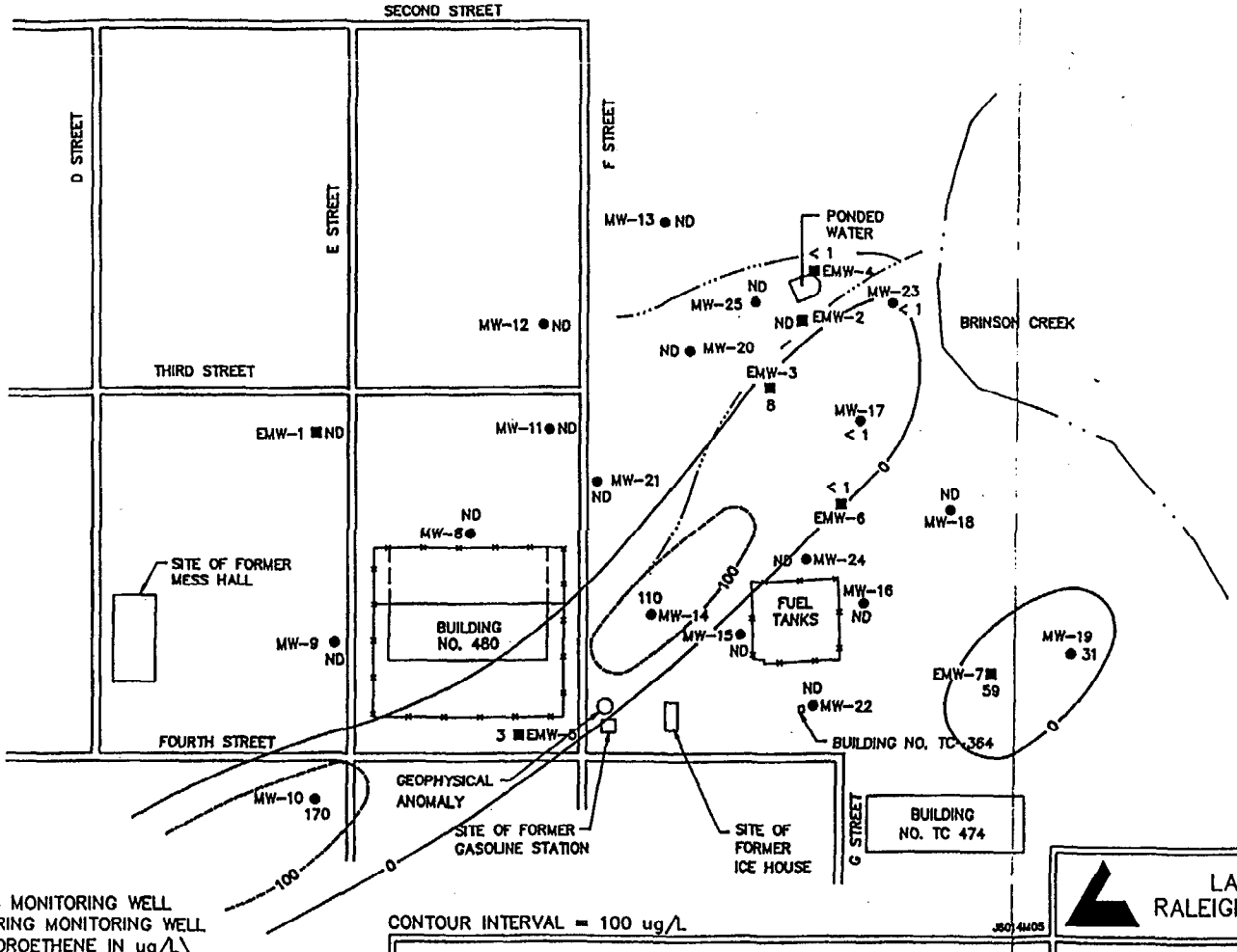
- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 49 CONCENTRATION OF CHLORINATED COMPOUNDS IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP
COMBINED CONCENTRATIONS OF CHLORINATED COMPOUNDS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: NOV. 1991
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.9

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91



LEGEND

- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 49 CONCENTRATION OF TRICHLOROETHENE IN ug/L\
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

CONTOUR INTERVAL = 100 ug/L

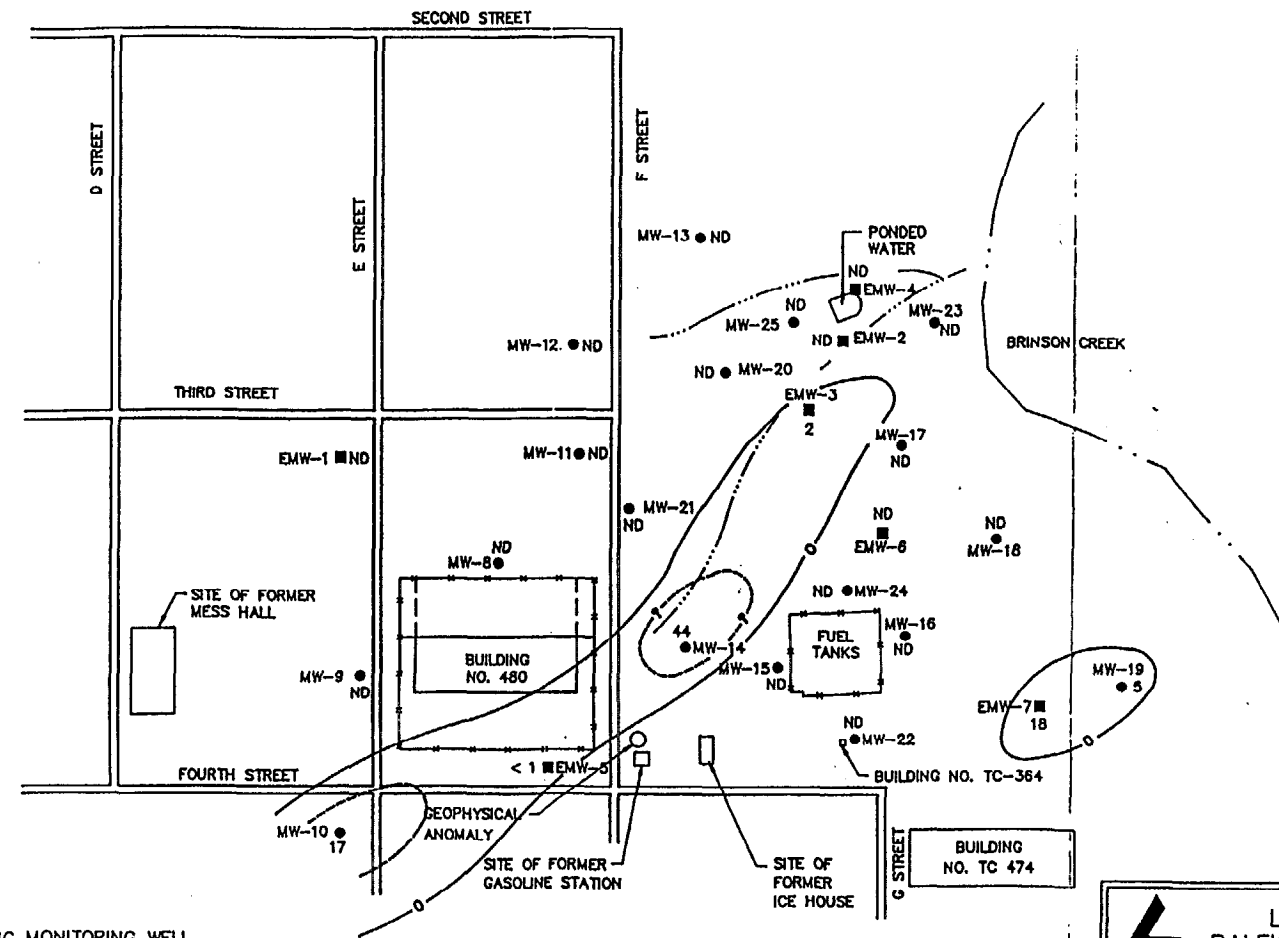
J60140405

ISOPLETH MAP – TRICHLOROETHENE CONCENTRATIONS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1 & 2 OF 2; 9/13/91.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DCC	DATE: FEB. 1992
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.9.1



LEGEND

- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 49 CONCENTRATION OF TRANS-1,2-DICHLOROETHENE IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

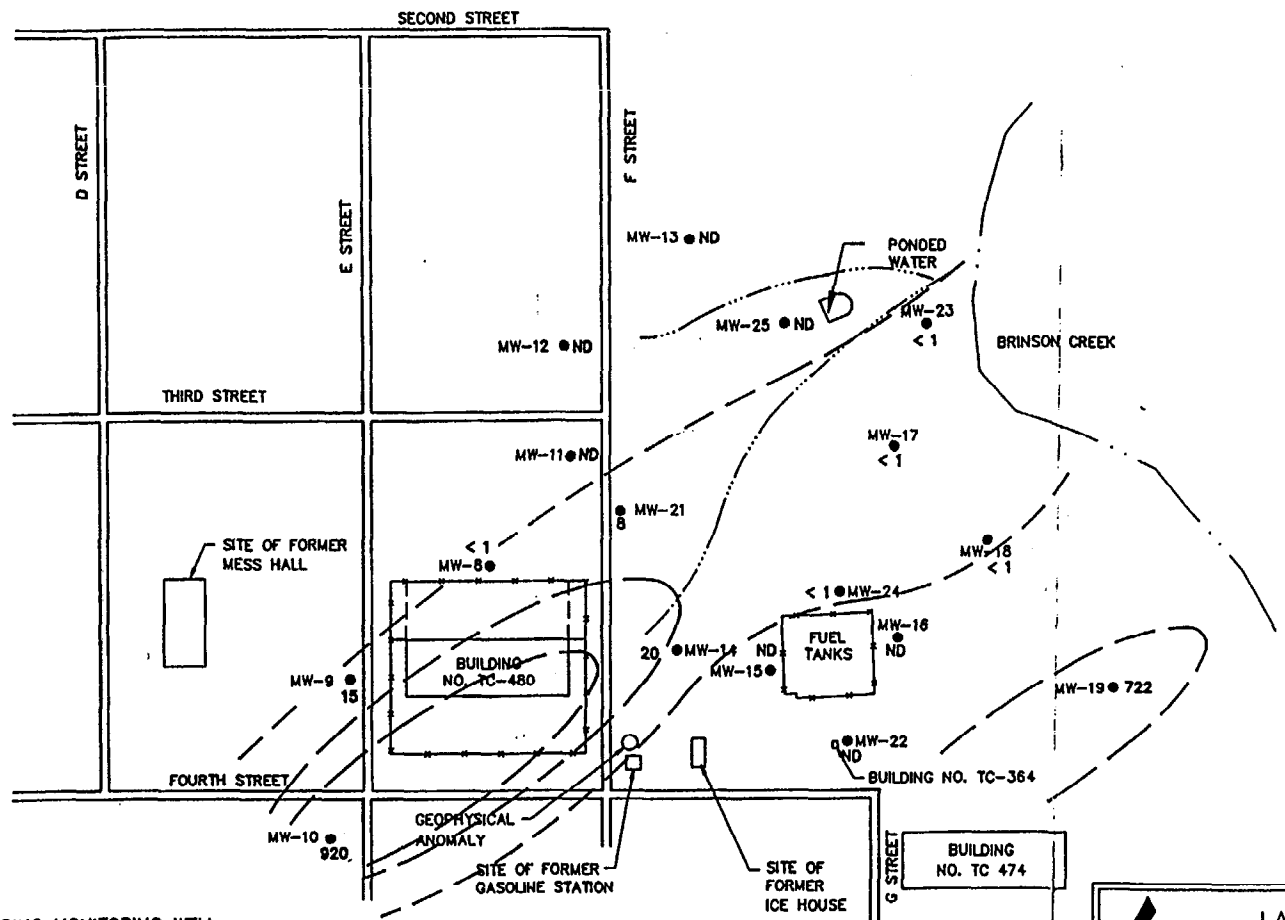
J601M06

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP - TRANS-1,2-DICHLOROETHENE CONCENTRATIONS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: FEB. 1992
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.9.2

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 920 CONCENTRATION OF CHLORINATED COMPOUNDS IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

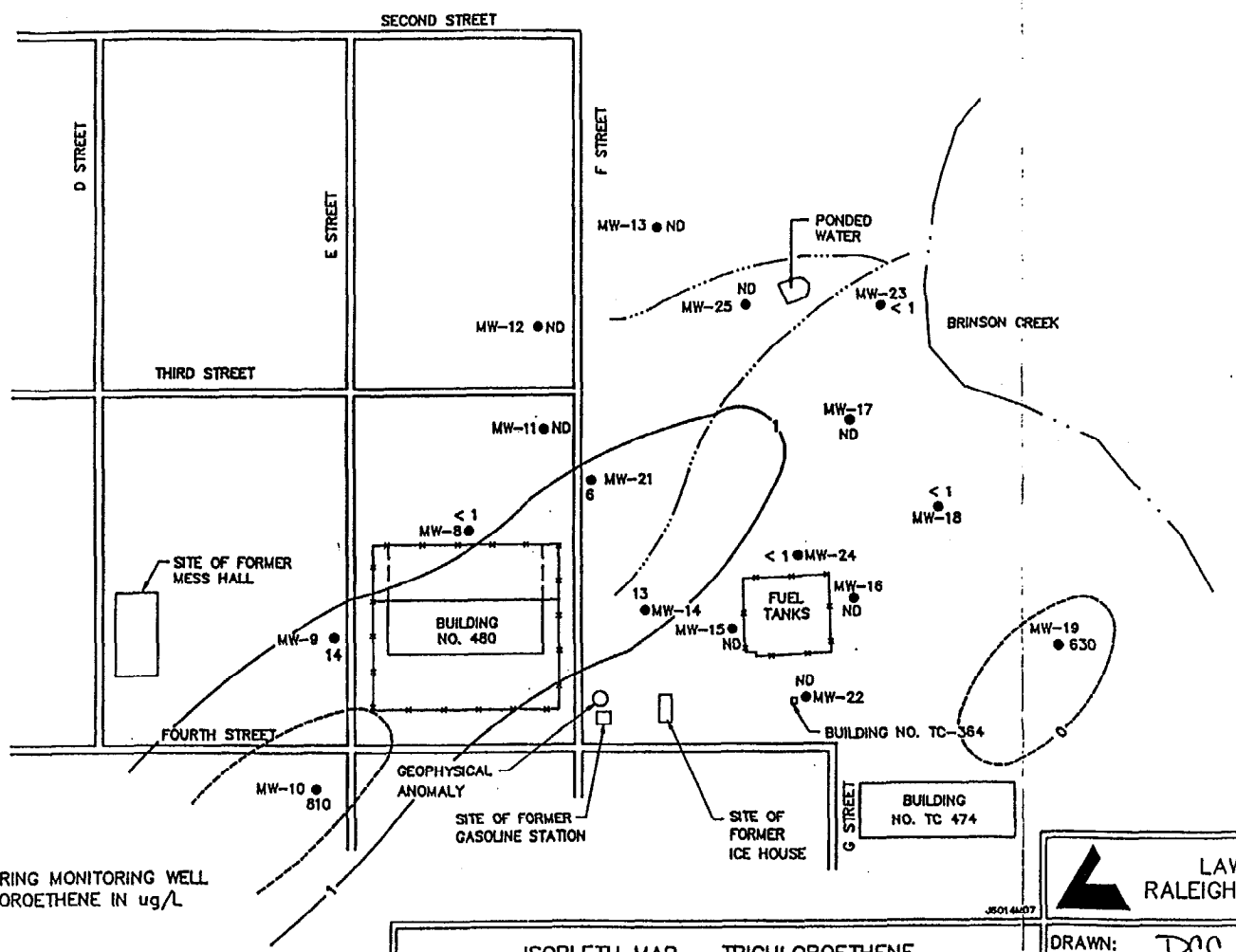
J8314216

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP
COMBINED CONCENTRATIONS OF CHLORINATED COMPOUNDS
WATER SAMPLES FROM DEEP SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: NOV. 1991
DFT CHECK:	SCALE: 1"=150'
ENG CHECK: WDDixon	JOB: J47590-6014
APPROVAL: WDDixon	DWG: 4.10

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91



LEGEND

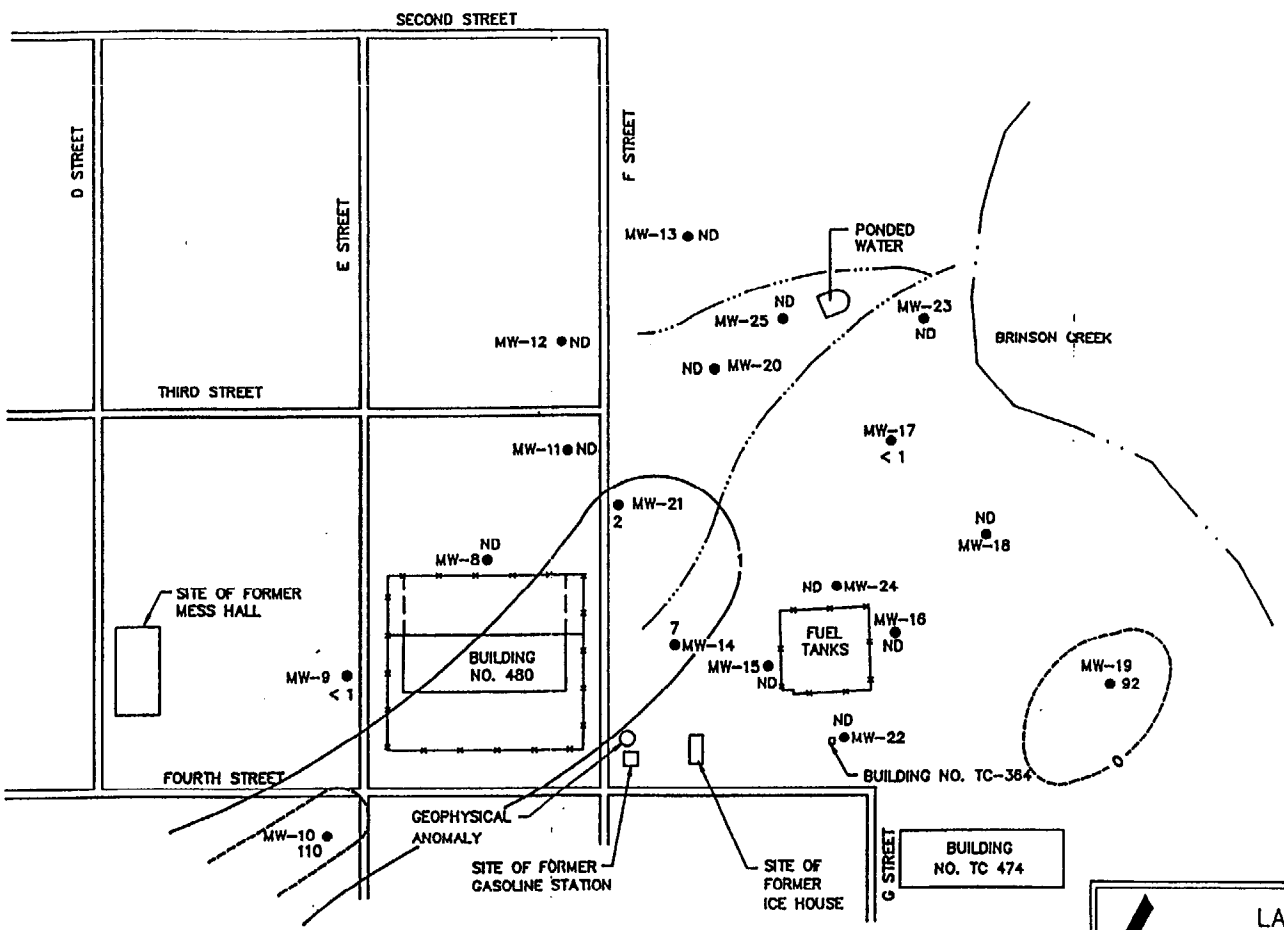
- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 49 CONCENTRATION OF TRICHLOROETHENE IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

ISOPLETH MAP – TRICHLOROETHENE CONCENTRATIONS
WATER SAMPLES FROM DEEP SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DCC	DATE: FEB. 1992
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.10.1



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 49 CONCENTRATION OF TRANS-1,2-DICHLOROETHENE IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

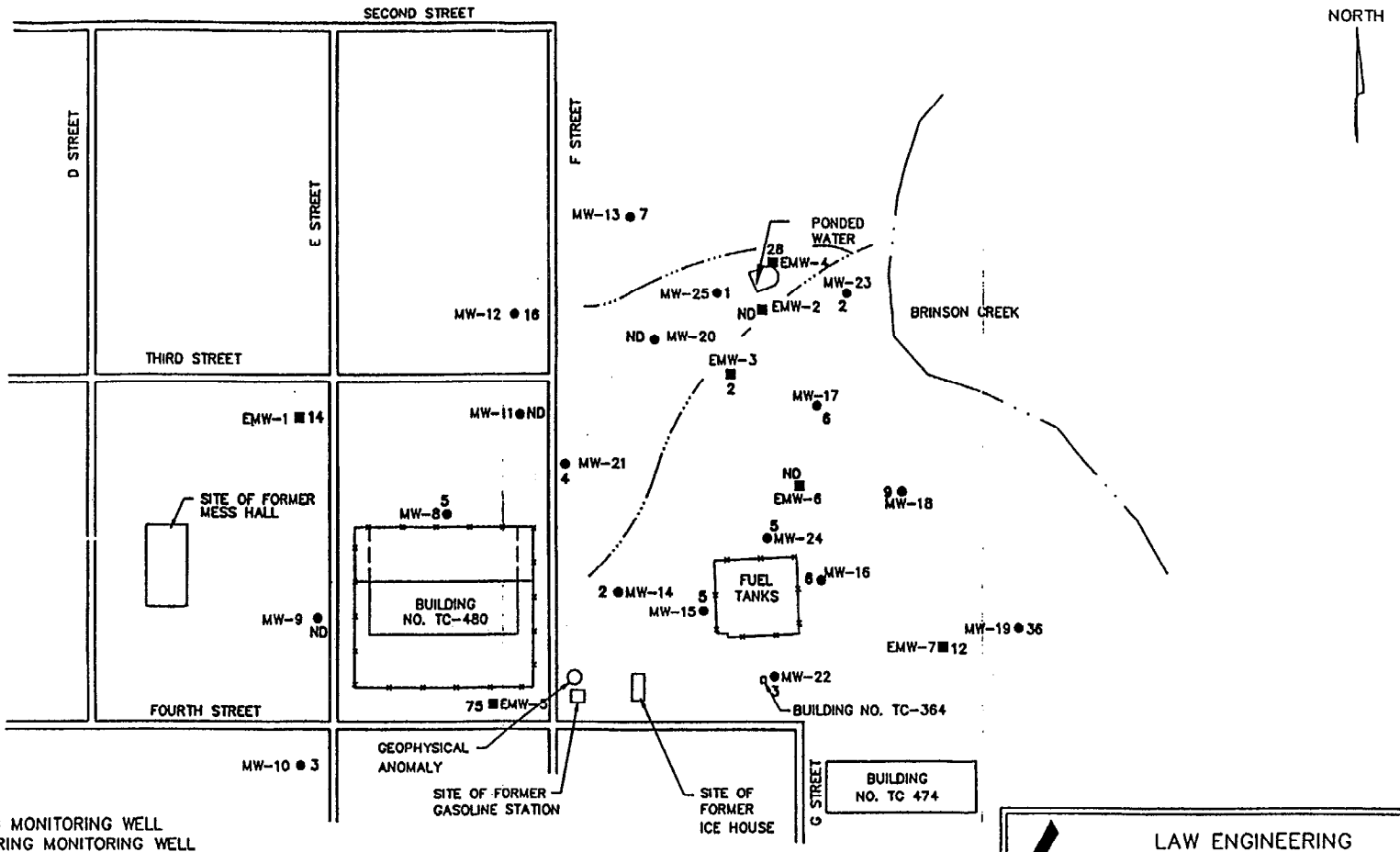
J6014A08

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ISOPLETH MAP - TRANS-1,2-DICHLOROETHENE CONCENTRATIONS
WATER SAMPLES FROM DEEP SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN:	DCC	DATE:	FEB. 1992
DFT CHECK:		SCALE:	1"=150'
ENG CHECK:		JOB:	J47590-6014
APPROVAL:		DWG:	4.10.2

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91



LEGEND

- FENCE
- ■EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 8 CONCENTRATION OF TOTAL LEAD IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

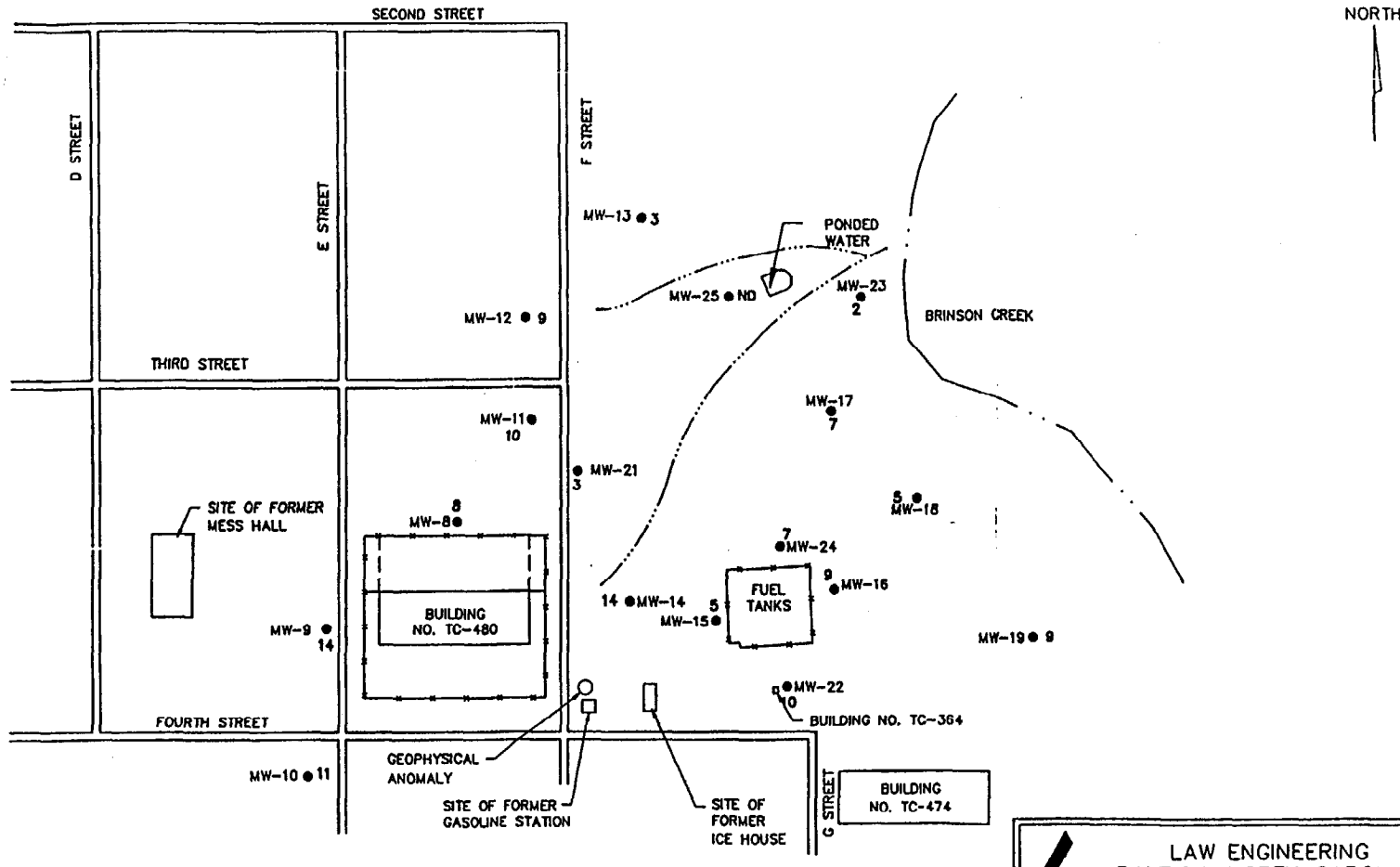
J6014212

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

TOTAL LEAD CONCENTRATIONS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: NOV. 1991
DFT CHECK: DCC	SCALE: 1"=150'
ENG CHECK: WDD	JOB: J47590-6014
APPROVAL: WDD	DWG: 4.11

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91



LEGEND

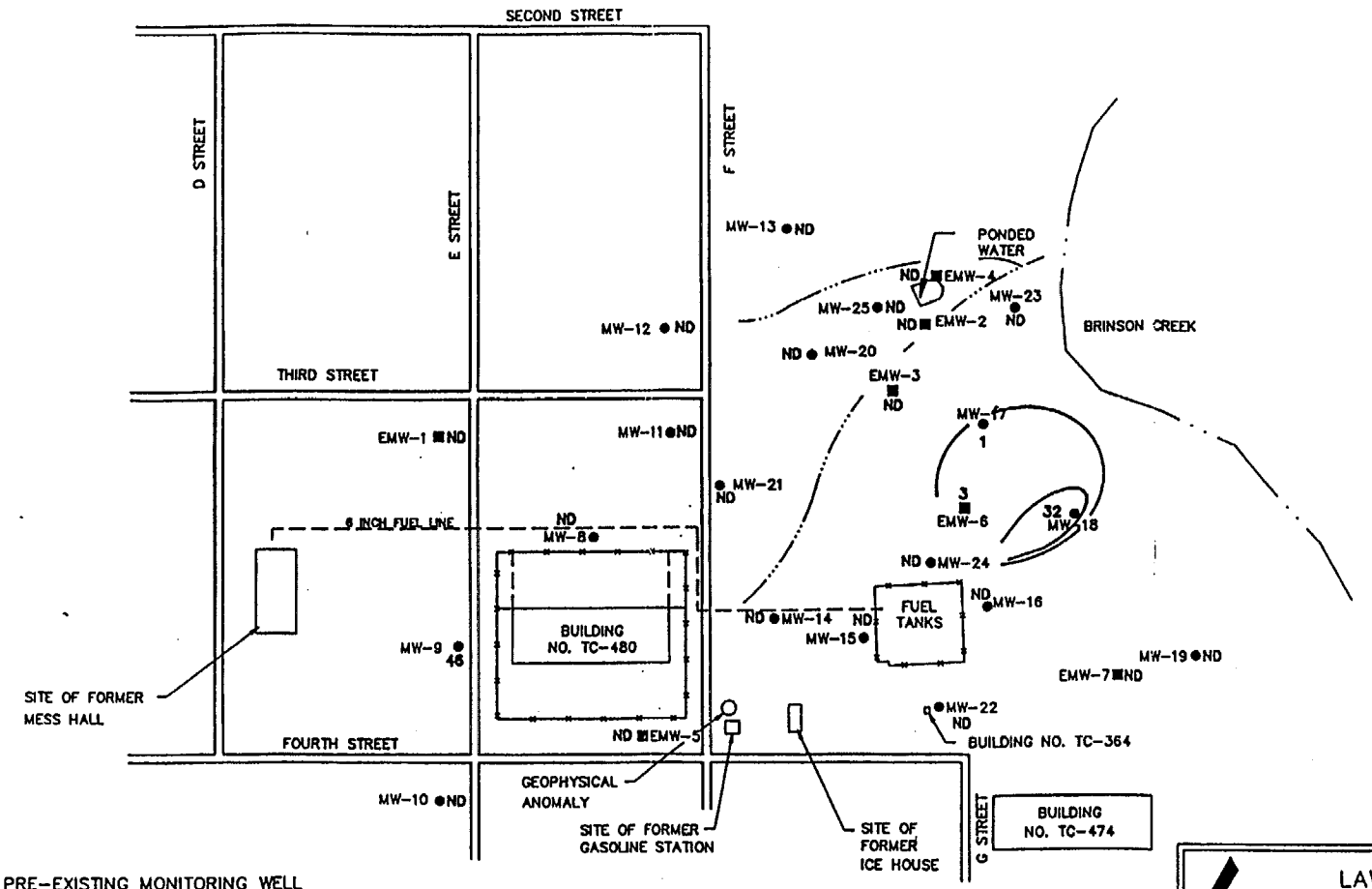
- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- 14 CONCENTRATION OF TOTAL LEAD IN ug/L
- ND NONE DETECTED
- TRANSITORY STREAM
- PERENNIAL STREAM

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

TOTAL LEAD CONCENTRATIONS
WATER SAMPLES FROM DEEP SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: NOV. 1991
DFT CHECK: DCC	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.12

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91



LEGEND

———	FENCE
■EMW-1	LOCATION OF PRE-EXISTING MONITORING WELL
●MW-1	LOCATION OF LAW ENGINEERING MONITORING WELL
46	CONCENTRATION OF MTBE IN ug/L
ND	NONE DETECTED
——·——·——	TRANSITORY STREAM
—— · · ——	PERENNIAL STREAM

J6014215

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

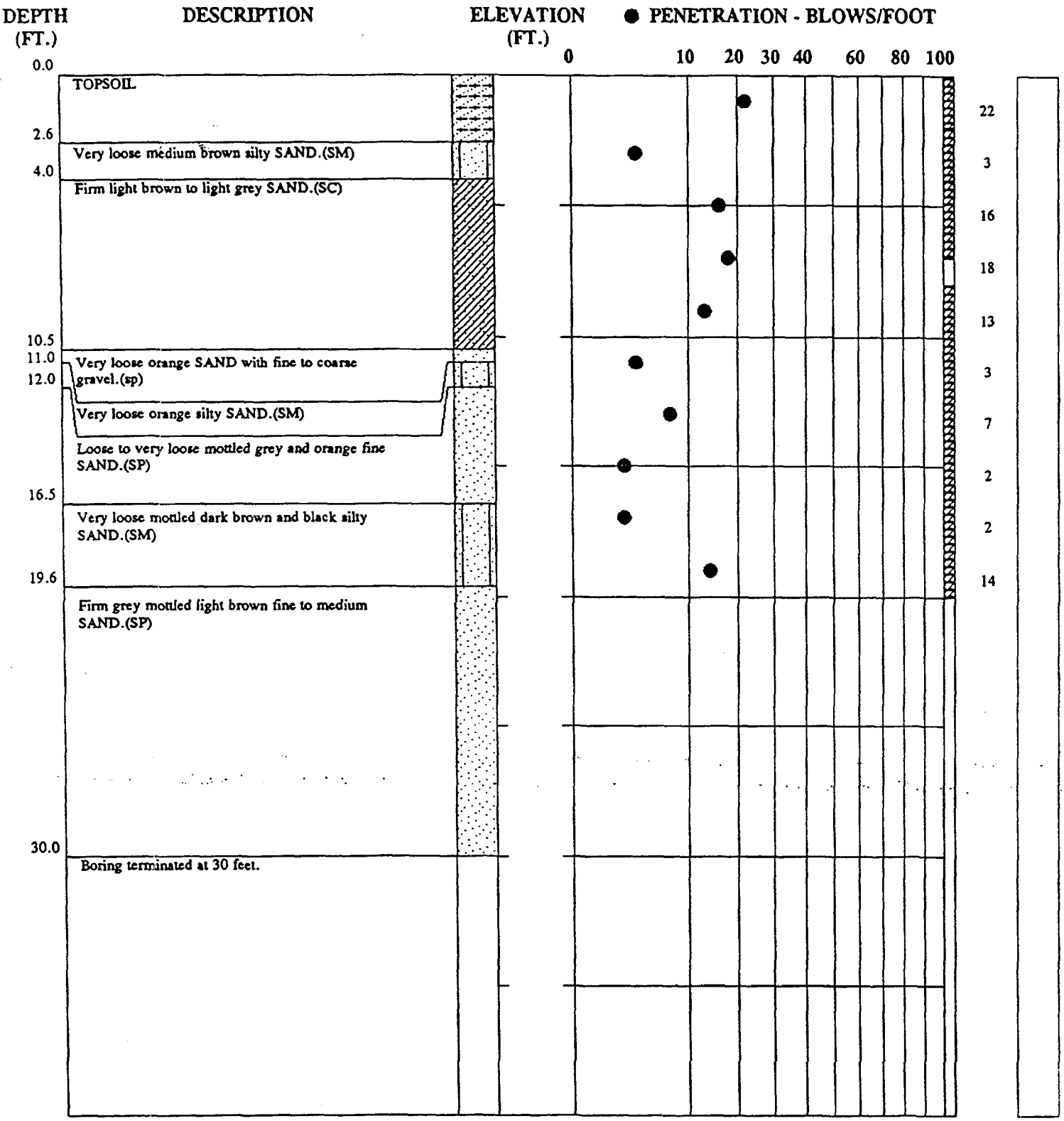
MTBE CONCENTRATIONS
WATER SAMPLES FROM SHALLOW SCREENED INTERVAL
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: DCC	DATE: NOV. 1991
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: J47590-6014
APPROVAL:	DWG: 4.13

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91

APPENDIX B

RECORDS OF SOIL-TEST BORING



REMARKS:

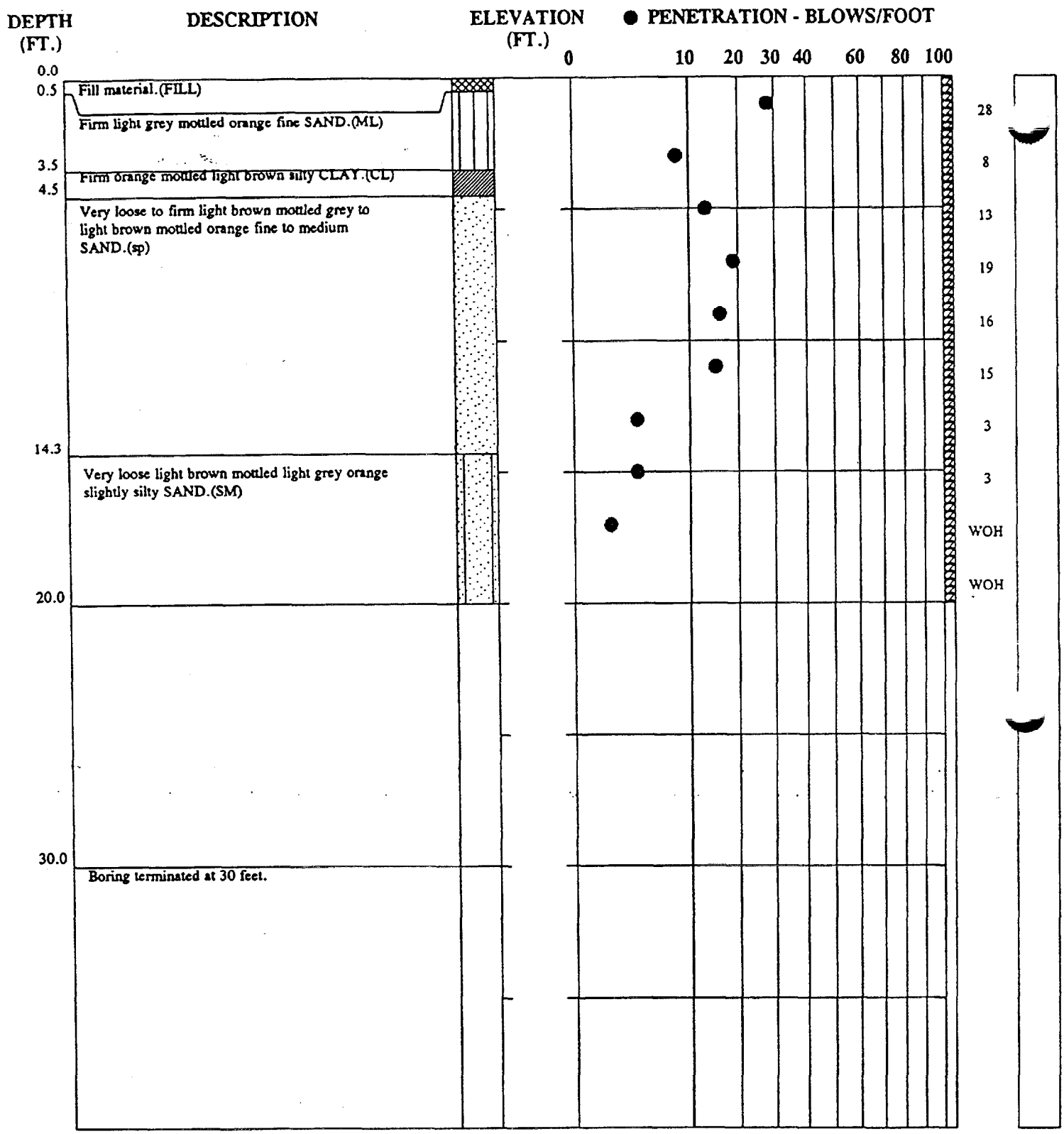
Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-8
DATE DRILLED	August 15, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

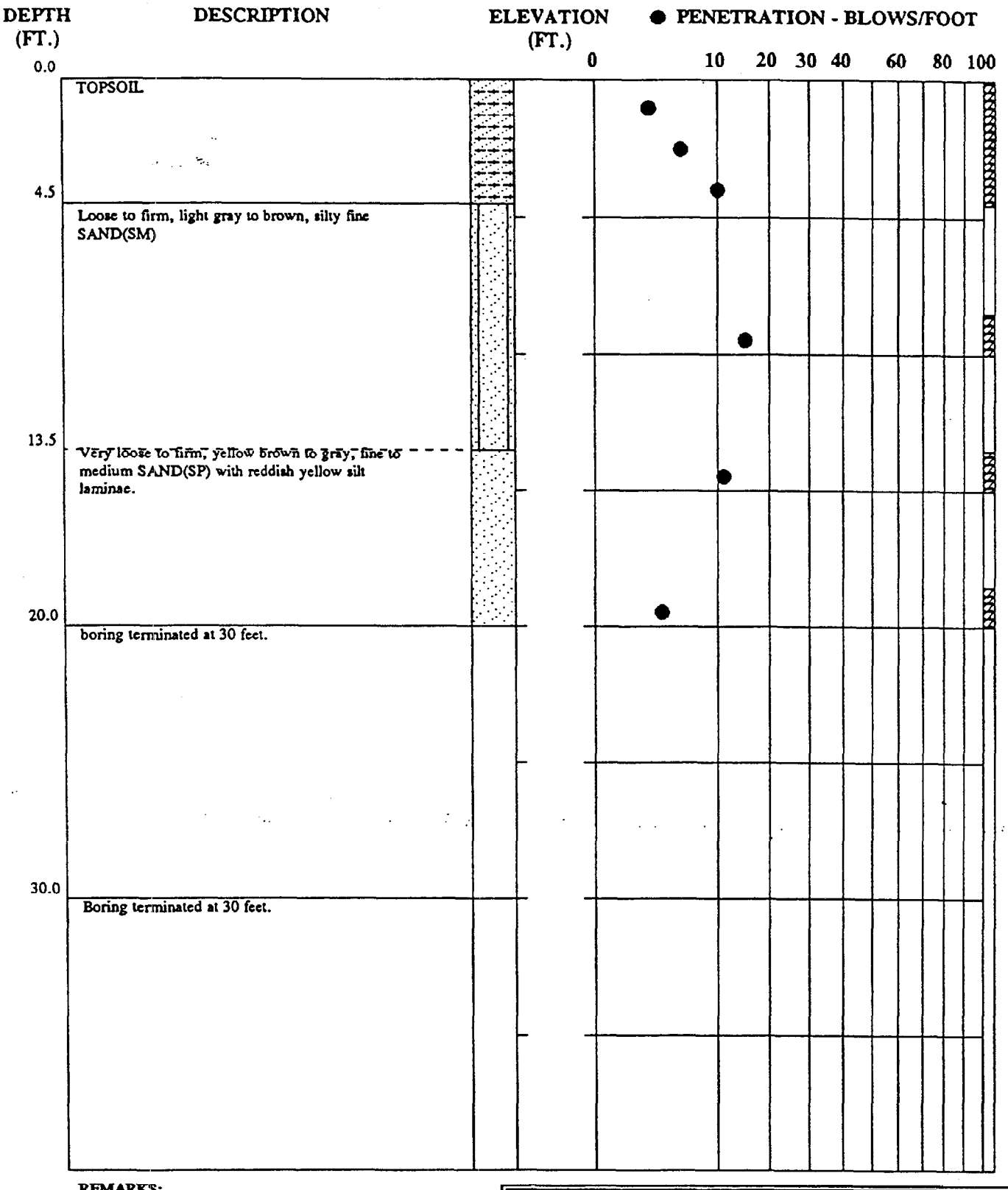
Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-9
DATE DRILLED	August 16, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

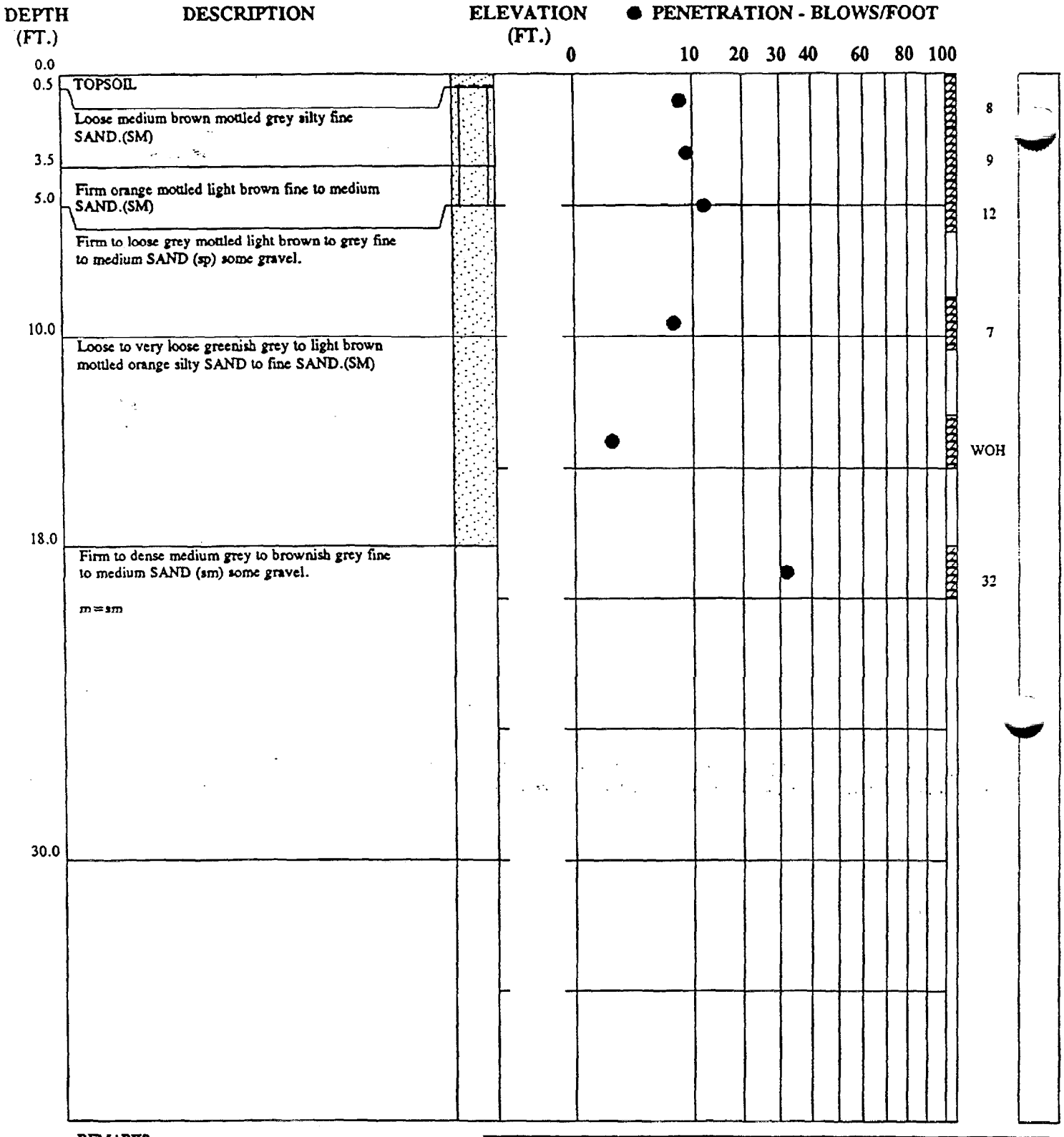
Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-10
DATE DRILLED	August 19, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

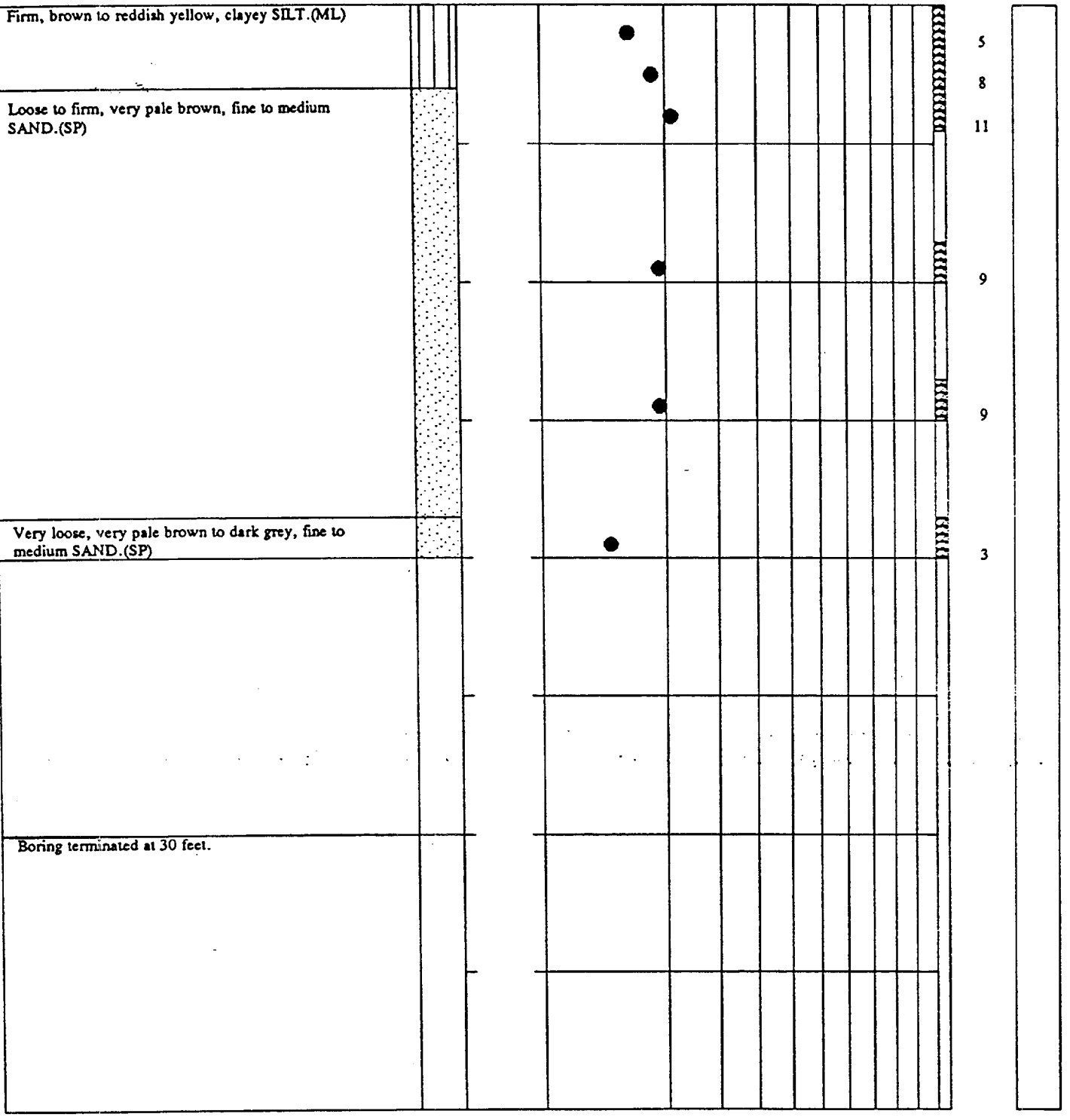
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-11
DATE DRILLED	August 16, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	● PENETRATION - BLOWS/FOOT 0 10 20 30 40 60 80 100
0.0	Firm, brown to reddish yellow, clayey SILT.(ML)		5
3.0	Loose to firm, very pale brown, fine to medium SAND.(SP)		8
			11
			9
			9
18.5			
20.0	Very loose, very pale brown to dark grey, fine to medium SAND.(SP)		3
30.0	Boring terminated at 30 feet.		



REMARKS:

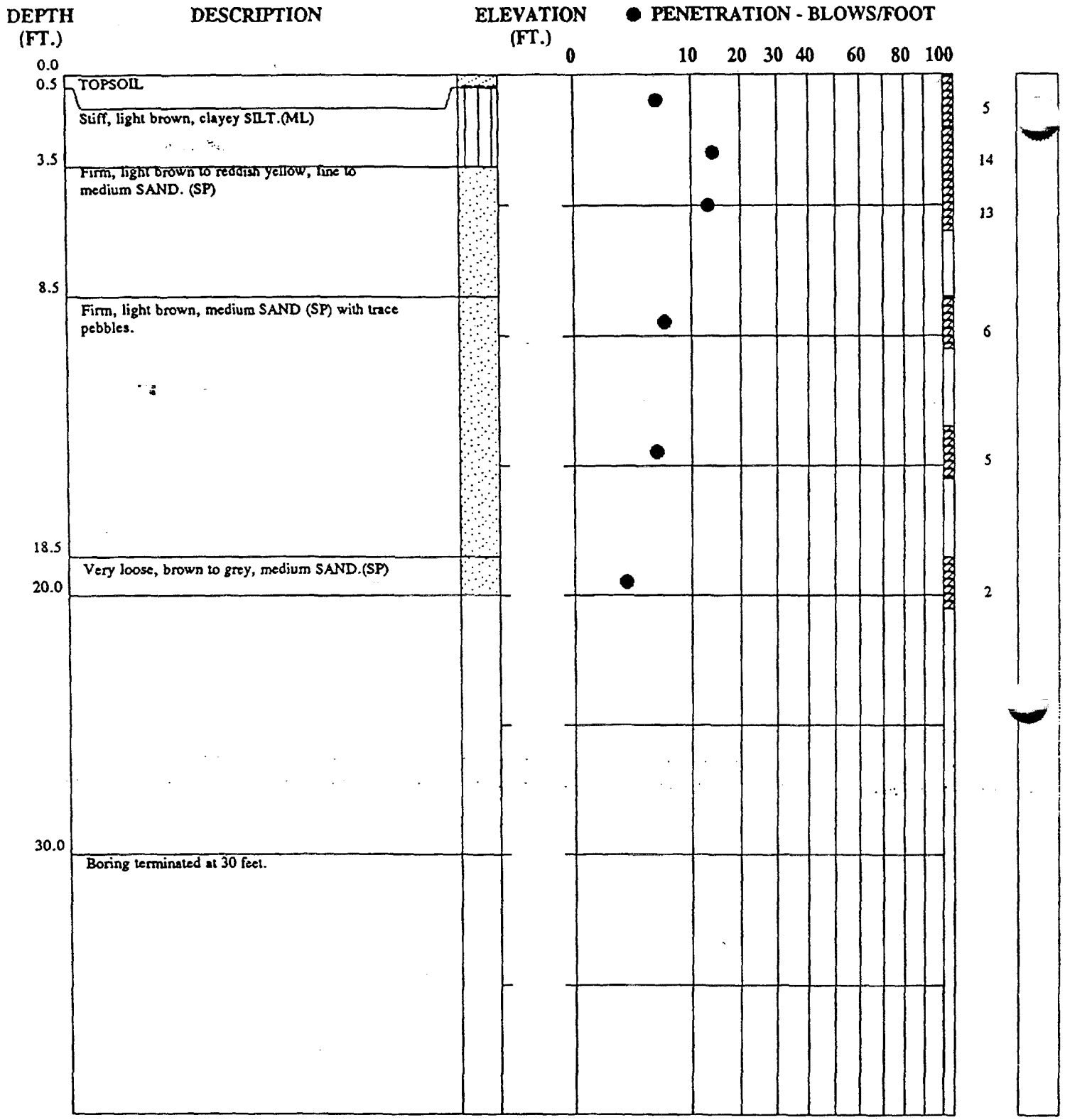
Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-12
DATE DRILLED	August 19, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

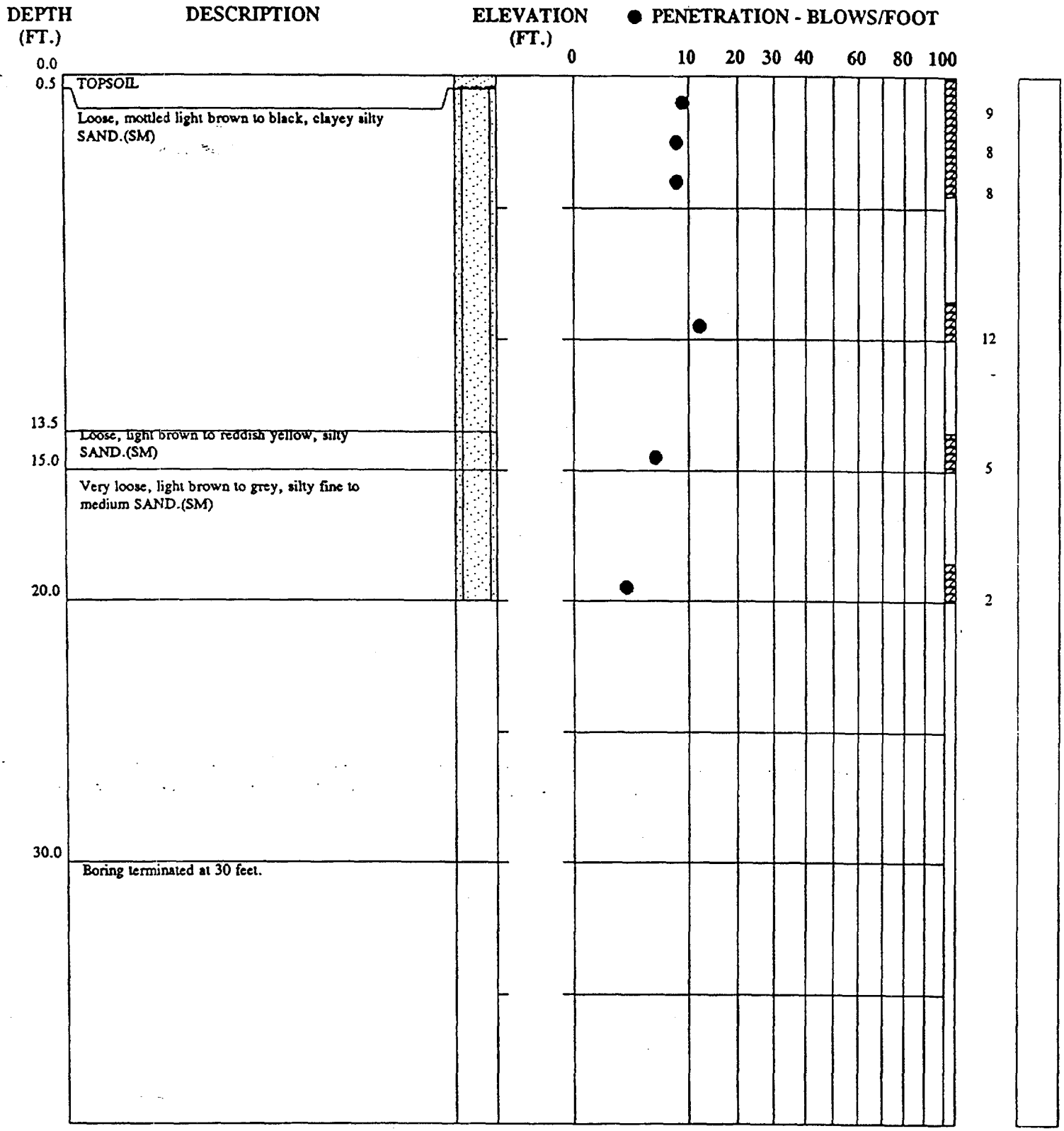
Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon boring completion, paired well installed. See well constructin records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-13
DATE DRILLED	August 20, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

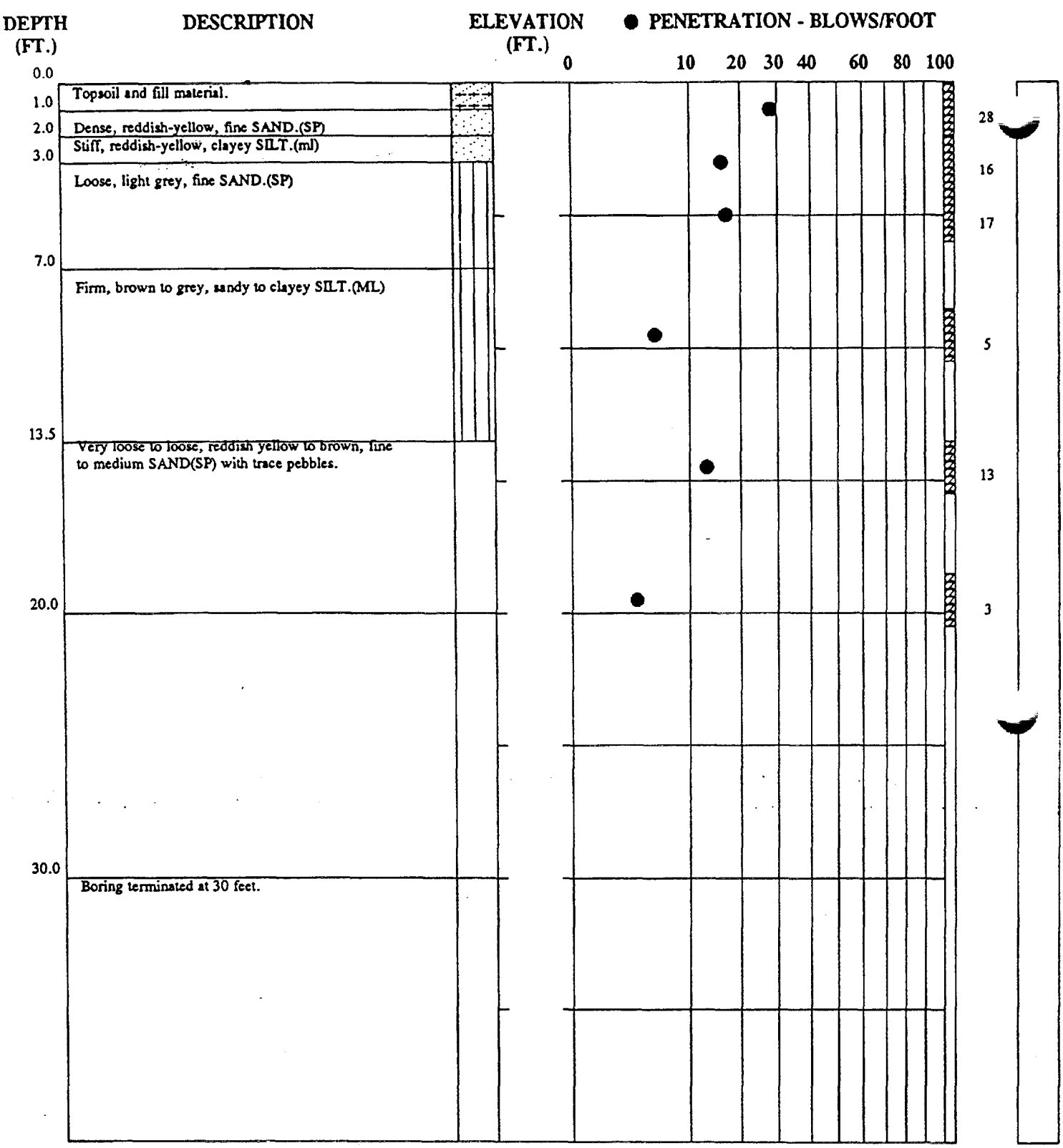
Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-14
DATE DRILLED	August 20, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

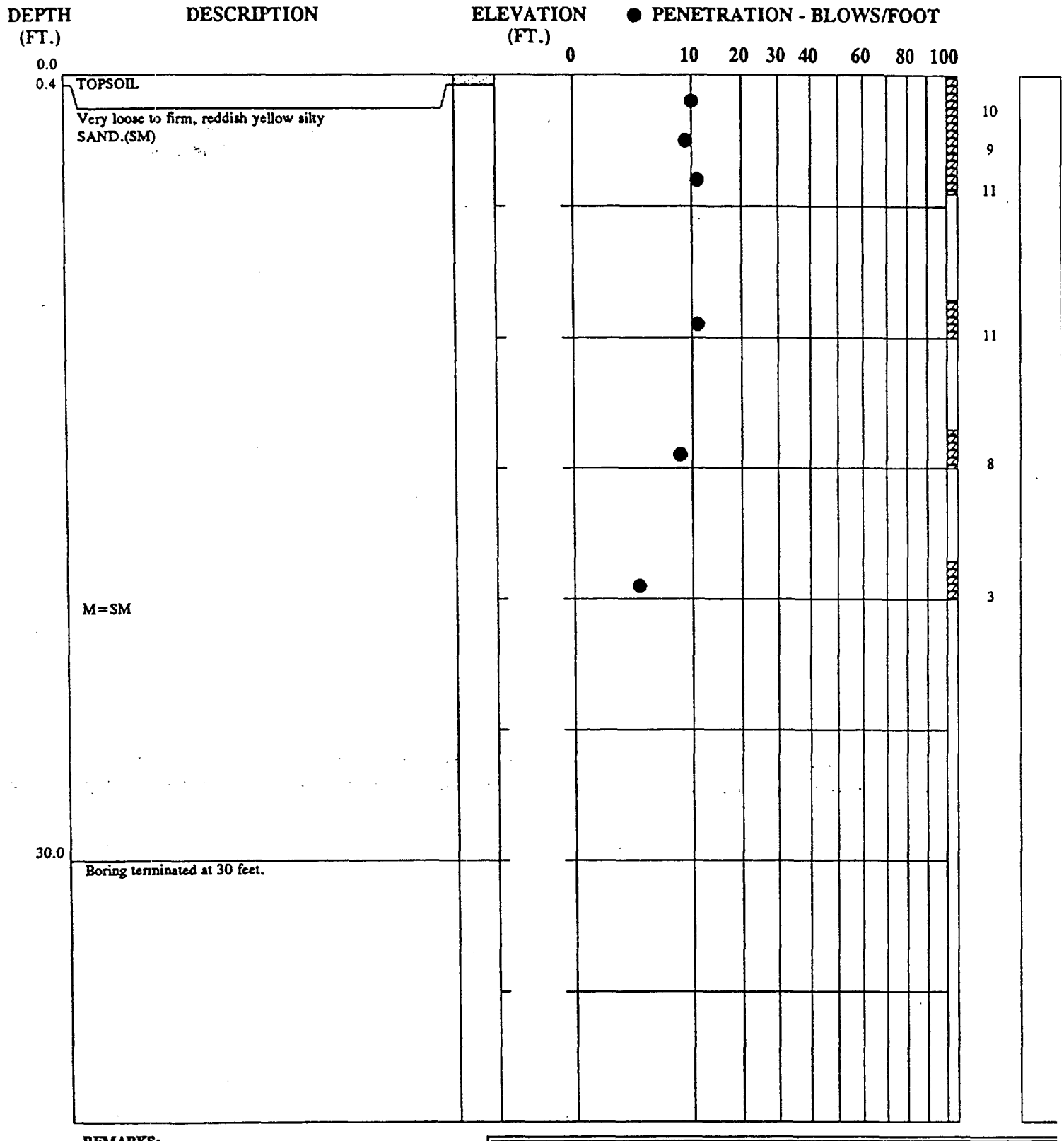
Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-15
DATE DRILLED	August 21, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

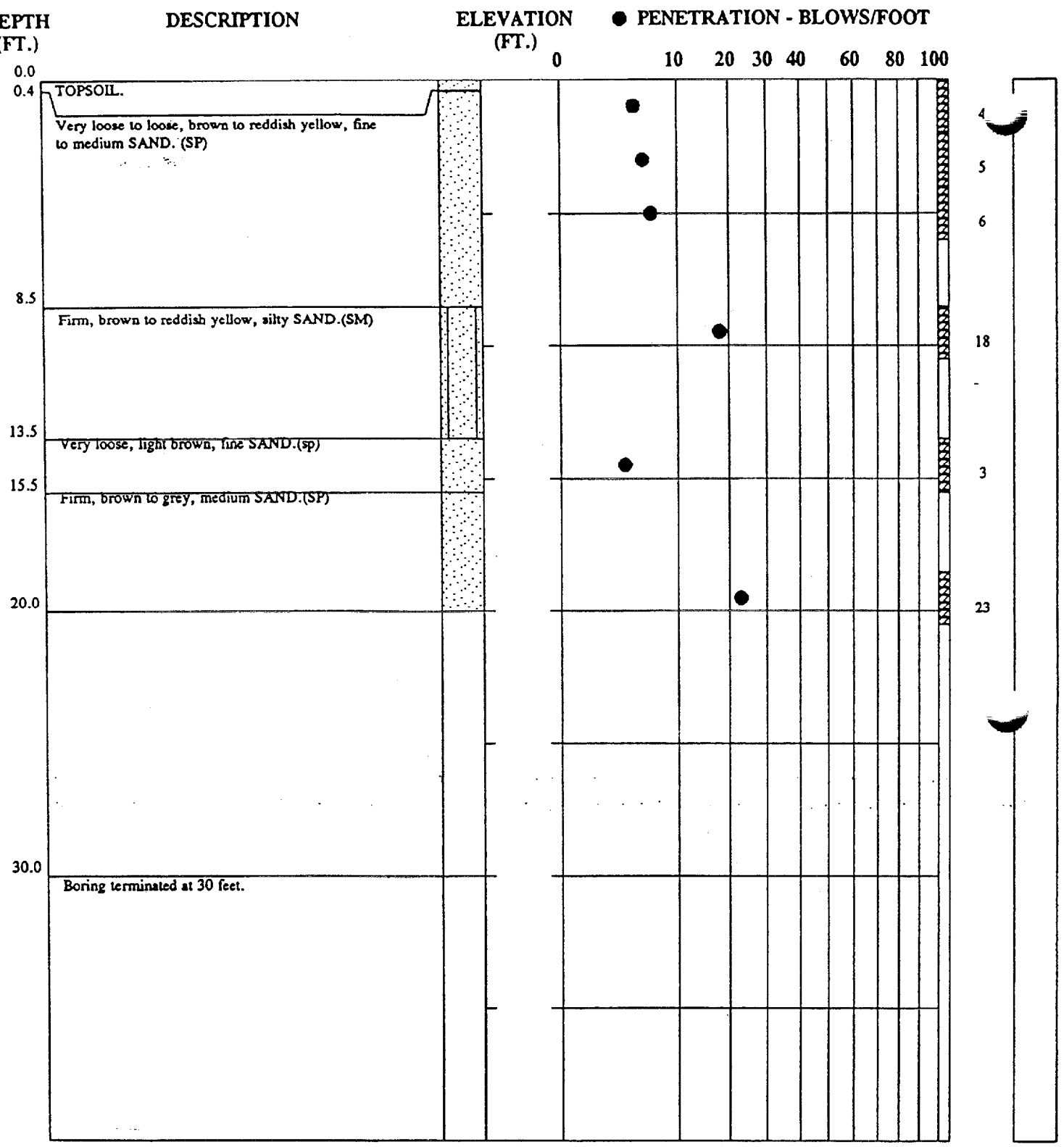
Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-16
DATE DRILLED	August 21, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

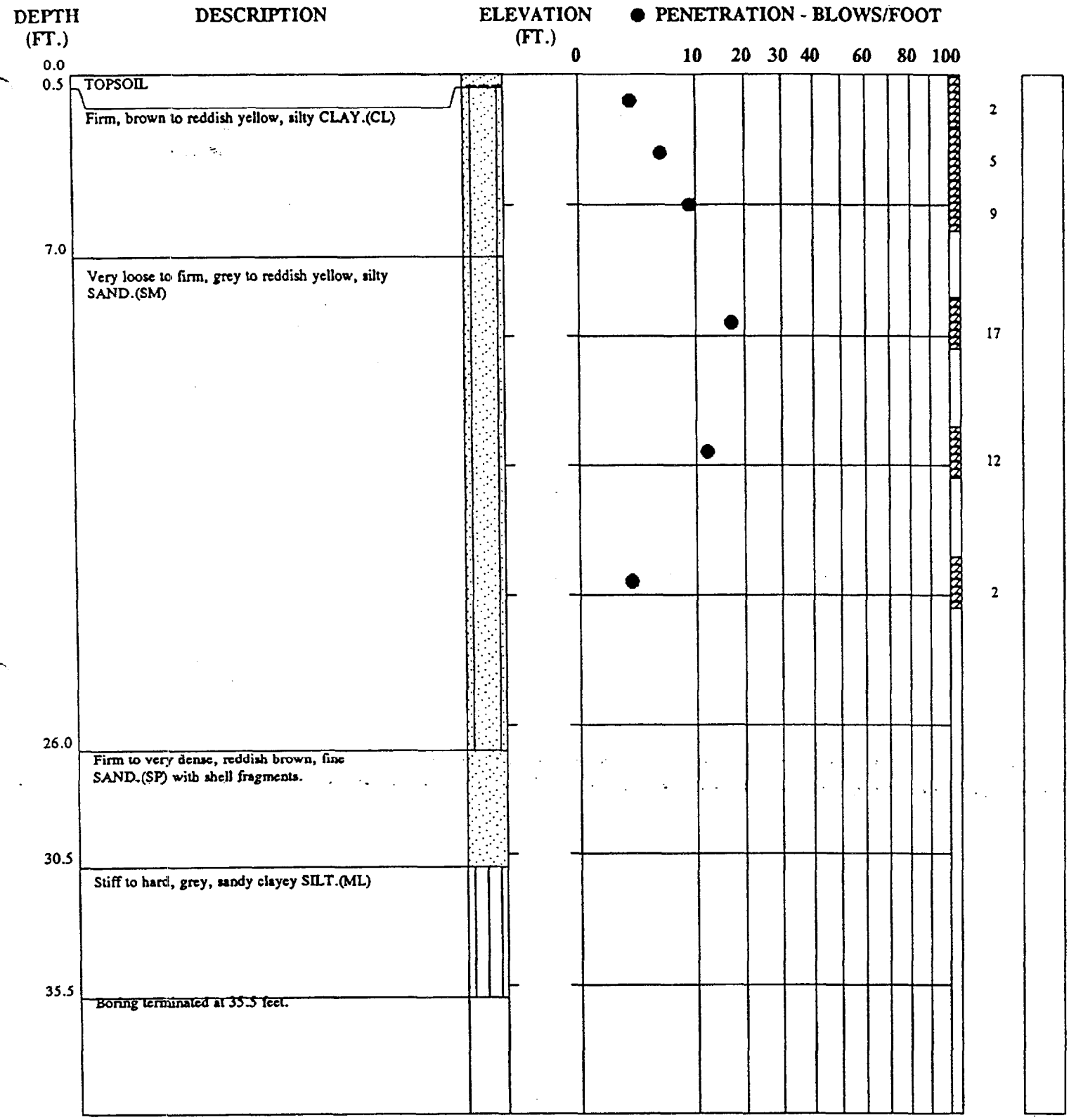
Boring terminated at 30 feet. No split spoon samples obtained beyond 20.5 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-17
DATE DRILLED	August 21, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

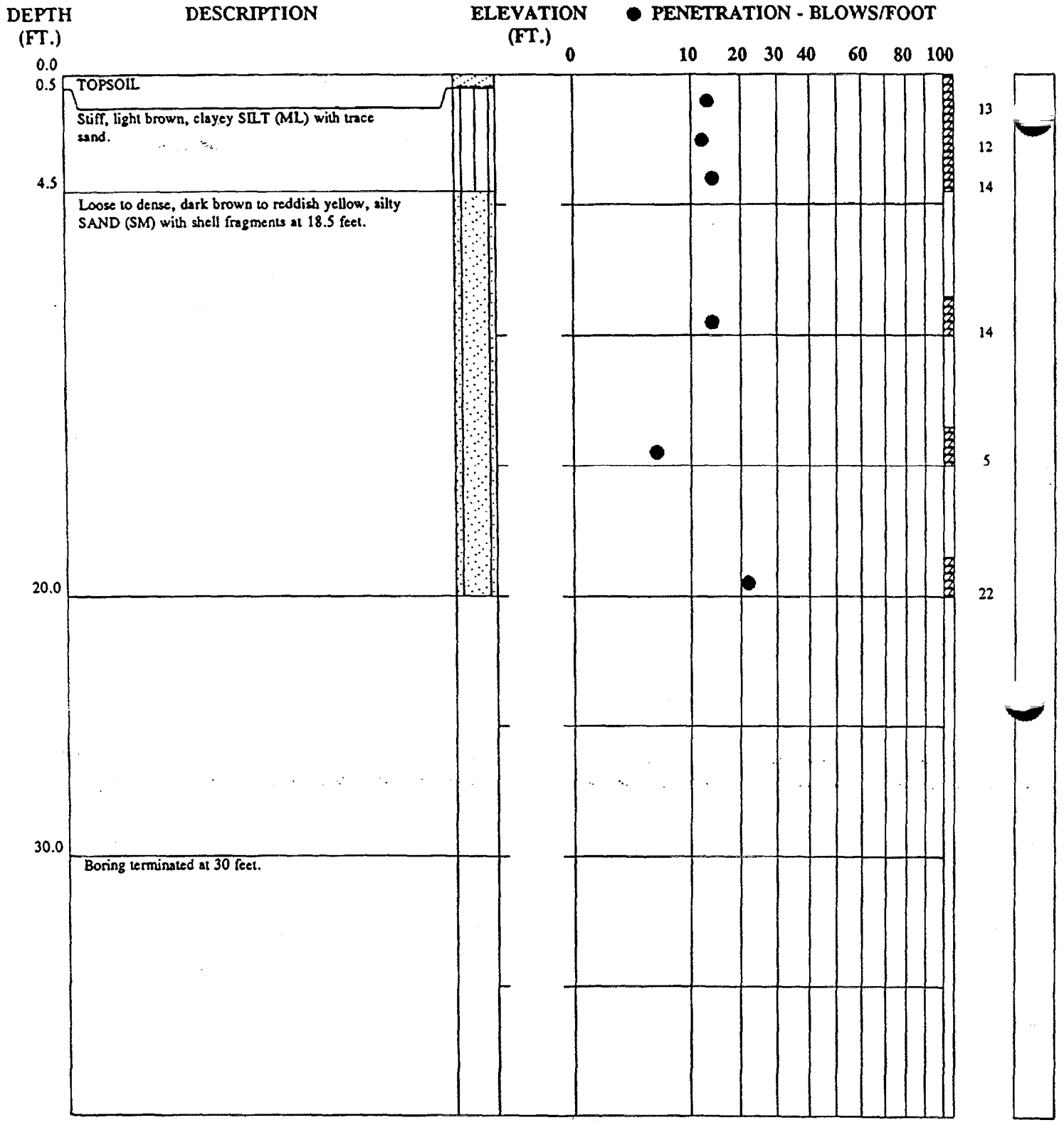
Boring terminated at 35.5 feet. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-19
DATE DRILLED	August 23, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

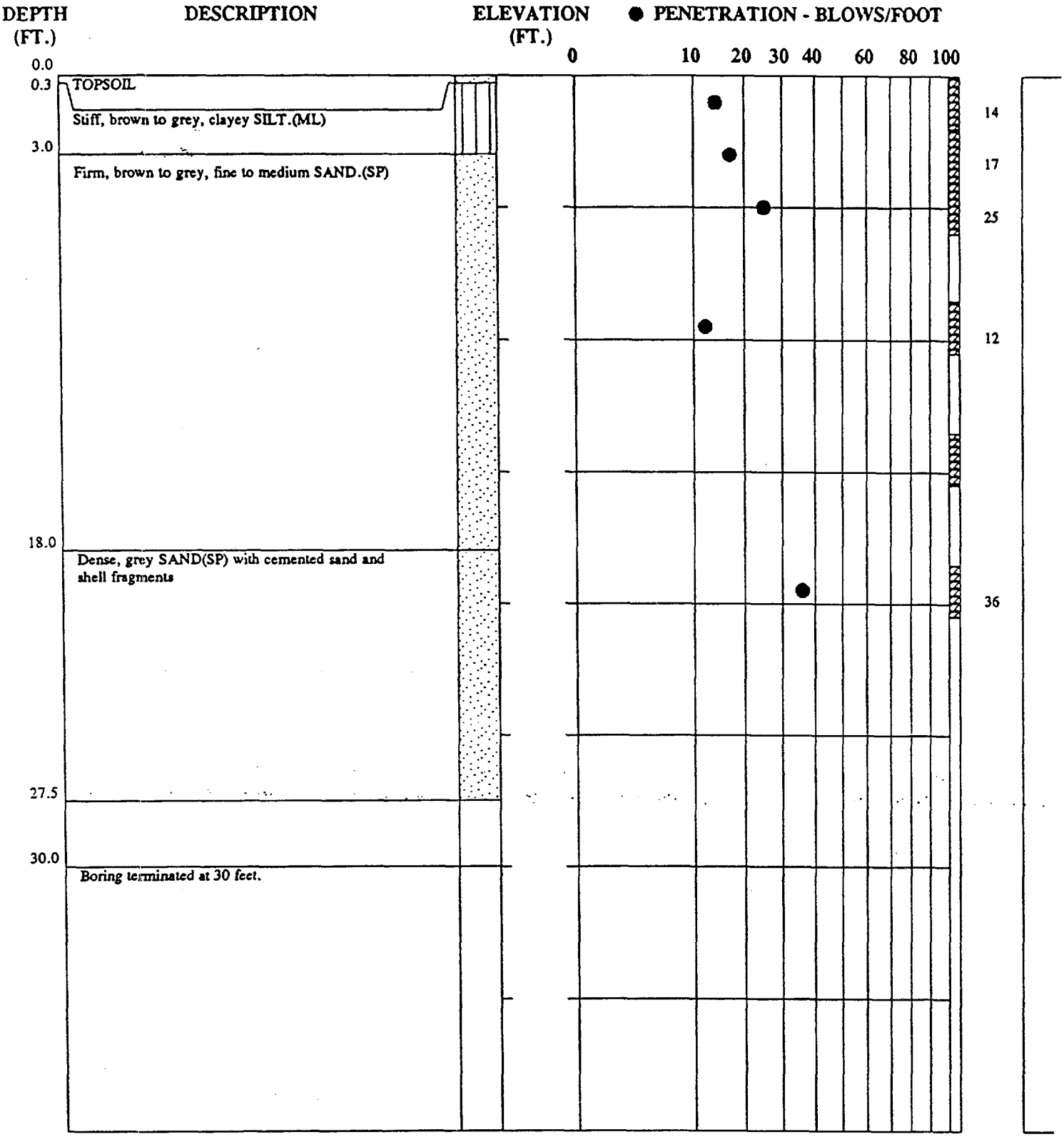
Boring terminated at 30 feet. No split spoon samples obtained beyond 20 feet due to heaving sands. Upon completion, single well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-20
DATE DRILLED	August 22, 1991
PROJECT NUMBER	J47590-6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

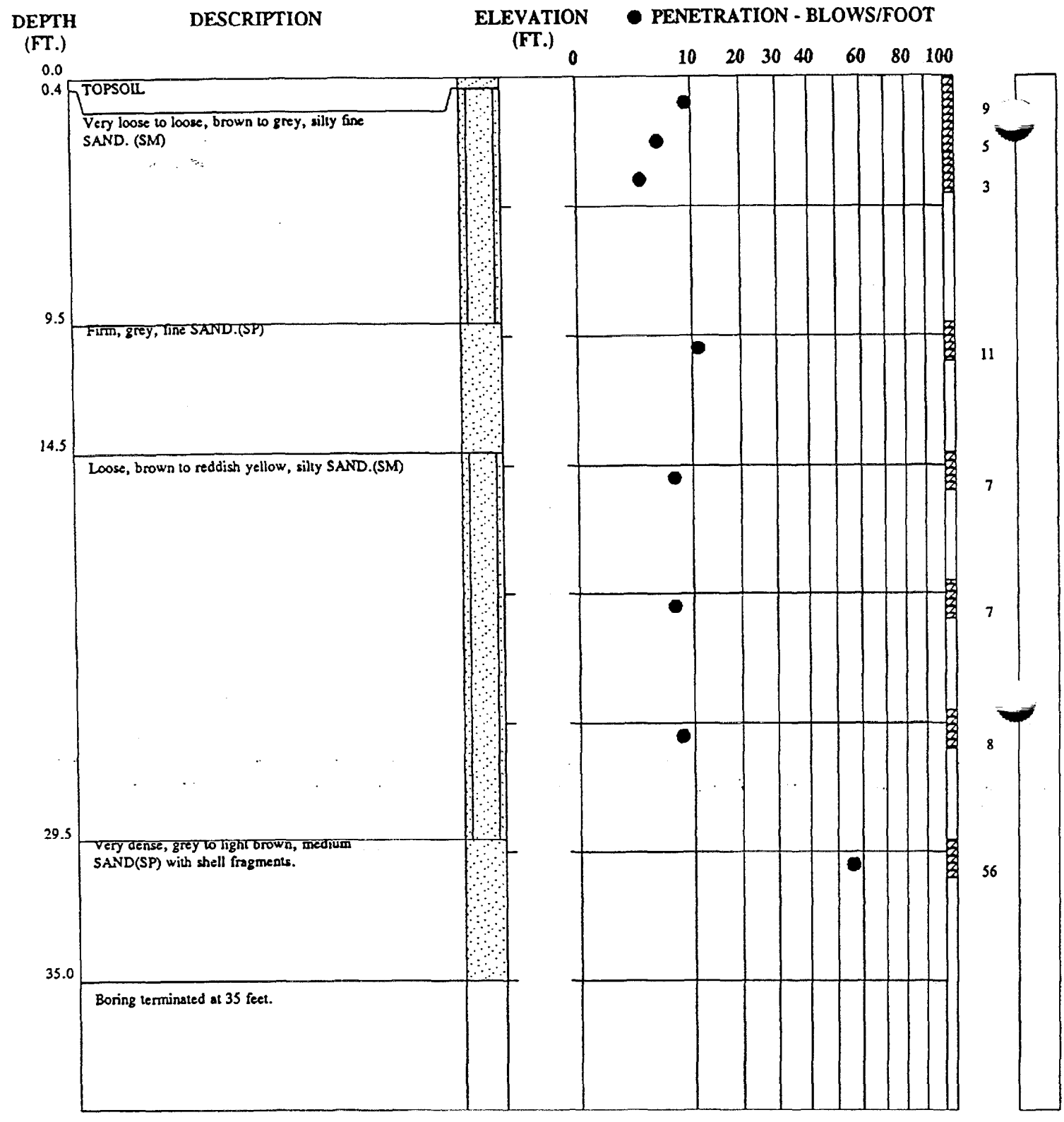
Boring terminated at 30 feet. No split spoon samples obtained beyond 27.5 due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-21
DATE DRILLED	August 23, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

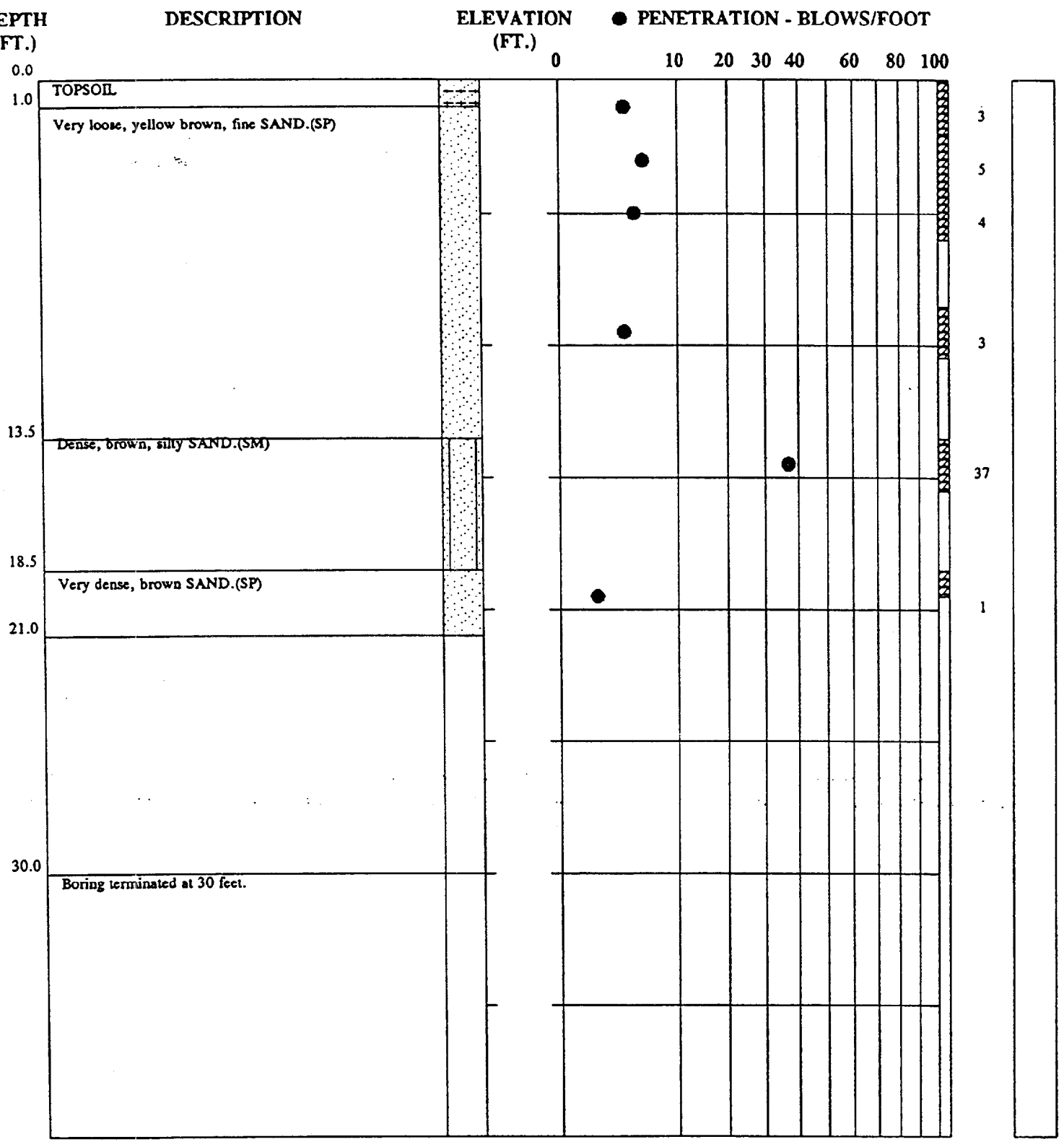
Boring terminated at 35 feet. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-22
DATE DRILLED	August 28, 1991
PROJECT NUMBER	J47590-6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

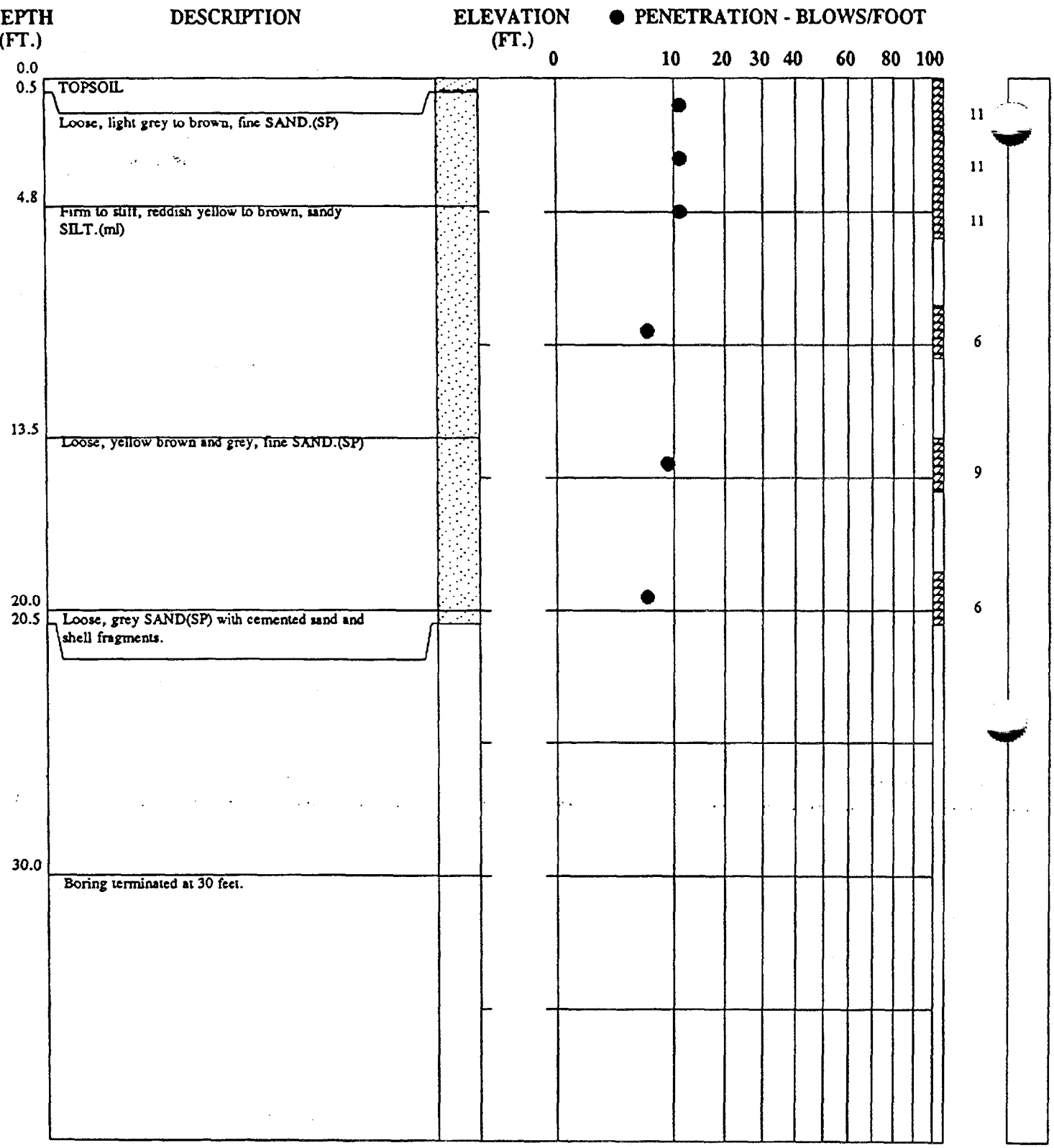
Boring termianted at 30 feet. No split spoon samples obtained beyond 21 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-23
DATE DRILLED	August 27, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

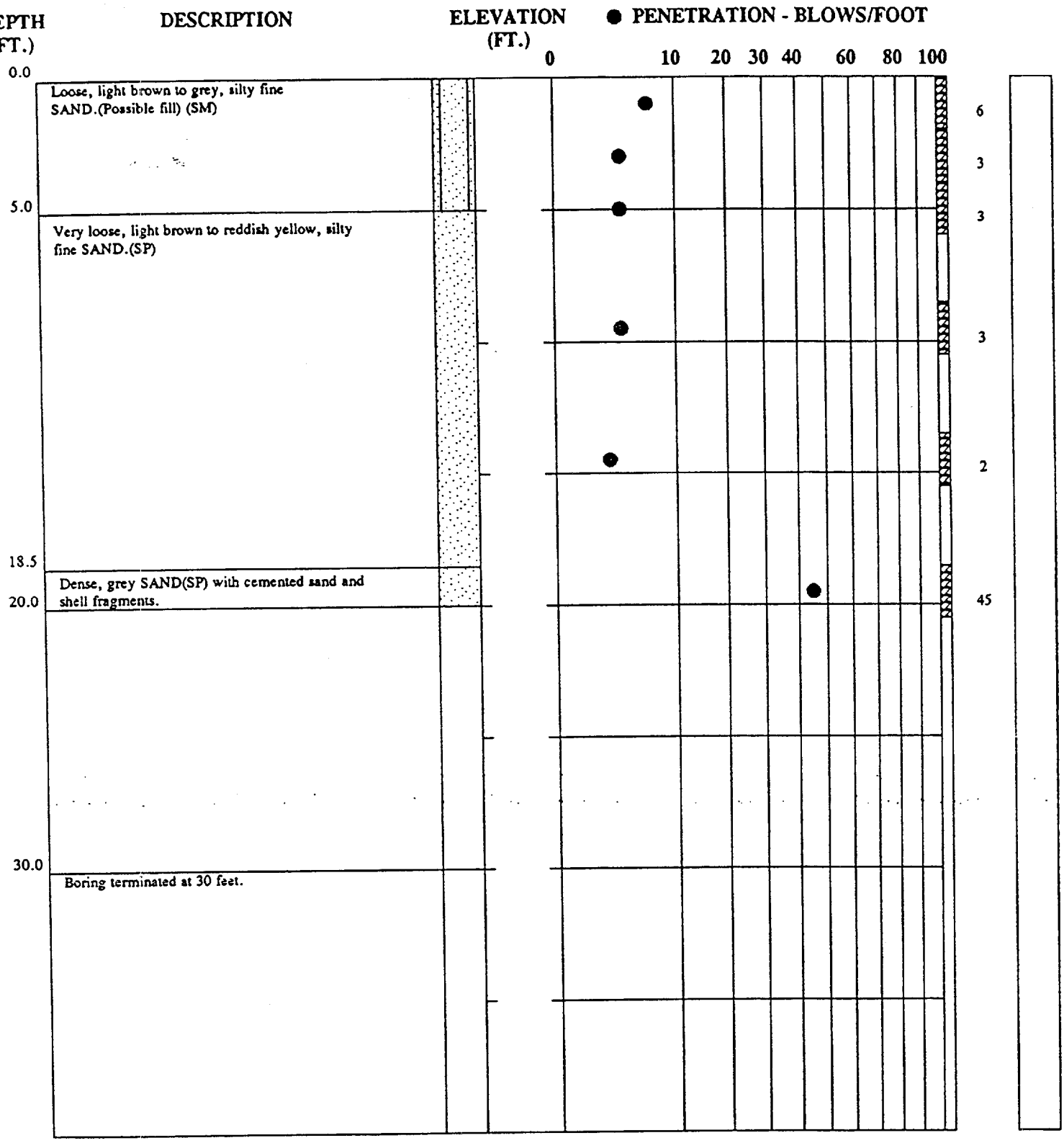
Boring terminated at 30 feet. No split spoon samples obtained beyond 20.5 feet due to heaving sands. Upon boring completion, paired well installed. See well contruction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-24
DATE DRILLED	August 28, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

Boring terminated at 30 feet. No split spoon samples obtained beyond 25.5 feet due to heaving sands. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-25
DATE DRILLED	August 28, 1991
PROJECT NUMBER	J47590-6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	● PENETRATION - BLOWS/FOOT 0 10 20 30 40 60 80 100
0.0	Augered to 20 feet.		
20.0	Dense to very dense, grey coarse SAND (SP) with shell fragments.		56 61 48 37

REMARKS:

Boring terminated at 44.5 feet.

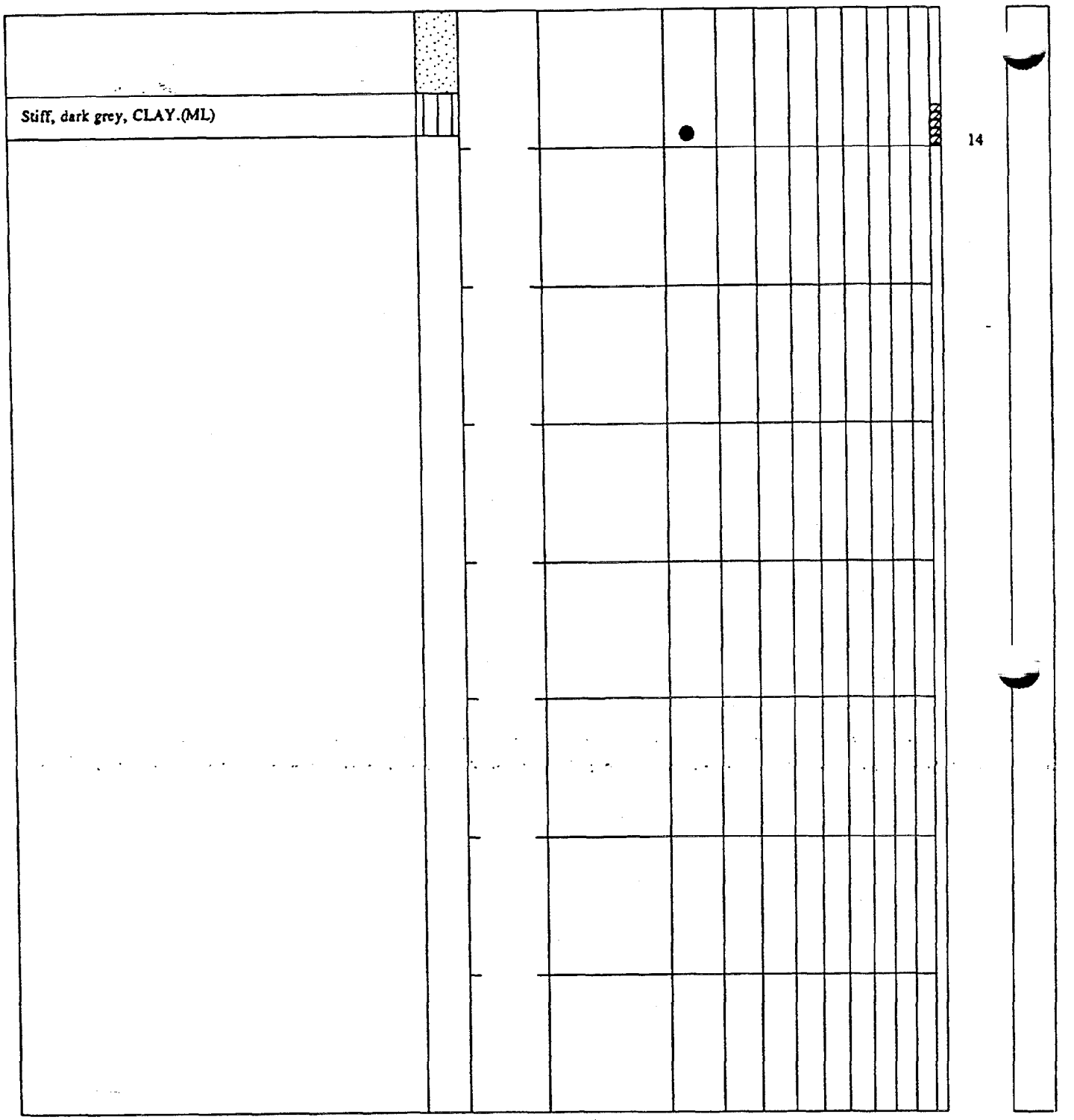
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	SB-1
DATE DRILLED	August 27, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 2	

LAW ENGINEERING

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	● PENETRATION - BLOWS/FOOT 0 10 20 30 40 60 80 100
43.0			
44.5	Stiff, dark grey, CLAY.(ML)		● 14



REMARKS:

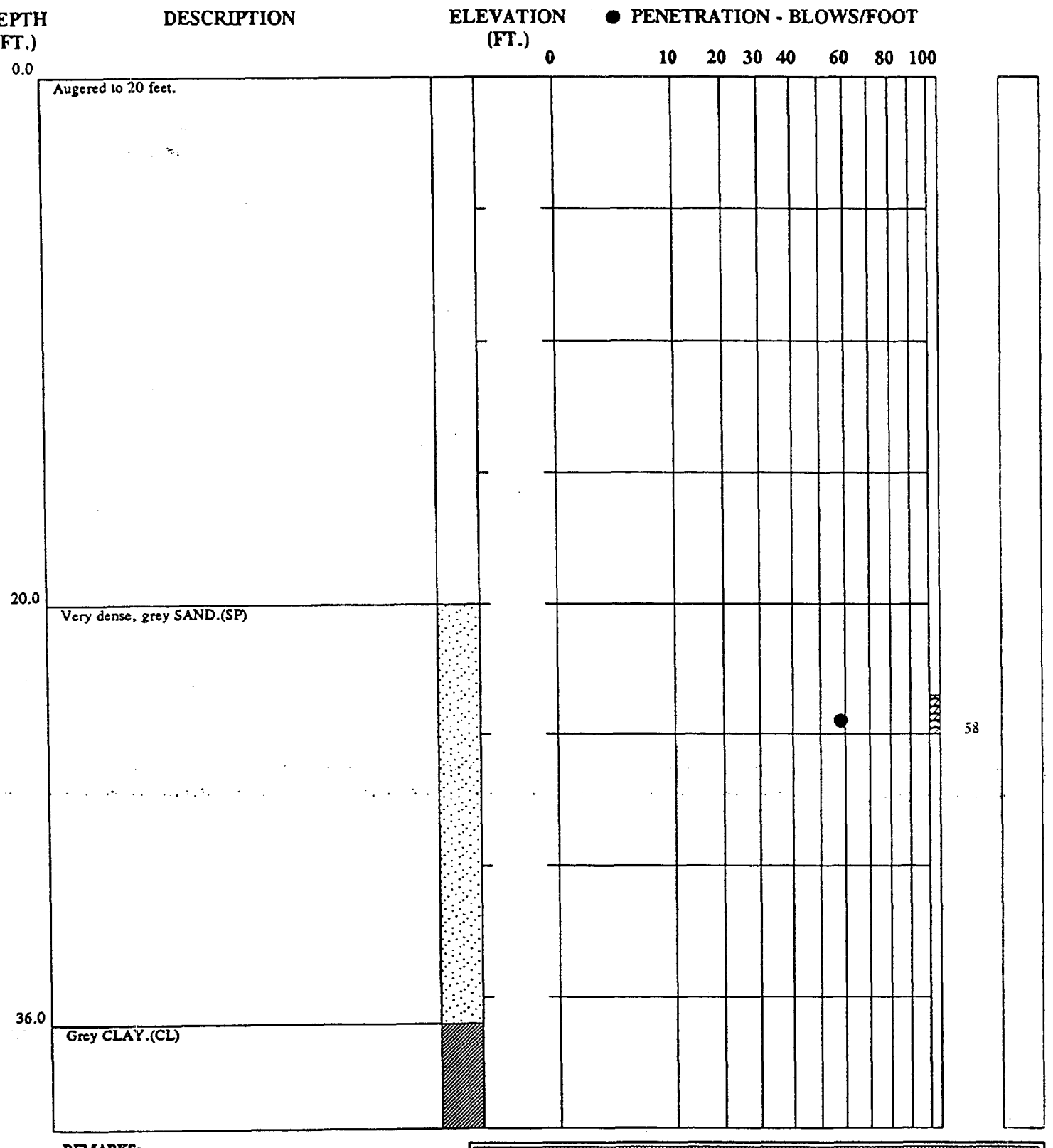
Boring terminated at 44.5 feet.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	SB-1
DATE DRILLED	August 27, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 2 OF 2	

LAW ENGINEERING



REMARKS:

Boring terminated at 42.5 feet.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

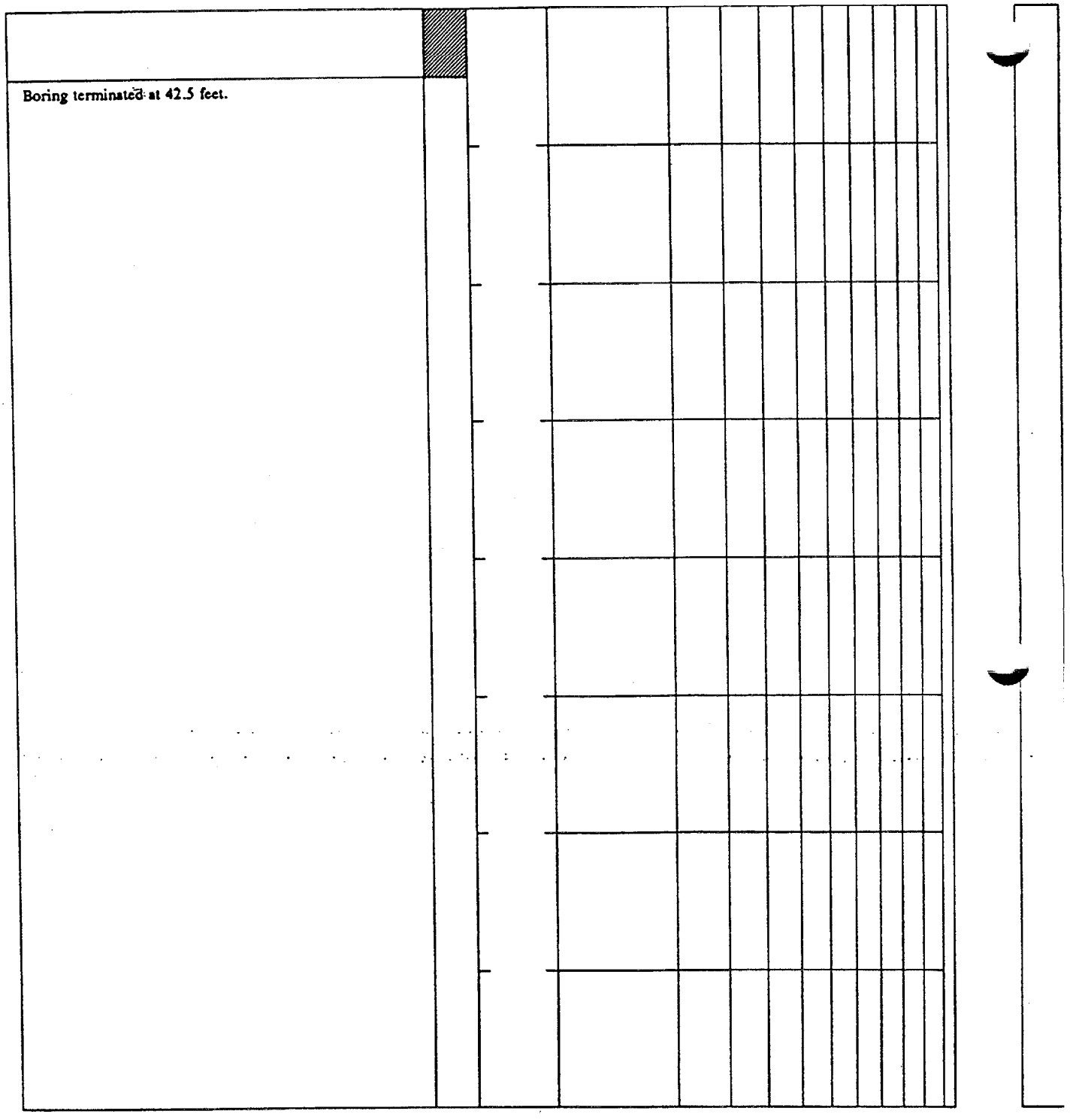
BORING NUMBER	SB-2
DATE DRILLED	August 27, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 2	

LAW ENGINEERING

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)
42.5	Boring terminated at 42.5 feet.	

● PENETRATION - BLOWS/FOOT

0 10 20 30 40 60 80 100



REMARKS:

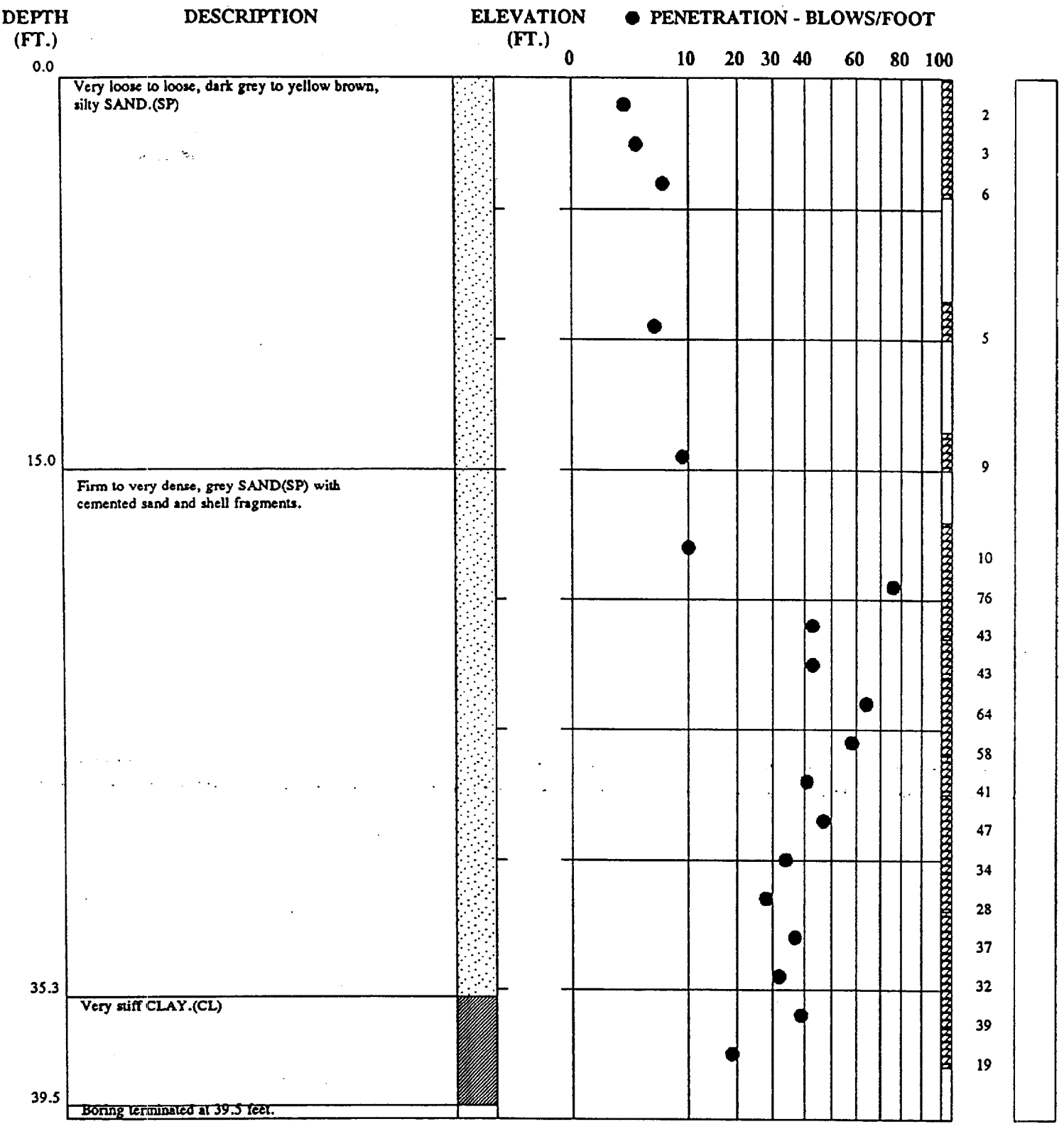
Boring terminated at 42.5 feet.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	SB-2
DATE DRILLED	August 27, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 2 OF 2	

LAW ENGINEERING



REMARKS:

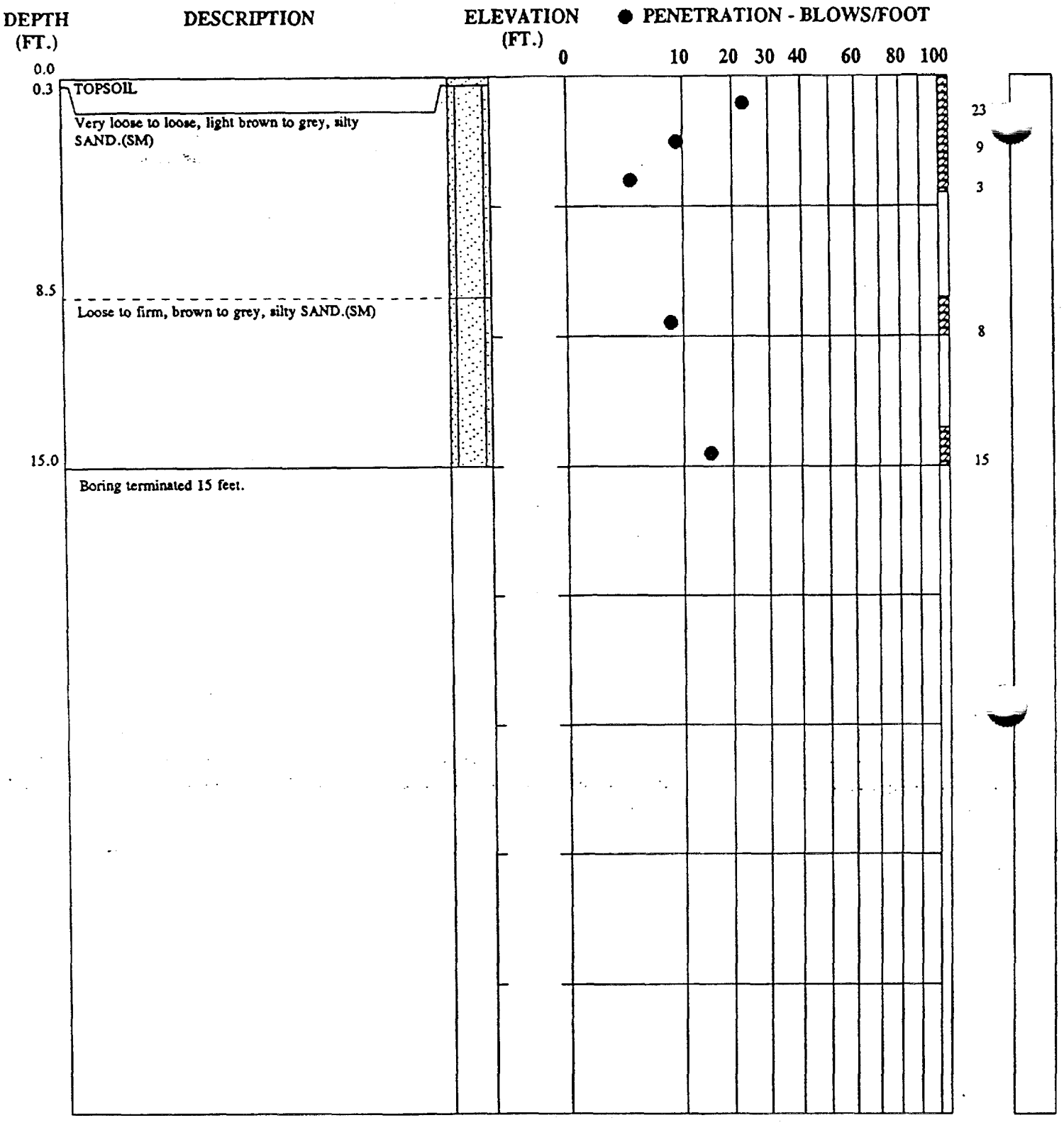
Boring terminated at 30.5 feet. Upon boring completion, paired well installed. See well construction records for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	SB-3
DATE DRILLED	August 21, 1991
PROJECT NUMBER	J47590-6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

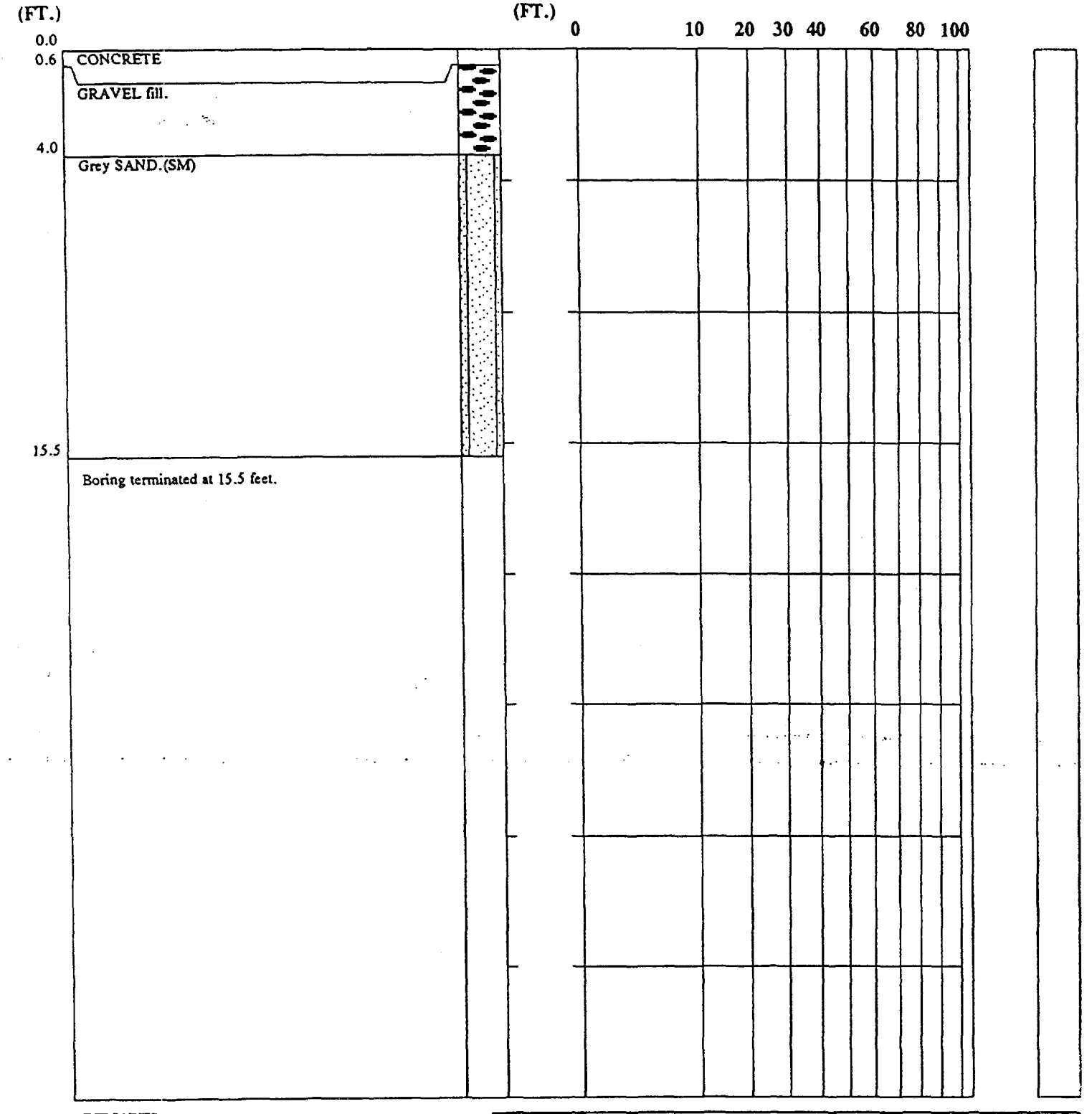
Boring terminated at 15 feet.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	B-1
DATE DRILLED	August 21, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

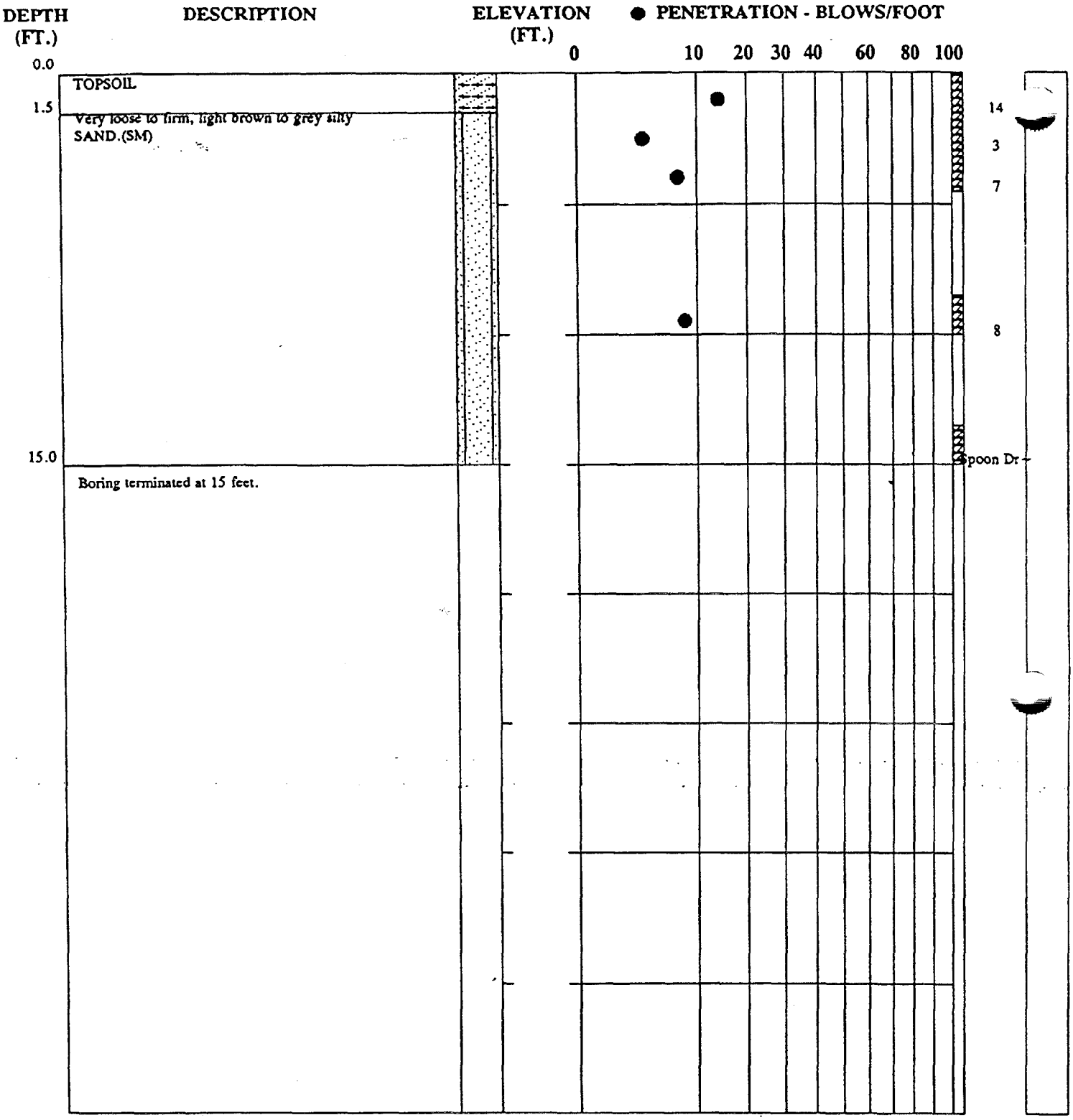
Boring terminated at 15.5 feet.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	B-2
DATE DRILLED	August 29, 1991
PROJECT NUMBER	J47590-6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

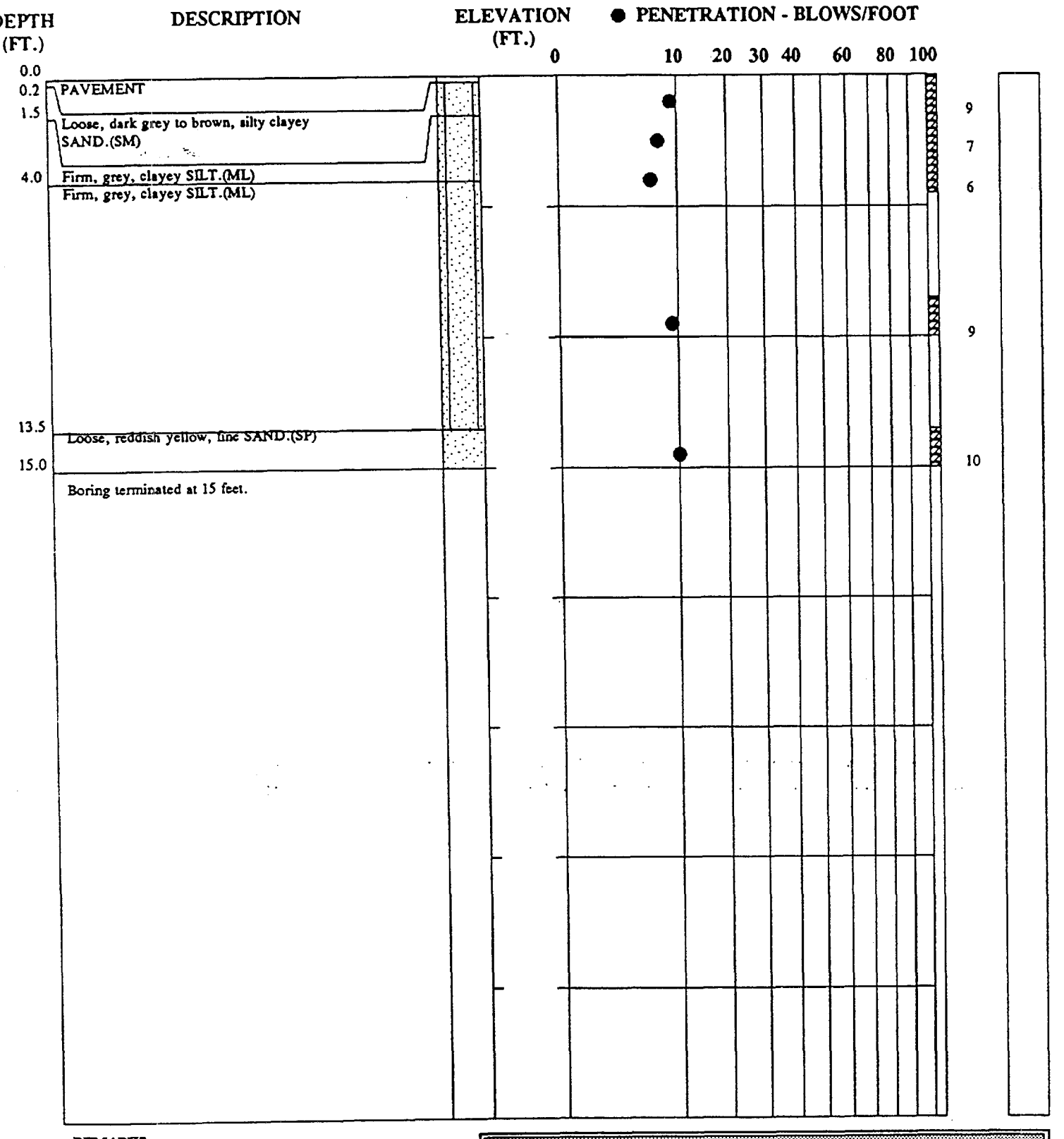
Boring terminated at 15 feet.

TEST BORING RECORD

BORING NUMBER	B-4
DATE DRILLED	August 30, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

LAW ENGINEERING



REMARKS:

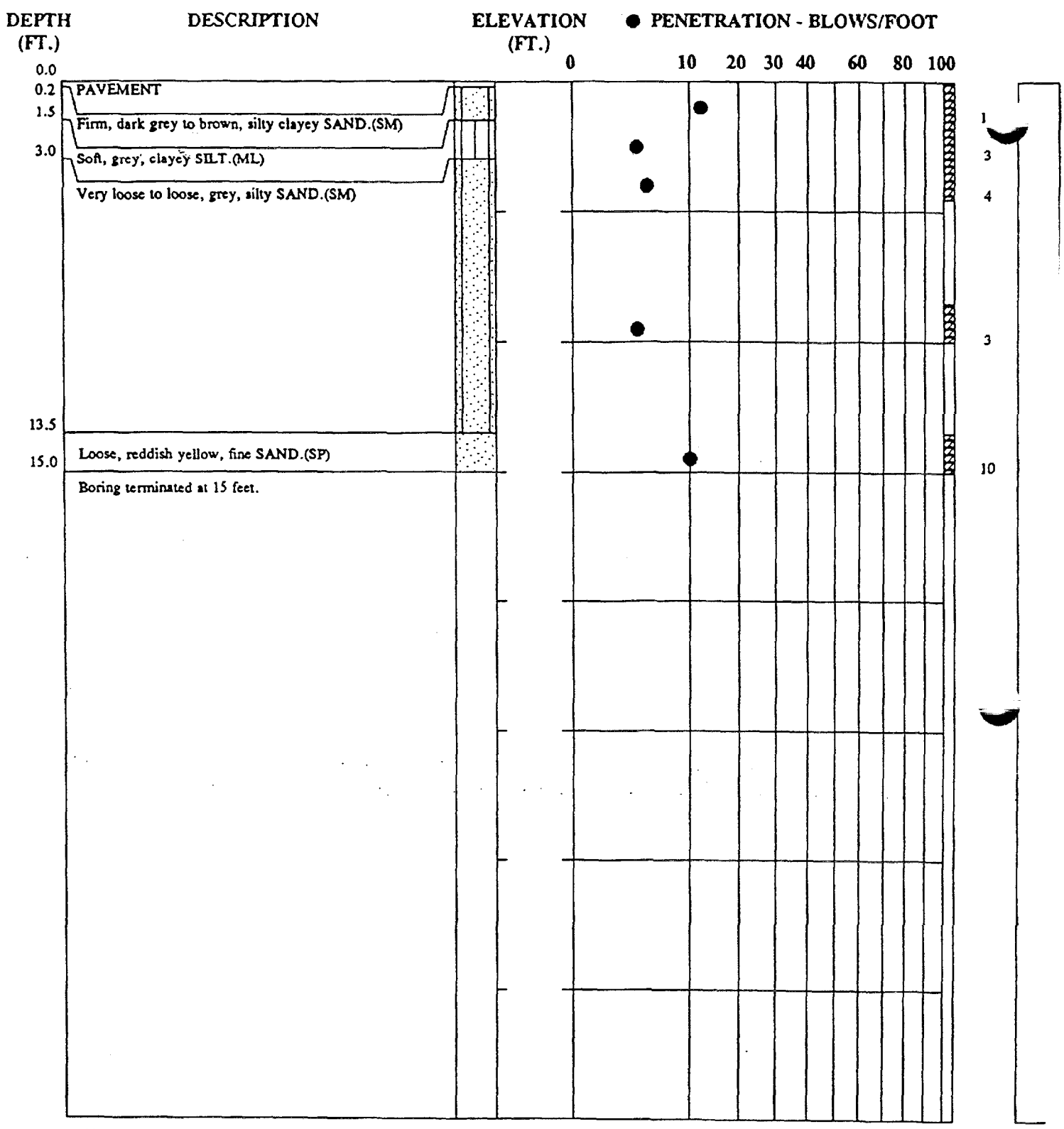
Boring terminated at 15 feet.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	B-5
DATE DRILLED	August 30, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

Boring terminated at 15 feet.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	B-6
DATE DRILLED	August 30, 1991
PROJECT NUMBER	J6014
PROJECT	Camp Geiger Fuel Farm
PAGE 1 OF 1	

LAW ENGINEERING

APPENDIX D

WELL-CONSTRUCTION RECORDS AND

GROUND-WATER MONITORING-WELL INSTALLATION DETAILS

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Po _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WI-0232

1. WELL LOCATION: (Show sketch of the location below) MW-8
Nearest Town: Jacksonville County: Onslow

Camp Geiger Fuel Farm
(Road, Community, or Subdivision and Lot No.)

2. OWNER *See Address Below
ADDRESS
(Street or Route No.)
City or Town State Zip Code

3. DATE DRILLED 8/15/91 USE OF WELL Monitoring
** 4. TOTAL DEPTH S=14.0' D=30.0'
5. CUTTINGS COLLECTED YES [X] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
** 7. STATIC WATER LEVEL Below Top of Casing: S=8.24 FT. D=8.24'
(Use "+" if Above Top of Casing)
** 8. TOP OF CASING IS S=2.35 FT. Above Land Surface* D=2.50'
* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm) N/A METHOD OF TEST
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 4.0	Ft.	2"	SCH 40	PVC
From 0	To 20.0	Ft.	2"	SCH 40	PVC
From	To	Ft.			

13. GROUT:

	Depth		Material	Method
From 1.0	To 2.0	Ft.	Bentonite	Pour
From 15.0	To 18.0	Ft.	Bentonite	Pour

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 4.5	To 13.5	Ft.	2	in.	.010	in.	PVC
From 20.5	To 29.5	Ft.	2	in.	.010	in.	PVC
From	To	Ft.		in.		in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2.0	To 15.0	Ft.	Torpedo	Sand
From 18.0	To 30.0	Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See attached test boring records

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 location map.

**S = Shallow monitoring well
D = Deep monitoring well

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287
Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Kell 10/14/91
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 5/91

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

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Po _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-9
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See Address Below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/16/91 USE OF WELL Monitoring
**4. TOTAL DEPTH S=13.0' D=30.0'
5. CUTTINGS COLLECTED YES [X] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
**7. STATIC WATER LEVEL Below Top of Casing: S=6.95 FT. D=6.99'
   (Use "+" if Above Top of Casing)
**8. TOP OF CASING IS S=2.12 FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	0	To 3.0 Ft.	2"	SCH 40	PVC
From	0	To 25.0 Ft.	2"	SCH 40	PVC
From		To Ft.			

13. GROUT:

	Depth		Material	Method
From	1.0	To 2.0 Ft.	Bentonite	Pour
From	13.0	To 16.0 Ft.	Bentonite	Pour

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From	3.5	To 12.5 Ft.	2	in.	.010	in.	PVC
From	25.5	To 29.5 Ft.	2	in.	.010	in.	PVC
From		To Ft.		in.		in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From	2.0	To 13.0 Ft.	Torpedo	Sand
From	16.0	To 30.0 Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See attached test
		boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287
Attn: Code 1821, Mr. Trueman Seamans

**S=Shallow monitoring well
D=Deep monitoring well

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

Richard A. Kell 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Pe _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-10
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/19/91 USE OF WELL Monitoring
**4. TOTAL DEPTH S=14.0 D=30.0
5. CUTTINGS COLLECTED YES [X] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
**7. STATIC WATER LEVEL Below Top of Casing: S=7.05 FT. D=6.78'
   (Use "+" if Above Top of Casing)
**8. TOP OF CASING IS S=2.49 FT. Above Land Surface* D=2.51'
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 4.0	Ft.	2"	SCH 40	PVC
From 0	To 25.0	Ft.	2"	SCH 40	PVC
From _____	To _____	Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From 1	To 2	Ft.	Bentonite	Pour
From 16	To 19	Ft.	Bentonite	Pour

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From 4.5	To 13.5	Ft.	2 in.	.010 in.	PVC
From 25.5	To 29.5	Ft.	2 in.	.010 in.	PVC
From _____	To _____	Ft.	_____ in.	_____ in.	_____

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2	To 14	Ft.	Torpedo	Sand
From 19	To 30	Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See attached test
		boring records

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 location map

* Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287
Attn: Code 181, Mr. Trueman Seamans

**S=Shallow monitoring well
D=Deep monitoring well

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

Richard A. Hall 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Elv. _____ GW Level _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below) MW-11
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See Address Below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/19/91 USE OF WELL Monitoring
**4. TOTAL DEPTH S=14.0' D=30.0'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
**7. STATIC WATER LEVEL Below Top of Casing: S=8.27 FT. D=8.60
   (Use "+" if Above Top of Casing)
**8. TOP OF CASING IS S=2.51 FT. Above Land Surface* D=2.59
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth) N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft	Material
From 0	To 4.0	Ft.	2"	SCH 40	PVC
From 0	To 25.0	Ft.	2"	SCH 40	PVC
From _____	To _____	Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From 1.0	To 2.0	Ft.	Bentonite	Pour
From 19.5	To 22.5	Ft.	Bentonite	Pour

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 4.5	To 13.5	Ft.	2	in.	.010	in.	PVC
From 25.5	To 29.5	Ft.	2	in.	.010	in.	PVC
From _____	To _____	Ft.	_____	in.	_____	in.	_____

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2.0	To 19.5	Ft.	Torpedo	Sand
From 22.5	To 30.0	Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See Attached Test
		boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seaman

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

Richard A. Kolb 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 5/91

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

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Pe _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below) MW-12
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/19/91 USE OF WELL Monitoring
** 4. TOTAL DEPTH S=14.5' D=28.5'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
** 7. STATIC WATER LEVEL Below Top of Casing: S=9.58 FT. D=10.34'
   (Use "+" if Above Top of Casing)
** 8. TOP OF CASING IS S=2.72 FT. Above Land Surface* D=2.75
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount
12. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
0	4.5 Ft.	2"	SCH 40	PVC
0	23.5 Ft.	2"	SCH 40	PVC
	Ft.			

13. GROUT:

Depth From	To		Material	Method
2.0	3.0	Ft.	Bentonite	Pour
15.5	19.0	Ft.	Bentonite	Pour

14. SCREEN:

Depth From	To		Diameter		Slot Size		Material
5.0	14.0	Ft.	2	in.	.010	in.	PVC
24.0	28.0	Ft.	2	in.	.010	in.	PVC
		Ft.		in.		in.	

15. SAND/GRAVEL PACK:

Depth From	To		Size	Material
3.0	14.5	Ft.	Torpedo	Sand
19.0	28.5	Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DEPTH From	To	DRILLING LOG Formation Description
		See attached test boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Kell 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Po _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-13
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/19/91 USE OF WELL Monitoring
**4. TOTAL DEPTH S=15.0' D=30.0'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
**7. STATIC WATER LEVEL Below Top of Casing: S=9.83 FT. D=9.96
(Use "+" if Above Top of Casing)
**8. TOP OF CASING IS S=2.50 FT. Above Land Surface* D=2.58'
* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 5.0	Ft.	2"	SCH 40	PVC
From 0	To 25.0	Ft.	2"	SCH 40	PVC
From _____	To _____	Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From 2.0	To 3.0	Ft.	Bentonite	Pellets
From 18.5	To 22.5	Ft.	Bentonite	Pellets

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From 5.5	To 14.5	Ft	2 in.	.010 in.	PVC
From 25.5	To 29.5	Ft.	2 in.	.010 in.	PVC
From _____	To _____	Ft.	_____ in.	_____ in.	_____

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 3.0	To 18.5	Ft.	Torpedo	Sand
From 22.5	To 30.0	Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DRILLING LOG	
From	To
See attached test boring records	

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Hall 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Pe _____
Minor Basin _____
Basin Code _____
Hydro Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-14
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/20/91 USE OF WELL Monitoring
4. TOTAL DEPTH S=13.0 D=30.0'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: S=9.58 FT. D=9.51'
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS S=2.51 FT. Above Land Surface* D=2.47'

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth From	To	Ft.	Diameter	Wall Thickness or Weight/Ft	Material
	0	3.0		2"	SCH 40	PVC
	0	24.0		2"	SCH 40	PVC

13. GROUT:

	Depth From	To	Ft.	Material	Method
	1.0	2.0		Bentonite	Pour
	18.0	21.0		Bentonite	Pour

14. SCREEN:

	Depth From	To	Ft.	Diameter		Slot Size		Material
	3.5	12.5		2	in.	.010	in.	PVC
	24.5	28.5		2	in.	.010	in.	PVC
					in.		in.	

15. SAND/GRAVEL PACK:

	Depth From	To	Ft.	Size	Material
	2.0	13.0		Torpedo	Sand
	21.0	29.0		Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DEPTH From	To	DRILLING LOG Formation Description
		See Attached Test
		Boring Records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Kolb — 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT — DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Pb _____
Minor Basin _____
Basin Code _____
Hydro Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-15
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/20/91 USE OF WELL Monitoring
**4. TOTAL DEPTH S=14.0 D=30.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
**7. STATIC WATER LEVEL Below Top of Casing: S=10.60 FT. D=10.70
   (Use "+" if Above Top of Casing)
**8. TOP OF CASING IS S=2.55 FT. Above Land Surface* D=2.52'
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
0	4.0 Ft.	2"	SCH 40	PVC
0	25.0 Ft.	2"	SCH 40	PVC
	To Ft.			

13. GROUT:

Depth From	To	Material	Method
1.5	2.5 Ft.	Bentonite	Pour
17.5	23.0 Ft.	Bentonite	Pour

14. SCREEN:

Depth From	To	Diameter	Slot Size	Material
4.5	13.5 Ft.	2 in.	.010 in.	PVC
25.5	29.5 Ft.	2 in.	.010 in.	PVC
	To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

Depth From	To	Size	Material
2.5	17.5 Ft.	Torpedo	Sand
25.0	30.0 Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DEPTH From	To	DRILLING LOG Formation Description
		See attached test
		boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Hall 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-16
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/21/91 USE OF WELL Monitoring
**4. TOTAL DEPTH S=14.5' D=29.0'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
**7. STATIC WATER LEVEL Below Top of Casing: S=12.87 FT. D=12.92
   (Use "+" if Above Top of Casing)
**8. TOP OF CASING IS S=2.62 FT. Above Land Surface* D=2.58

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft	Material
From 0	To 4.5	Ft.	2"	SCH 40	PVC
From 0	To 24.0	Ft.	2"	SCH 40	PVC
From _____	To _____	Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From 1.0	To 2.0	Ft.	Bentonite	Pour
From 17.5	To 20.5	Ft.	Bentonite	Pour

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 5.0	To 14.0	Ft	2	in.	.010	in.	PVC
From 24.0	To 28.5	Ft.	2	in.	.010	in.	PVC
From _____	To _____	Ft.	_____	in.	_____	in.	_____

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2.0	To 17.5	Ft.	Torpedo	Sand
From 20.0	To 24.5	Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See attached test boring records

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)

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

See attached site location map

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Kolb 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. SERIAL NO.
Lat. Long.
Minor Basin
Basin Code
Header Ent. GW Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-17
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/21/91 USE OF WELL Monitoring
** 4. TOTAL DEPTH S=17.0' D=29.5'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
** 7. STATIC WATER LEVEL Below Top of Casing: S=11.07 FT. D=10.92'
   (Use "+" if Above Top of Casing)
** 8. TOP OF CASING IS S=2.56 FT. Above Land Surface* D=2.50'
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	0	To 7.0 Ft.	2"	SCH 40	PVC
From	0	To 24.5 Ft.	2"	SCH 40	PVC
From		To Ft.			

13. GROUT:

	Depth		Material	Method
From	3.5	To 4.5 Ft.	Bentonite	Pour
From	19.5	To 22.5 Ft.	Bentonite	Pour

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From	7.5	To 16.5 Ft.	2 in.	.010 in.	PVC
From	25.0	To 29.0 Ft.	2 in.	.010 in.	PVC
From		To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From	4.5	To 19.5 Ft.	Torpedo	Sand
From	22.5	To 30.0 Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0 to 3.5'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See attached test
		boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Kell 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Index Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-18
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *see address below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/21/91 USE OF WELL Monitoring
**4. TOTAL DEPTHS S=12.5' D=25.0'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
**7. STATIC WATER LEVEL Below Top of Casing: S=7.96 FT. D=7.96'
   (Use "+" if Above Top of Casing)
**8. TOP OF CASING IS S=2.64 FT. Above Land Surface* D=2.62'
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

Depth From	To	Ft.	Diameter	Wall Thickness or Weight/Ft.	Material
0	2.5		2"	SCH 40	PVC
0	20.0		2"	SCH 40	PVC

13. GROUT:

Depth From	To	Ft.	Material	Method
0.5	1.5		Bentonite	Pour
14.0	17.0		Bentonite	Pour

14. SCREEN:

Depth From	To	Ft.	Diameter		Slot Size		Material
3.0	12.0		2	in.	.010	in.	PVC
20.5	24.5		2	in.	.010	in.	PVC
				in.		in.	

15. SAND/GRAVEL PACK:

Depth From	To	Ft.	Size	Material
1.5	14.0		Torpedo	Sand
17.0	25.0		Torpedo	Sand

16. REMARKS: Concrete from 0 to 0.5'

DEPTH From	To	DRILLING LOG Formation Description
		See attached test
		boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Hall 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ PD _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-19
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/22/91 USE OF WELL Monitoring
** 4. TOTAL DEPTH S=14.0' D=25.0'
5. CUTTINGS COLLECTED YES [X] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
** 7. STATIC WATER LEVEL Below Top of Casing: S=3.54 FT. D=3.02
   (Use "+" if Above Top of Casing)
** 8. TOP OF CASING IS S=2.62 FT. Above Land Surface* D=2.58
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
0	4.0 Ft.	2"	SCH 40	PVC
0	22.0 Ft.	2"	SCH 40	PVC
	To Ft.			

13. GROUT:

Depth From	To	Material	Method
1.0	2.0 Ft.	Bentonite	Pour
17.0	20.0 Ft.	Bentonite	Pour

14. SCREEN:

Depth From	To	Diameter	Slot Size	Material
4.5	13.5 Ft.	2 in.	.010 in.	PVC
22.5	24.5 Ft.	2 in.	.010 in.	PVC
	To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

Depth From	To	Size	Material
2.0	15.0 Ft.	Torpedo	Sand
20.0	25.0 Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0 to 1.0'

DEPTH From	To	DRILLING LOG Formation Description
		See attached test boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Hall 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Pg. _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-20
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER* See address below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/23/91 USE OF WELL Monitoring
**4. TOTAL DEPTH 12.5'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
**7. STATIC WATER LEVEL Below Top of Casing: 9.08 FT.
(Use "+" if Above Top of Casing)
**8. TOP OF CASING IS 2.38 FT. Above Land Surface*
* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 2.5	Ft.	2"	SCH 40	PVC
From _____	To _____	Ft.	_____	_____	_____
From _____	To _____	Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From .5	To 1.5	Ft.	Bentonite	Pour
From _____	To _____	Ft.	_____	_____

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 3.0	To 12.0	Ft.	2	in.	.010	in.	PVC
From _____	To _____	Ft.	_____	in.	_____	in.	_____
From _____	To _____	Ft.	_____	in.	_____	in.	_____

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 12.5	To 1.5	Ft.	Torpedo	Sand
From _____	To _____	Ft.	_____	_____

16. REMARKS: Concrete from 0 to 0.5'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See attached test
		boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Kell 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. SERIAL NO.
Lat. Long. Pe
Minor Basin
Basin Code
Header Ent. GW-1 Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below) MW-21
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *see address below
   ADDRESS
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/23/91 USE OF WELL Monitoring
** 4. TOTAL DEPTH S=14.0 D=27.5'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
** 7. STATIC WATER LEVEL Below Top of Casing: S=8.50 FT. D=8.62'
   (Use "+" if Above Top of Casing)
** 8. TOP OF CASING IS S=2.47 FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount
12. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
0	4.0 Ft.	2"	SCH 40	PVC
0	24.5 Ft.	2"	SCH 40	PVC
	Ft.			

13. GROUT:

Depth From	To	Material	Method
1.0	2.0 Ft.	Bentonite	Pour
19.0	22.0 Ft.	Bentonite	Pour

14. SCREEN:

Depth From	To	Diameter	Slot Size	Material
4.5	13.5 Ft.	2 in.	.010 in.	PVC
25.5	27.0 Ft.	2 in.	.010 in.	PVC
	Ft.	in.	in.	

15. SAND/GRAVEL PACK:

Depth From	To	Size	Material
2.0	14.0 Ft.	Torpedo	Sand
22.0	28.5 Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0' to 1.0'

DEPTH From	To	DRILLING LOG Formation Description
		See attached test boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Hall 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina · Department of Environment, Health, and Natural Resources
Division of Environmental Management · Groundwater Section
P.O. Box 29535 · Raleigh, N.C. 27626-0535
Phone (919) 733-3221

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QUAD. NO. SERIAL NO.
Lat. Long Pg.
Minor Basin
Basin Code
Header Ent. GW-1 Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-22
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Form
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/28/91 USE OF WELL Monitoring
4. TOTAL DEPTH S=15.0' D=35.0'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: S=11.67 FT. D=11.85'
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS S=2.91 FT. Above Land Surface* D=2.91'

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount
12. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
0	5.0 Ft.	2"	SCH 40	PVC
0	32.0 Ft.	2"	SCH 40	PVC
	To Ft.			

13. GROUT:

Depth From	To	Material	Method
2.0	3.0 Ft.	Bentonite	Pour
25.5	29.0 Ft.	Bentonite	Pour

14. SCREEN:

Depth From	To	Diameter	Slot Size	Material
5.5	14.5 Ft.	2 in.	.010 in.	PVC
32.5	35.0 Ft.	2 in.	.010 in.	PVC
	To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

Depth From	To	Size	Material
3.0	25.5 Ft.	Torpedo	Sand
29.0	35.0 Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0 to 2.0'

DEPTH From	To	DRILLING LOG Formation Description
		See attached test
		boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Kalt 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

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QUAD. NO. SERIAL NO.
Lat. Long. Po
Minor Basin
Basin Code
Header Ent. GW-1 Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

1. WELL LOCATION: (Show sketch of the location below) MW-23
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/27/91 USE OF WELL Monitoring
**4. TOTAL DEPTH S=9.5' D=20.0'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
**7. STATIC WATER LEVEL Below Top of Casing: S=5.50 FT. D=4.02
(Use "+" if Above Top of Casing)
**8. TOP OF CASING IS S=2.35 FT. Above Land Surface* D=2.35+
* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 2.0	Ft.	2"	SCH 40	PVC
From 0	To 17.0	Ft.	2"	SCH 40	PVC
From	To	Ft.			

13. GROUT:

	Depth		Material	Method
From 0.5	To 1.0	Ft.	Bentonite	Pour
From 10.0	To 13.0	Ft.	Bentonite	Pour

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 2.5	To 9.5	Ft	2	in.	.010	in.	PVC
From 17.5	To 20.0	Ft.	2	in.	.010	in.	PVC
From	To	Ft.		in.		in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 1.0	To 10.0	Ft.	Torpedo	Sand
From 13.0	To 21.0	Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0 to 0.5'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See attached test boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Kolb 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 REV. 5/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

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QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ Po _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below) MW-24
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *see address below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/28/91 USE OF WELL Monitoring
4. TOTAL DEPTH S=18.0' D=29.0'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: S=7.96 FT. D=12.12'
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS S=2.20' FT. Above Land Surface* D=2.88'

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 8.0	Ft.	2"	SCH 40	PVC
From 0	To 26.0	Ft.	2"	SCH 40	PVC
From _____	To _____	Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From 0	To 3.0	Ft.	Bentonite	Pour
From 20.0	To 23.0	Ft.	Bentonite	Pour

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From 8.5	To 17.5	Ft.	2 in.	.010 in.	PVC
From 26.5	To 29.0	Ft.	2 in.	.010 in.	PVC
From _____	To _____	Ft.	_____ in.	_____ in.	_____

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 4.0	To 20.0	Ft.	Torpedo	Sand
From 23.0	To 29.0	Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0 to 3.0'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See attached test
		boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Holt 10/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 5/91

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

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

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Lat. Long. Po
Minor Basin
Basin Code
Header Ent. Chk. Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0237-WM-0232

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below) MW-25
   Nearest Town: Jacksonville County: Onslow
   Camp Geiger Fuel Farm
   (Road, Community, or Subdivision and Lot No.)
2. OWNER *See address below
   ADDRESS
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 8/29/91 USE OF WELL Monitoring
4. TOTAL DEPTH S=14.0 D=30.0'
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: S=7.65 FT. D=7.13
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS S=2.21 FT. Above Land Surface* D=2.19

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 4.0	Ft.	2"	SCH 40	PVC
From 0	To 27.0	Ft.	2"	SCH 40	PVC
From	To	Ft.			

13. GROUT:

	Depth		Material	Method
From 1.0	To 2.0	Ft.	Bentonite	Pour
From 22.0	To 25.0	Ft.	Bentonite	Pour

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From 4.5	To 13.5	Ft.	2 in.	.010 in.	PVC
From 27.5	To 30.0	Ft.	2 in.	.010 in.	PVC
From	To	Ft.	in.	in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2.0	To 22.0	Ft.	Torpedo	Sand
From 25.0	To 30.0	Ft.	Torpedo	Sand

16. REMARKS: Concrete from 0 to 1.0'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See attached test
		boring records

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 location map

*Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

**S=Shallow monitoring well
D=Deep monitoring well

Attn: Code 1821, Mr. Trueman Seamans

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

Richard A. Kell 12/14/91

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 5/91

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

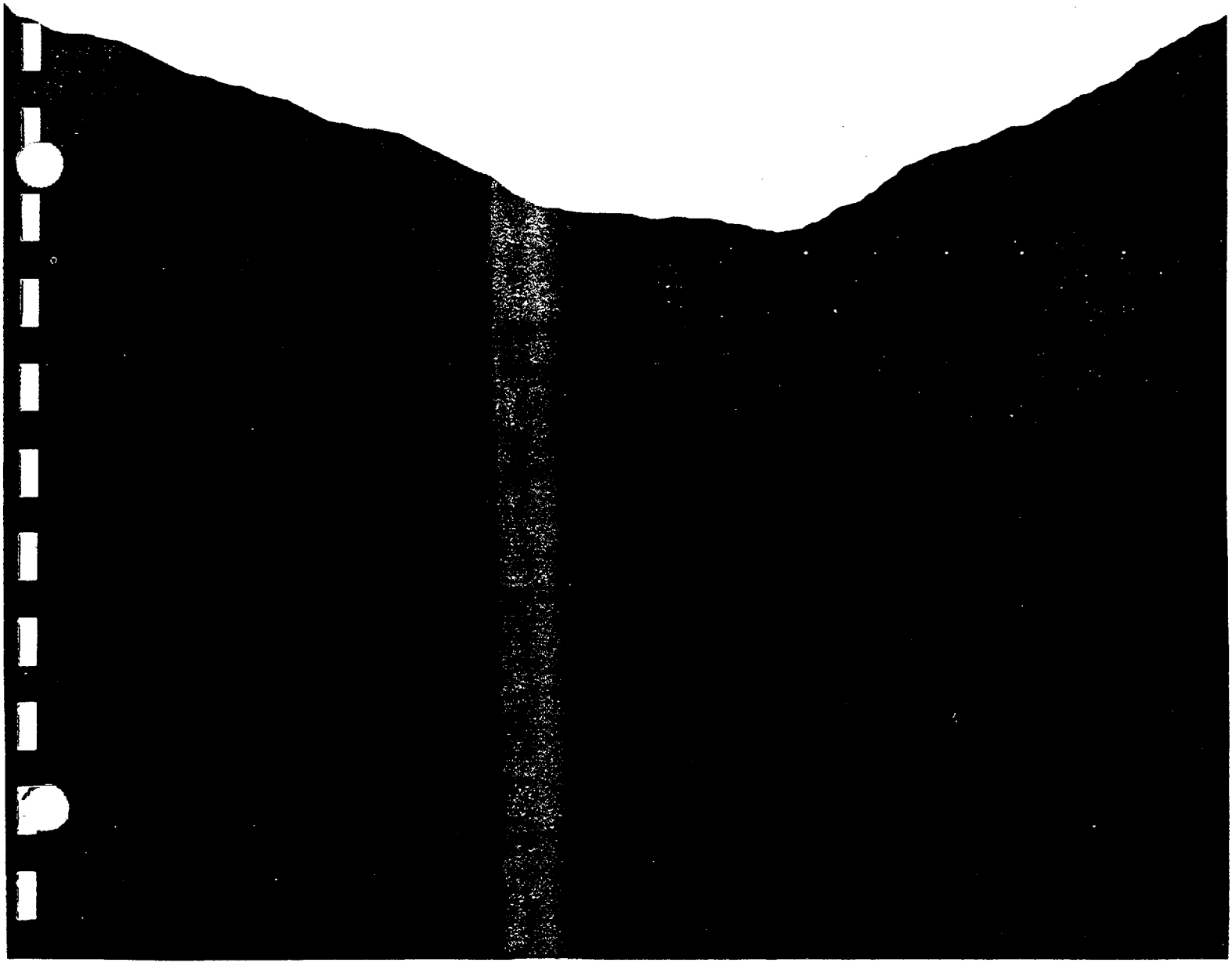
APPENDIX C
ADDENDUM TO REPORT OF UNDERGROUND FUEL INVESTIGATION AND COMPREHENSIVE SITE ASSESSMENT (LAW, 1993)

APPENDIX E
UST REPORT, FORMER MESS HALL HEATING PLANT
(ATEC, 1992)

Environmental
Consulting Services

ATEC®

UST REPORT
FORMER MESS HALL HEATING PLANT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NC



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UNDERGROUND STORAGE TANK (UST) SITE CHECK INVESTIGATION REPORT FORMER MESS HALL HEATING PLANT UST MARINE CORPS BASE CAMP GEIGER, NORTH CAROLINA ATEC PROJECT NUMBER: 26-07-92-00142

1.0 INTRODUCTION

ATEC Associates, Inc. was contracted to perform an underground storage tank (UST) Site Check of the Former Mess Hall Heating Plant UST located at the Camp Geiger area of Marine Corps Base (MCB), Camp Lejeune, North Carolina. Site Checks are to be conducted at various Marine facilities at UST locations where releases are suspected to have occurred. The Site Checks are needed to comply with both the U.S. Environmental Protection Agency (EPA) and North Carolina UST regulations. This investigation report details the work performed at the project site and the information obtained through this investigation.

The project site is located adjacent to Building TC-341 at Camp Geiger MCB (Figure 1). ATEC installed three wells around the Former Mess Hall Heating Plant UST. The three wells were installed under Well Construction Permit No. 66-0264-WM-0274, which was issued on May 20, 1992 by the State of North Carolina Department of Environment, Health, and Natural Resources (DEHNR). A copy of this permit and copies of the completed Well Construction Records are included in Appendix A.

The now abandoned UST was used to supply number six heating fuel to the boilers of an adjacent heating plant which is now demolished (Figure 2). The size and construction of the UST are unknown. The installation date of the tank is approximately 1941. A suspected release from the UST was documented by a subsurface investigation performed by Law Engineering in November of 1991. Laboratory analysis of a soil sample for Total Petroleum Hydrocarbons obtained adjacent to the UST quantified a contaminant level of 8400 ppm.

2.0 SITE ASSESSMENT

To obtain the information necessary to describe and evaluate the project site geology and the extent of contamination, ATEC installed three groundwater monitoring wells and analyzed soil samples from the three well locations. Prior to the installation of the monitoring wells, the well locations were cleared for underground utilities by MCB personnel.

2.1 Area Geology

The project site is located within the Atlantic Coastal Plain physiographic province, which consists of a wedge of stratified, unconsolidated and semi-consolidated sediments that dip and thicken eastward. These sediments consist primarily of sand, clay, silt and gravel, with variable amounts of shell material, that range in age from Cretaceous to Recent (Holocene). Unconformably underlying the Coastal Plain sediments is a basement rock surface composed of massive igneous rocks and highly deformed metamorphic rocks that range in age from Precambrian to lower Paleozoic. The basement surface forms the basal limit of the Coastal Plain hydrogeologic system, which consists of a surficial, unconfined water table aquifer and seven deeper level confined to semi-confined aquifers separated by intervening aquitards (less permeable units) (Meng and Harsh, 1988; Hamilton and Larson, 1989).

Topographically, the project site is at an elevation of approximately 20 feet above mean sea level (USGS, 1971). Topographic relief across the site is relatively slight. Based on topographic map interpretation, surface drainage at the project site flows to the east, toward Brinson Creek, a tributary of the New River. However, human activities at the site, such as construction and grading may have affected the natural surface water drainage.

2.2 Soil Boring and Soil Sampling Program

On June 1 and 2, 1992, ATEC drilled three soil borings at the project site. These borings were converted to monitoring wells (Figure 2). The soil borings were advanced using a Mobil B-57 truck-mounted drill rig with 10-inch diameter hollow stem augers. The augers and sampling tools were decontaminated between borings using a pressure washer to minimize the potential of cross-contamination. During the soil boring activities, soil samples were collected with split spoon samplers at 0 to 2 feet, 2 to 4 feet, 4 to 6 feet, 8 to 10 feet, 13 to 15 feet, and 18 to 20 feet. Soils encountered at each of the well locations consisted of a surficial brown to gray silty sand to 4 feet below the ground surface (BGS), underlain by a brown to gray medium sand to 10 feet BGS. Greenish gray, fine to medium sands were encountered from 13 to 15 feet BGS, followed by greenish gray to gray medium sands from 18 to 20 feet. Soil boring logs are included in Appendix B.

Each split spoon sample was collected in a clean sample jar, leaving ample head space in the jar. The samples were then screened in the field for the presence of petroleum hydrocarbons with a Photoionization Detector (PID). The results of this screening yielded readings that ranged from 0 part per million (ppm) up to a maximum of 119 ppm at the MW-2 location.

A separate soil sample for laboratory analysis was collected from each boring at the approximate depth of the water table. A duplicate soil sample was taken at the MW-2 location and marked "MWS-4". These soil samples were analyzed in the laboratory for Total Petroleum Hydrocarbons (TPH) using EPA Method 8015 (California modified) and for Benzene, Toluene, Ethylbenzene, and Total Xylenes (BTEX) using EPA Method 8020. The limit set by the DEHNR is 10 ppm for TPH in soil. No limits are established for BTEX concentrations in soil. As shown in Table 1, the laboratory results indicate the presence of TPH contamination at all three well locations at levels above the DEHNR action level of 10 ppm (Figure 3).

Table 1: Laboratory Results of Soil Analyses

Sample No.	TPH 8015 mg/kg	BTEX ug/kg
MWS-1	140	Benzene 6 Toluene 52 Ethylbenzene 55 Total Xylenes 42
MWS-2	2,000	Benzene <20 Toluene 130 Ethylbenzene 2300 Total Xylenes 3100
MWS-3	110	Benzene <5 Toluene <5 Ethylbenzene <5 Total Xylenes <5
MWS-4 (Duplicate of MWS-2)	1,200	Benzene <50 Toluene <50 Ethylbenzene 750 Total Xylenes 1200

Note: mg/kg is numerically equivalent to parts per million (ppm)
ug/kg is numerically equivalent to parts per billion (ppb)

2.3 Monitoring Well Installation

On June 1 and 2, 1992, ATEC installed three groundwater monitoring wells at the project site. The monitoring well locations are shown in Figure 2. During the drilling activities, the water table was encountered at approximately 8 feet BGS.

The wells were constructed with 10 feet of 0.010 inch slotted schedule 40 polyvinyl chloride (PVC) screen and 10 feet of PVC riser. A Number 2 industrial sand was used to create a filter pack around the well casings to 2 feet above the well screen. A one foot thick annular seal of bentonite pellets was placed above the sand filter

pack and concrete grout was placed above the bentonite seal to the surface to protect the wells from infiltrating surface waters. Concrete pads, steel posts and protective covers were set above the wells to protect them from damage. A well identification tag, including construction data, was installed on each well. Well completion data is included with the soil boring logs in Appendix B.

2.4 Groundwater Sampling Program

The three groundwater monitoring wells were developed by pumping a minimum of five well bore volumes of groundwater to remove fine silt and clay particles present in the wells and to remove stagnant standing water. New development hose and sampling tubing was used for each well to minimize the potential for cross-contamination between wells. Prior to surveying each well, water levels were measured using an oil/water interface probe, which can detect the presence of free phase product. At the time of the survey, none of the monitoring wells contained free product.

The three wells were sampled on June 6, 1992. The static water table prior to purging was measured between 9.08 feet and 9.88 feet below the top of the well casings. The groundwater samples were collected at a depth of approximately one foot below the water table. A duplicate sample was obtained from MW-2 and labeled as "MW-4". No trip blanks were prepared. The water samples were analyzed in the laboratory for TPH using EPA Method 8015 (California modified) and for BTEX using EPA Method 8020. As shown in Table 2, the results of the TPH analyses for groundwater from the wells ranged from <1 ppm to 5 ppm. The DEHNR has not set limits for TPH in groundwater. Concentrations of the BTEX constituents also were detected in groundwater at MW-2 (Figure 4). Allowable levels of BTEX in groundwater are available in Subchapter 2L, Section 0.200 of the North Carolina Administrative Code, "Classifications and Water Quality Standards

Applicable to the Groundwaters of North Carolina" and are as follows: Benzene 0.001 ppm (1 parts per billion (ppb)), Toluene 1.0 ppm (1,000 ppb), Ethylbenzene 0.029 ppm (29 ppb), and Total Xylenes 0.4 ppm (400 ppb). The benzene limit was exceeded at MW-2.

Table 2: Laboratory Results of Groundwater Analyses

Sample No. (Well No.)	TPH mg/L	BTEX ug/L
MW-1	5	Benzene <1 Toluene <1 Ethylbenzene <1 Total Xylenes <1
MW-2	3	Benzene 2 Toluene 1 Ethylbenzene 27 Total Xylenes 4
MW-3	<1	Benzene <1 Toluene <1 Ethylbenzene <1 Total Xylenes <1
MW-4 (Duplicate of MW-2)	2	Benzene 1 Toluene <1 Ethylbenzene 25 Total Xylenes 5

Note: mg/L is numerically equivalent to parts per million (ppm)
ug/L is numerically equivalent to parts per billion (ppb)

2.5 Groundwater Flow Direction

Groundwater flow at the project site was expected to mimic the surface drainage pattern, with groundwater flowing to the east, toward Brinson Creek. A survey of the monitoring wells and groundwater level elevations was conducted to determine the actual direction of groundwater flow at the project site. The wells were surveyed for future reference - survey needs to be tied into established "permanent" benchmarks from the elevation of a fire hydrant (identification tag 6-16-6) located east of the site adjacent to a railroad spur, using mean sea level (MSL) as datum. Table 3 lists the measured elevations. Groundwater flow was determined to be toward the east, as shown in Figure 5.

Table 3: Monitoring Well Elevations

Benchmark (Fire hydrant) Elevation = 18.08 feet above MSL

Well Number	Casing (feet MSL)	Elevation Water Table (feet)	Water Table Depth To (feet MSL)	Elevation
MW-1		20.15	9.08	1107
MW-2		20.68	9.88	10.8
MW-3		20.06	9.31	1075

The velocity of groundwater flow at the project site was calculated to provide a general estimate of how rapidly groundwater, and any associated contamination, would migrate away from the USTs. The following standard equation based on Darcy's law of groundwater flow was used to estimate the groundwater velocity:

$$V = (K/n)\ (dh/dl);$$

where V = rate of groundwater flow (ft/day)

dh/dl = measured water table gradient (0.005 ft/ft)

K = assumed hydraulic conductivity (0.28 ft/day for fine sands)

n = assumed porosity factor (0.30)

The rate of groundwater flow in the water table aquifer was calculated using an assumed porosity of 30 percent, a measured water table gradient of 0.005 ft/ft, and an assumed hydraulic conductivity of 0.28 ft/day for a fine sand aquifer (Fetter, 1980). The calculated velocity is approximately 0.005 ft/day or 2 ft/year. This analysis shows that groundwater contamination would migrate away from the UST area toward the east. However, as an aquifer pumping or slug test was not conducted at this site, this calculated value represents only a rough estimate of the true groundwater flow velocity. This estimated velocity also does not necessarily correspond with the rate of contaminant movement, as contaminant characteristics greatly affect their rate of movement.

3.0 CONCLUSIONS AND RECOMMENDATIONS

The Former Mess Hall Heating Plant UST, which contained number six heating fuel, is located adjacent to Building TC-341. The UST was installed in the early 1940's. Based upon the information gathered during the UST Site Check, high levels of contamination caused by a suspected release of petroleum hydrocarbons from the UST are present at the site. This investigation revealed the presence of both soil and groundwater contamination around the UST.

ATEC recommends that the UST and its associated lines be removed as soon as possible due to the systems age, construction, and inactivity. If UST removal is conducted, soil samples from the UST excavation pit should be analyzed for petroleum hydrocarbon content. Once this investigation is completed, the need for further action can be assessed.

4.0 QUALIFICATIONS

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with customary principles and practices in the fields of environmental science and engineering. This warranty is in lieu of all other warranties either expressed or implied. This company is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

The work performed in conjunction with this assessment and the data developed, are intended as a description of available information at the dates and locations given. This report does not warrant against future operations or conditions nor does it warrant against operations present of a type or at a location not investigated.

5.0 REFERENCES

Fetter, C. W., 1980. Applied Hydrogeology, Charles E. Merrill Publishing Co.: Columbus, Ohio

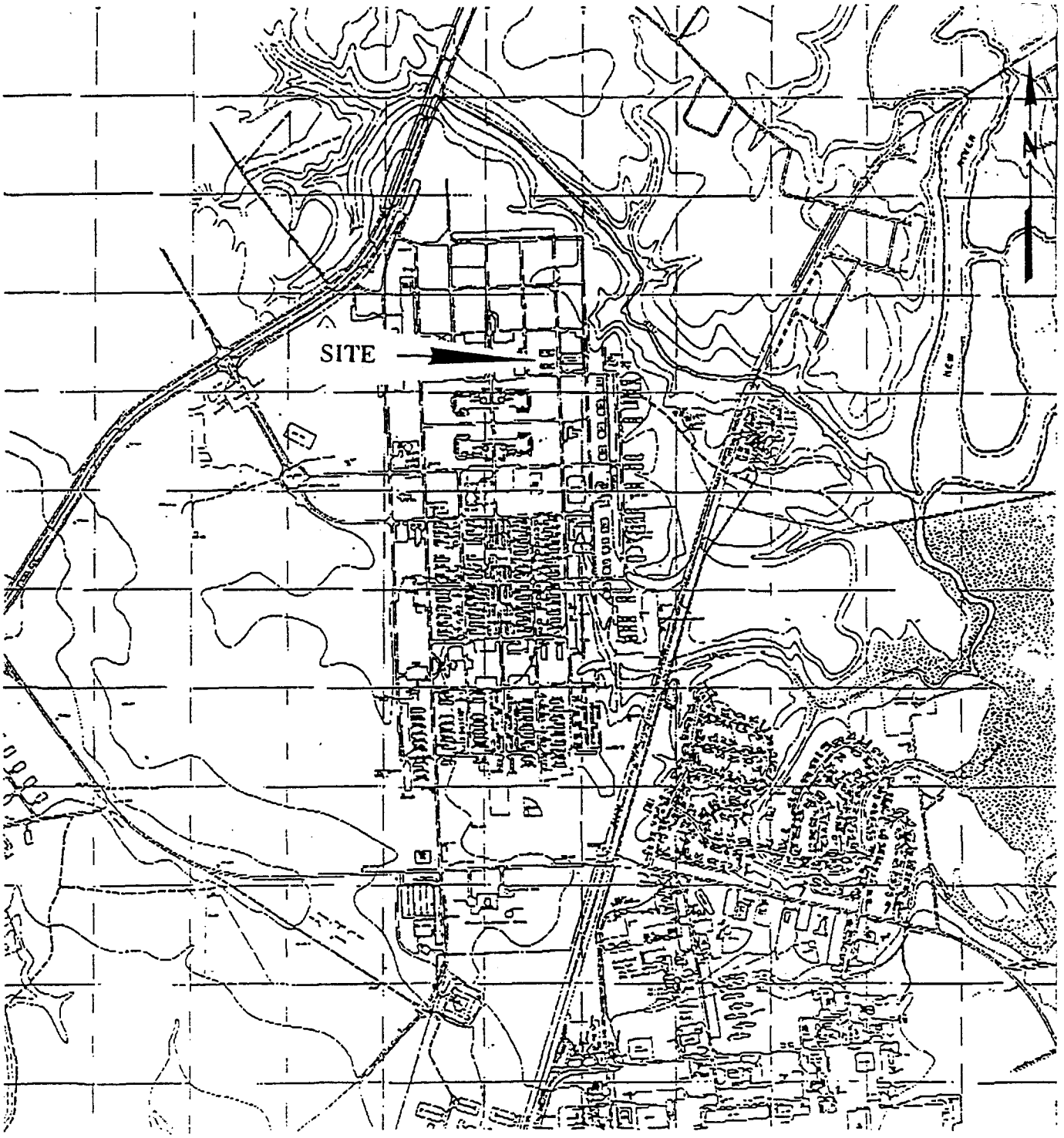
Hamilton, P. A. and J. D. Larson, 1988. Hydrogeology and Analysis of the Ground-Water Flow System in the Coastal Plain of Southeastern Virginia. U. S. Geological Survey, Water-Resources Investigations Report, 87-4240.

Meng, A. A. and J. G. Harsh, 1988. Hydrogeologic Framework of the Virginia Coastal Plain. U. S. Geological Survey Professional Paper 1404-C.

Mixon, R. B., C. R. Berquist, Jr., W. L. Newell, and F. G. Johnson, 1989. Geologic Map and Generalized Cross Sections of the Coastal Plain and Adjacent Parts of the Piedmont, Virginia. United States Geological Survey, Miscellaneous Investigations Series, Map I-2033.

U. S. Geological Survey, 7.5 Minute Topographic Map Series, Jacksonville South, North Carolina quadrangle, 1952, photo inspected 1971.

FIGURES

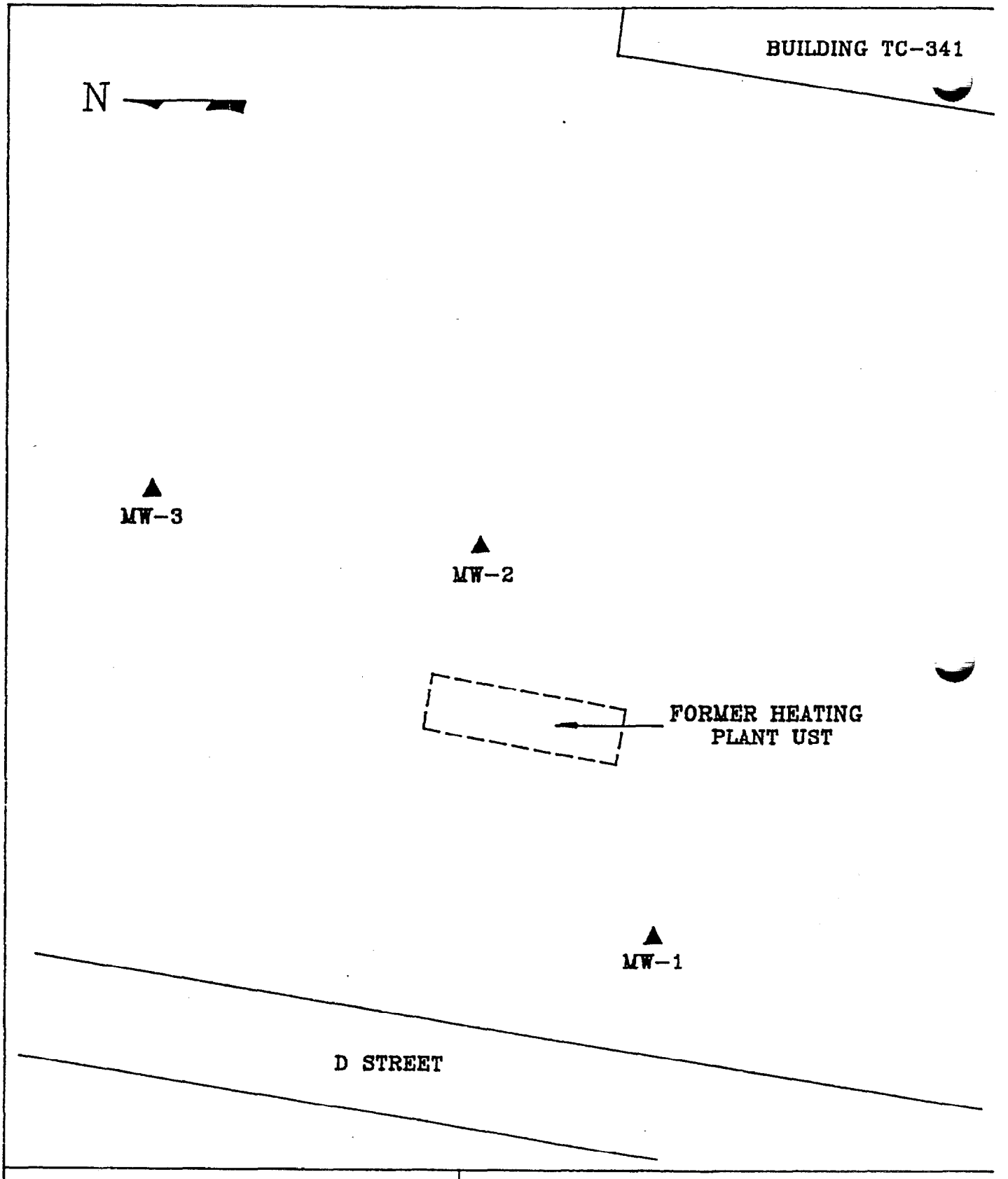


ATEC Associates, Inc.

Norfolk, Virginia

FIGURE 1 SITE VICINITY MAP

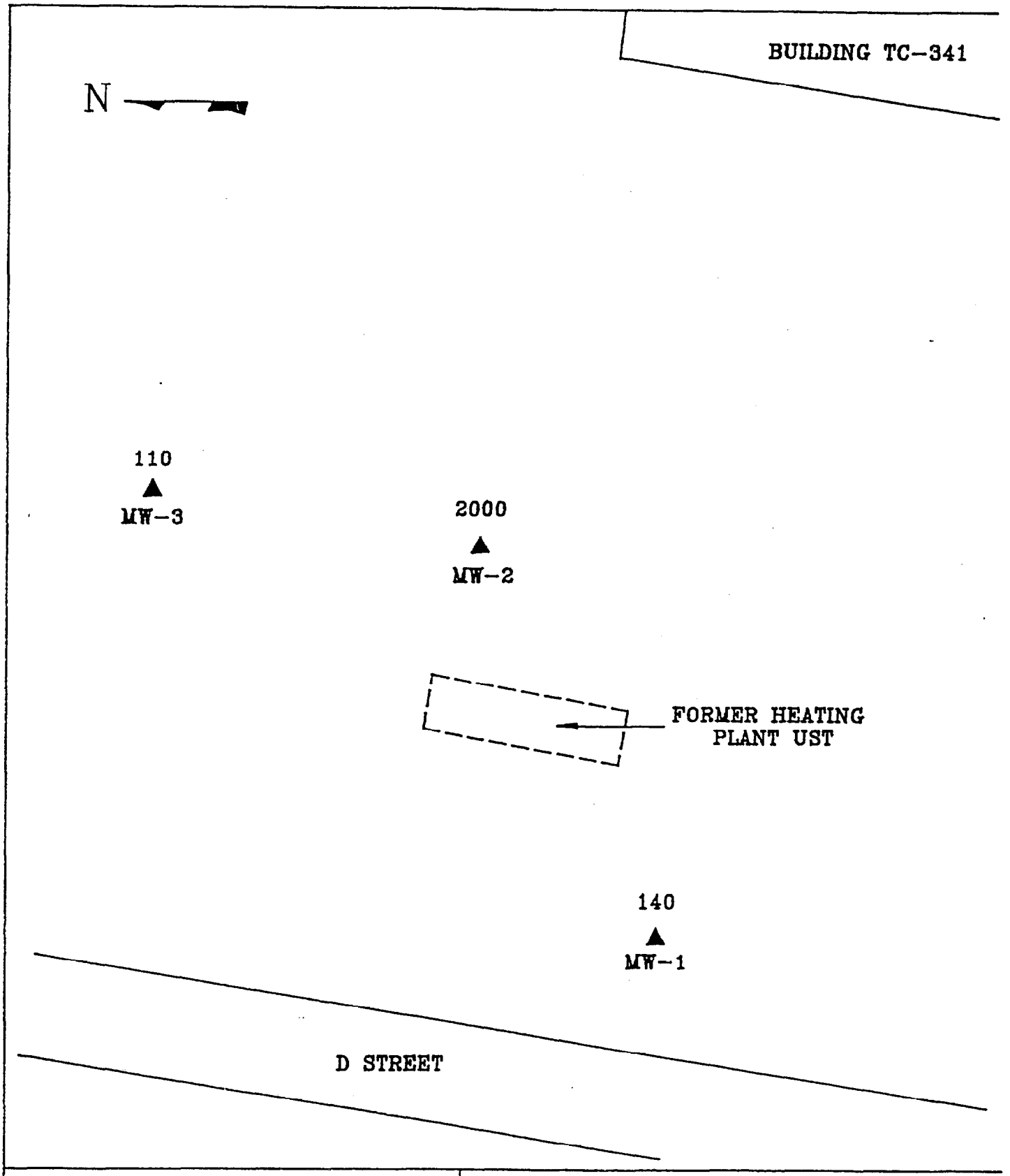
JOB NAME: FORMER MESS HALL HEATING PLANT UST
JOB NO.: 26-07-92-00142
CLIENT: U.S. NAVY
SCALE: 1:18,000
SOURCE: UNKNOWN DATE: JUNE, 1992



ĀTEC Associates, Inc.
Norfolk, Virginia

FIGURE 2 SITE DESCRIPTION MAP

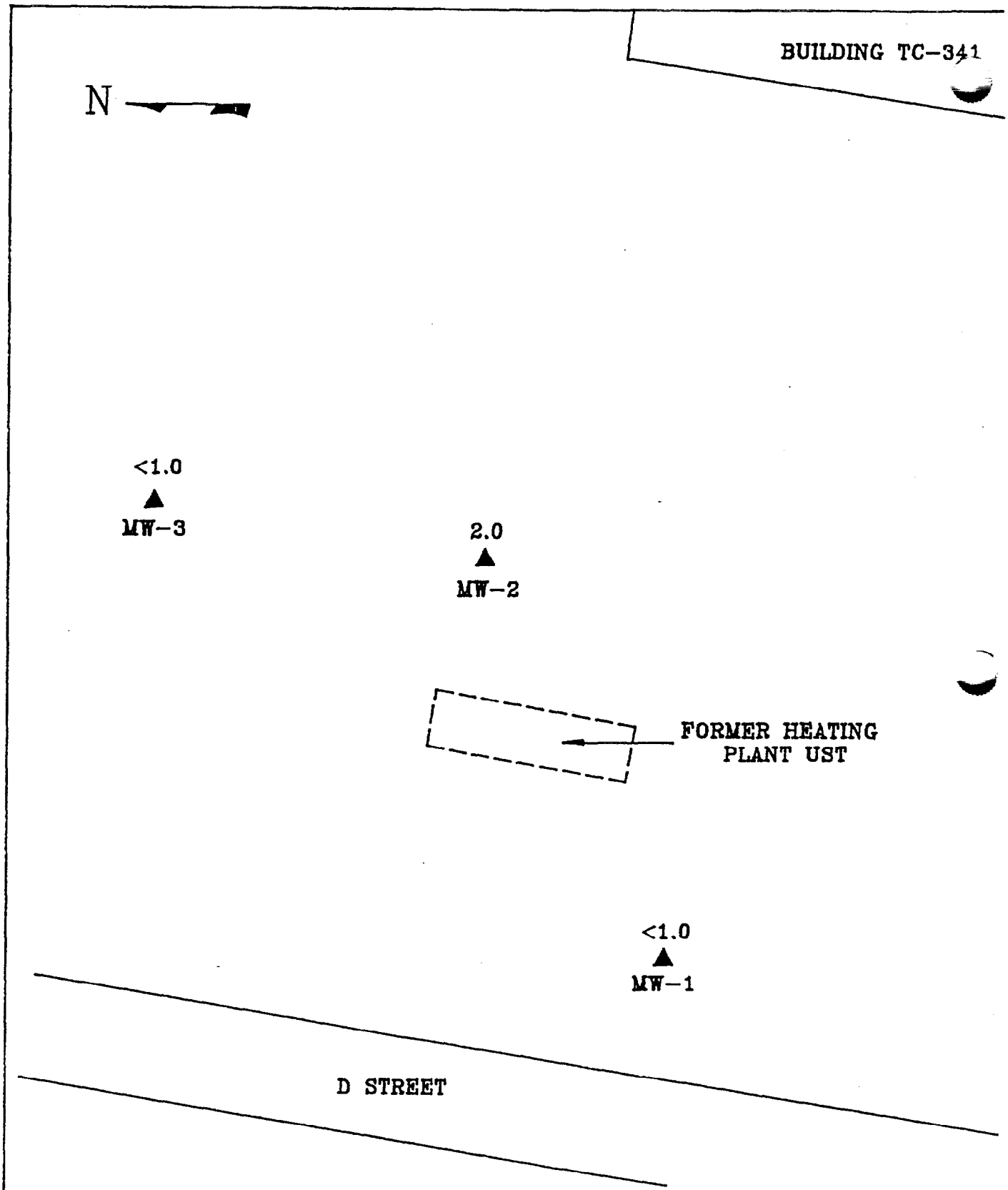
JOB NAME: FORMER MESS HALL HEATING PLANT UST
JOB NO.: 26-07-92-00142
DATE: JUNE, 1992
CLIENT: U.S. NAVY
SCALE: 1 INCH = 20 FEET
DRAWN BY: WKP



ĀTEC Associates, Inc.
Norfolk, Virginia

FIGURE 3 SOIL TPH CONCENTRATION MAP (ppm)

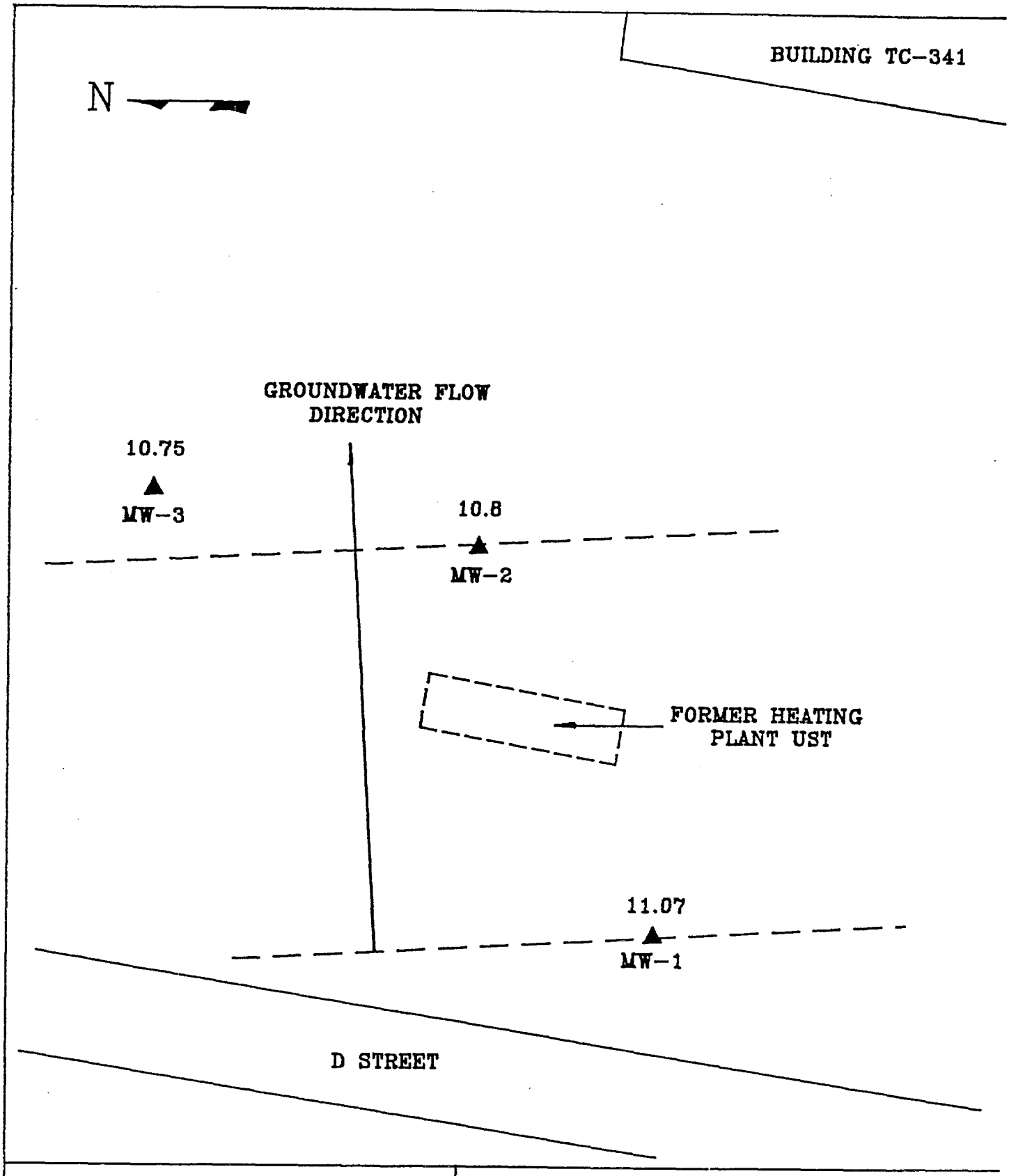
JOB NAME: FORMER MESS HALL HEATING PLANT UST
JOB NO.: 26-07-92-00142
DATE: JUNE, 1992
CLIENT: U.S. NAVY
SCALE: 1 INCH = 20 FEET
DRAWN BY: WEP



ATEC Associates, Inc.
Norfolk, Virginia

FIGURE 4 GROUNDWATER BENZENE CONCENTRATION MAP (ppb)

JOB NAME: FORMER MESS HALL HEATING PLANT UST
JOB NO.: 26-07-92-00142
DATE: JUNE, 1992
CLIENT: U.S. NAVY
SCALE: 1 INCH = 20 FEET
DRAWN BY: WKP



ĀTEC Associates, Inc.
Norfolk, Virginia

FIGURE 5 POTENTIOMETRIC SURFACE MAP (ft)

JOB NAME: FORMER MESS HALL HEATING PLANT UST
JOB NO.: 26-07-92-00142
DATE: JUNE, 1992
CLIENT: U.S. NAVY
SCALE: 1 INCH = 20 FEET
DRAWN BY: WKP

APPENDIX B

SOIL BORING AND WELL COMPLETION DATA

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat _____ Long. _____ RO _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

1. DRILLING CONTRACTOR: ATEC Associates, Inc.

DRILLER REGISTRATION NUMBER: 696

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0264-WM-0274

WELL LOCATION: (Show sketch of the location below)
Nearest Town: Jacksonville, NC County: Onslow

(Road, Community, or Subdivision and Lot No.)

2. OWNER Environmental Management Department
ADDRESS Camp Lejeune, Marine Corps Base
(Street or Route No.)
North Carolina 28542-5001
City or Town State Zip Code

DATE DRILLED _____ USE OF WELL MONITOR
4. TOTAL DEPTH 20 ft
5. CUTTINGS COLLECTED YES [x] NO [ ]
DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
3. TOP OF CASING IS _____ FT. Above Land Surface*
*Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	_____	To _____ Ft.	_____	_____	_____
From	_____	To _____ Ft.	_____	_____	_____
From	_____	To _____ Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From	_____	To _____ Ft.	_____	_____
From	_____	To _____ Ft.	_____	_____

SCREEN:

	Depth		Diameter	Slot Size	Material
From	_____	To _____ Ft	_____ in.	_____ in.	_____
From	_____	To _____ Ft.	_____ in.	_____ in.	_____
From	_____	To _____ Ft.	_____ in.	_____ in.	_____

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From	_____	To _____ Ft.	_____	_____
From	_____	To _____ Ft.	_____	_____

REMARKS: _____

DEPTH From	DEPTH To	DRILLING LOG Formation Description

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 attachments for well locations, construction, and formation descriptions.

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

ATEC Associates, Inc. Kevin Davis 6/1/92
SIGNATURE OF CONTRACTOR OR AGENT DATE

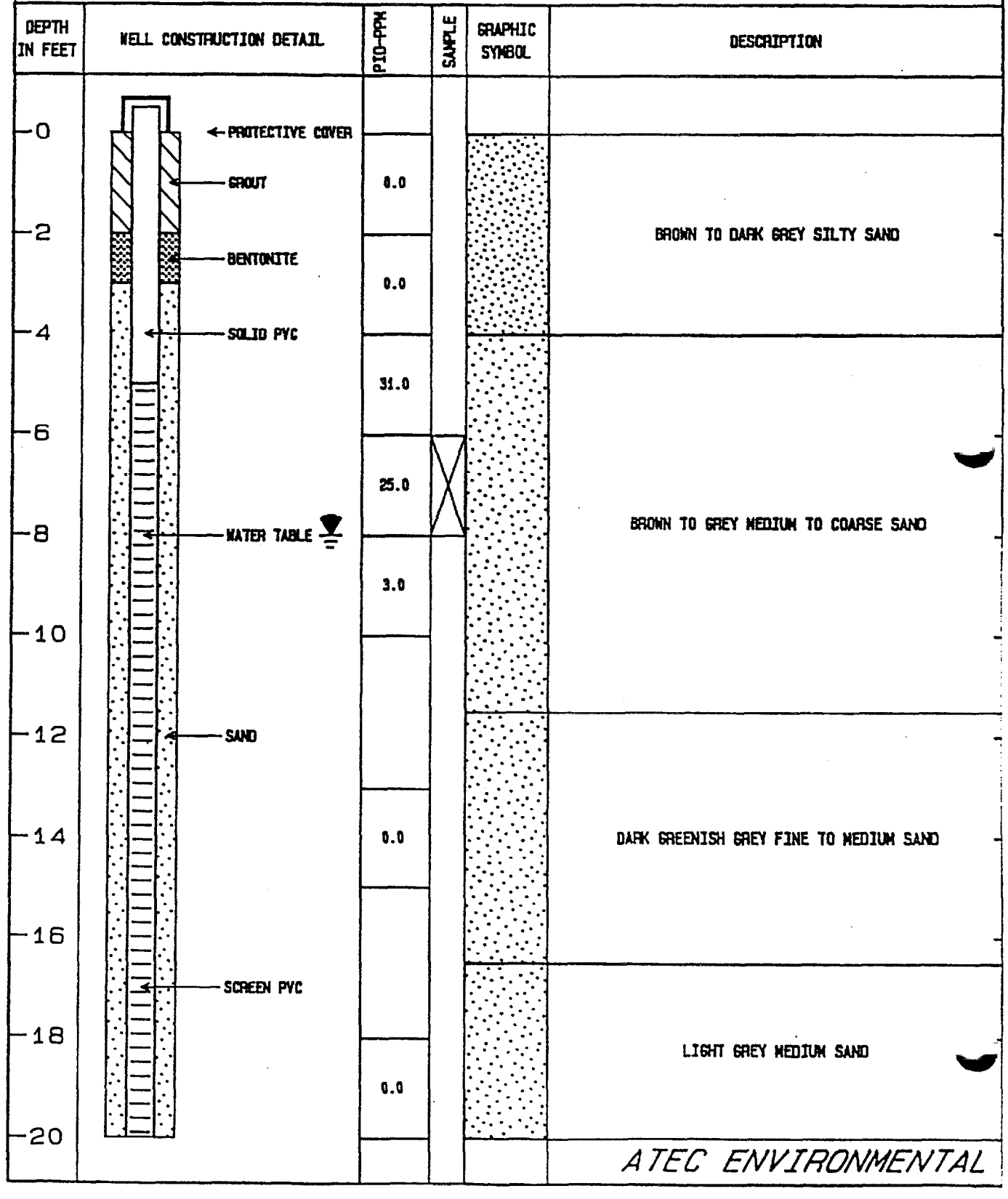
GW-1 REV 9/91

Submit original to Division of Environmental Management

BORING LOG

Project: FORMER HEATING PLANT UST
Location: CAMP GEIGER, N.C.
Job No.: 26-07-92-00142
Geologist: KEVIN DAVIS
Client: U.S. NAVY

Hole/Well No.: MW-1
Diameter of Well Casing: 4 inches
Total Depth of Hole: 20 feet
Date Started: 6/1/92
Date Completed: 6/1/92

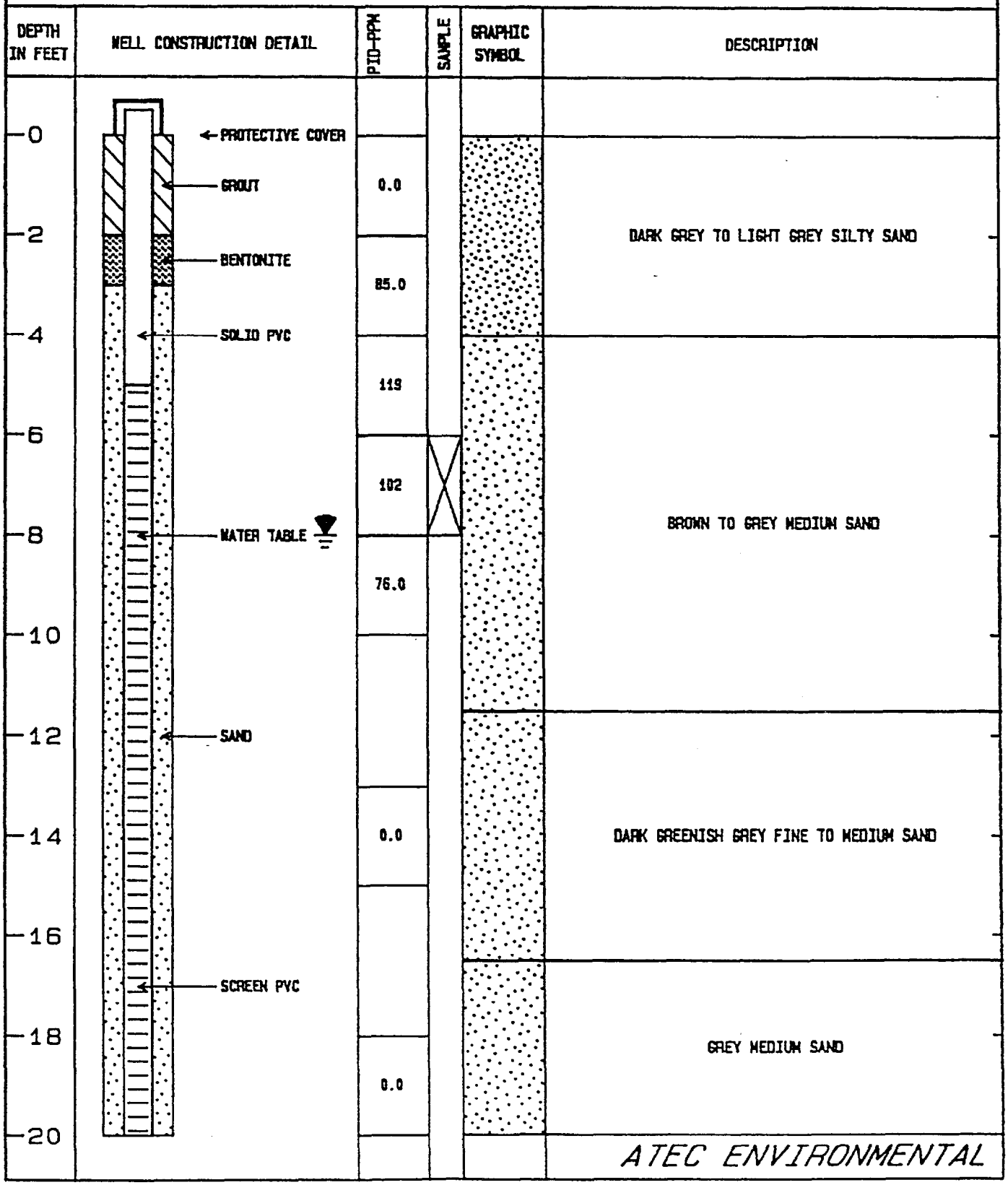


ATEC ENVIRONMENTAL

BORING LOG

Project: FORMER HEATING PLANT UST
Location: CAMP GEIGER, N.C.
Job No.: 26-07-92-00142
Geologist: KEVIN DAVIS
Client: U.S. NAVY

Hole/Well No.: MW-2
Diameter of Well Casing: 4 inches
Total Depth of Hole: 20 feet
Date Started: 6/2/92
Date Completed: 6/2/92

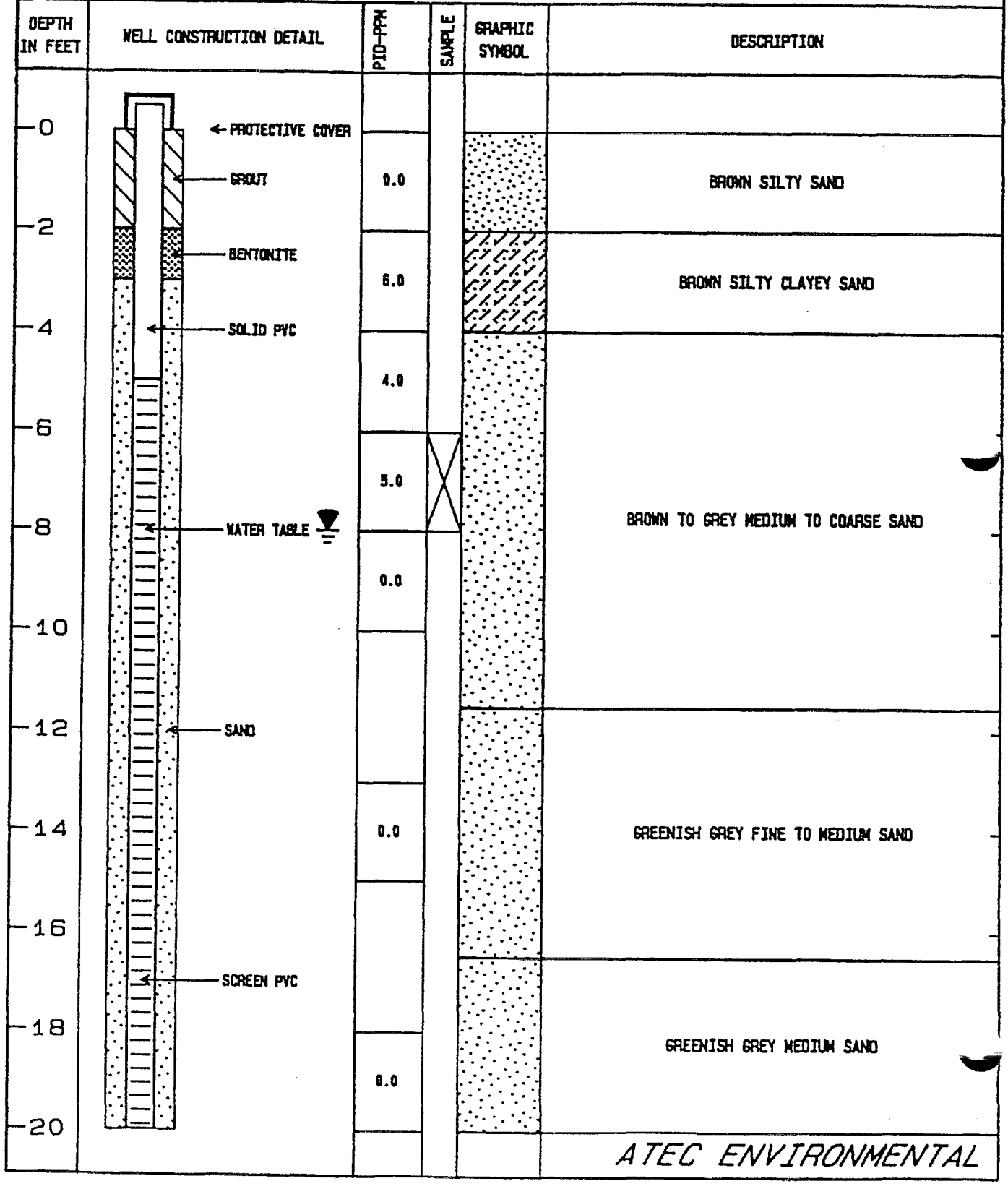


ATEC ENVIRONMENTAL

BORING LOG

Project: FORMER HEATING PLANT UST
Location: CAMP GEIGER, N.C.
Job No.: 26-07-92-00142
Geologist: KEVIN DAVIS
Client: U.S. NAVY

Hole/Well No.: MW-3
Diameter of Well Casing: 4 inches
Total Depth of Hole: 20 feet
Date Started: 6/2/92
Date Completed: 6/2/92



ATEC ENVIRONMENTAL

APPENDIX F
LEAKING UNDERGROUND STORAGE TANK SITE ASSESSMENT REPORT (LAW, 1994)

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

LEAKING UNDERGROUND STORAGE TANK SITE ASSESSMENT REPORT

VOLUME I

Building TC-341
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

Prepared For:

Commander
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia 23511-6287

Prepared By:

Law Engineering, Inc.
3301 Atlantic Avenue
Raleigh, North Carolina 27604

April 13, 1994

Law Engineering Job No. 475-09183-01

DRAFT

EXECUTIVE SUMMARY

In accordance with the Naval Facilities Engineering Command Order for Supplies and Services Contract No. N62470-93-D-4020 dated August 29, 1993, Law Engineering preformed a Leaking Underground Storage Tank Comprehensive Site Assessment (CSA) in the vicinity of Heating Plant Building TC-341 at Camp Geiger within the Marine Corps Base (MCB) in Camp Lejeune, North Carolina. The investigation involved the assessment of soil and ground-water quality conditions in the vicinity of Building TC-341, near the former location of a number 6 heating oil underground storage tank (UST) of unknown size and the associated 6-inch diameter fuel supply line which originated at the Camp Geiger fuel farm located east of the site.

The assessment involved the installation of twelve Type II and two Type III monitoring wells and analysis of soil and ground-water samples. Soil samples were tested for total petroleum hydrocarbons (TPH) according to EPA preparation/testing Methods 5030/8015 (volatile fraction), 3550/8015 (semi-volatile fraction) and 9071 (oil and grease), as well as TCLP metals, flash point and pH. Ground-water samples were analyzed for purgeable aromatic hydrocarbons according to EPA Method 602, and polynuclear aromatic hydrocarbons according to EPA Method 610, and also for the eight RCRA metals.

Based upon the results of our investigation, petroleum related contamination is present within soils and ground water within the area of investigation. The majority of soil contamination appears to be located within the immediate vicinity of the underground storage tank (UST) system at the site. Ground-water contamination was detected mainly in the upper portion of the surficial aquifer. Free product is also present in the immediate vicinity of the UST system.

The extent of benzene, ethylbenzene, toluene, total xylenes, methyl-tertiary-butyl ether and polynuclear aromatic hydrocarbons within the shallow ground water has been adequately defined by the sampling network used in this study. Elevated concentrations of PAH compounds at the furthest downgradient well location suggest that other petroleum sources located east of TC-341 have contributed petroleum compounds to the shallow ground water in the area.

Results of this assessment suggest that the majority of soil and ground-water contamination originating from the tank system at Building TC-341 has been adequately defined for the purposes of preparing a Corrective Action Plan.

Based on our assessment of the subject site, soil and ground water both indicated the presence of compounds characteristic of fuel oil that leaked from the UST system at TC-341 and possibly gasoline or Jet fuel from the petroleum source located east of TC-341. The presence of free product in ground-water coupled with elevated concentrations of petroleum constituents requires additional measures to satisfy groundwater requirements set forth by the state.

Our recommendations are as follows:

- Initiate free product recovery activities in the vicinity of the TC-341 UST system.
- Provide a copy of this comprehensive site assessment to the State for their review and files.
- Perform additional investigation to determine the limits of soil and ground-water contamination to the east of Building TC-341.
- Begin preparation of a Corrective Action Plan.

DRAFT

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DRAFT

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D. Well Construction Records
E. Monitoring Well Casing and Water Elevation Worksheets
F. Ground-Water Flow Direction
G. Recovery Test Data and Hydraulic Conductivity Calculations
H. Monitoring Well and Sampling Field Data Worksheets
I. Laboratory Analytical Test Reports/Chain of Custody Records

DRAFT

1.0 INTRODUCTION

1.1 Purpose of Investigation

The Commander of the Atlantic Division Naval Facilities Engineering Command in Norfolk, Virginia, contracted with Law Companies Group, Inc. to perform a Leaking Underground Storage Tank Comprehensive Site Assessment (CSA) at Building TC-341, located on Camp Geiger at the Marine Corps Base at Camp Lejeune, North Carolina (Drawing 1.1). The purpose of the investigation was to identify the presence, magnitude and extent of possible free product accumulation and ground-water contamination, and assess potential exposure to subsurface contaminants resulting from the release of Number 6 heating oil from an underground storage tank (UST) system at the site. As stated in the Leaking Underground Storage Tank Workplan contained in Appendix A, the objective of the investigation was to provide sufficient data to meet the requirements of Sections 280.63 and 280.65 of 40 CFR Part 280, Federal Technical Standards for Underground Storage Tanks. This data should also be sufficient to meet the requirements of Sections .0704 and .0706 of Title 15A, Chapter 2, Subchapter 2N, North Carolina Criteria and Standards Applicable To Underground Storage Tanks and Comprehensive Site Assessments. This report is designed to include information requested by the North Carolina Department of Environment, Health and Natural Resources in accordance with the document entitled "Groundwater Section Guidelines For The Investigation and Remediation of Soils and Groundwater" dated March 1993 (Revised June 1993).

1.2 Scope of Work

Authorization to proceed with the investigation was granted by the Commander of the Atlantic Division Naval Facilities Engineering Command, Norfolk, Virginia, via Contract No. N62470-93-D-4020, Delivery Order No. 0001, dated October 29, 1993. As specified in the contract requirements and outlined in the delivery order, Law Engineering prepared a work plan and health and safety plan to outline a site specific scope of work for field assessment activities.

The investigation involved the advancement of fourteen soil borings from which soil samples were obtained and into which twelve Type II and two Type III monitoring wells were installed. The delivery order also included provisions to sample three of the previously installed Type II monitoring wells.

Soil and ground-water samples were collected from the soil borings and monitoring wells for both on-site and off-site laboratory analysis. The collected data were used to delineate the horizontal and vertical extent of soil and ground-water contamination and to identify potential receptors that could be affected by the release so that a Corrective Action Plan (CAP) for the site can be developed. The specific methods

employed during performance of the project activities and the results, conclusions and recommendations of the CSA are described within the appropriate sections of this report.

1.3 Area of Investigation

The site is located east of D Street between Third Street and Fourth Streets at Camp Geiger, Camp Lejeune Marine Corps Base (MCB). The subject UST of this study is located approximately 90 feet west of Building TC-341 and 20 feet east of D Street. The exact location of the UST is not clearly marked or identified on base drawings but can reportedly be identified as a slight cresting of the ground surface. The topography in the vicinity of the site is relatively flat and is at an elevation of approximately 15 feet above mean sea level (msl). Most of the area is not serviced by storm sewers. Runoff generally travels by sheet flow before entering drainage ditches which discharge into Brinson Creek which is located approximately 1000 feet northeast of the site.

2.0 SITE HISTORY AND SOURCE CHARACTERIZATION

2.1 Site History and Operations

Information concerning the history of the project site was provided by Ms. Deborah Pickett with the Installation/Restoration Division of the Environmental Department (EMD/IRD) at Camp Lejeune.

The UST at the subject site was used to supply number 6 heating oil to a former mess hall heating plant which has since been demolished. The UST was reportedly installed around 1941. An underground fuel distribution supply line formerly connected the UST to the Camp Geiger Fuel Farm, located east of the TC-341 site.

2.2 Contaminant Source Inventory

Free product was observed in MW-1 and MW-2 (Drawing 2.1), which are located in close proximity to the UST and the fuel supply line. However, according to EMD/IRD it could not be determined whether the leak occurred from the UST or the associated

fuel supply line. Several building structures were once located east of the site which have since been demolished and include an ice house and a gasoline filling station. The Camp Geiger Fuel Farm also is located east of the site. Suspected or known areas of soil and ground-water contamination have been documented for these sites, all of which are located downgradient of the study area with respect to shallow ground-water flow direction and are not expected to affect the subject property.

2.3 Release Incident History

A suspected release from the UST was first documented by Law Engineering, Inc. in September of 1991 during the investigation of the adjacent Camp Geiger Fuel Farm. The study identified the number 6 heating oil UST and associated piping as a potential source of contamination. One soil boring was advanced adjacent to the UST to provide a preliminary determination as to whether or not the tank had leaked. The analysis of two soil samples collected from the boring at 3.0 to 4.5 feet and 8.5 to 10.0 feet below land surface (BLS) (at ground water) detected total petroleum hydrocarbons (TPH) at 8,400 and 5,100 parts per million (ppm), respectively, by EPA preparation/testing Methods 3550/8015 and 5030/8015 (Law Engineering, 1991).

2.4 Previous Investigation

Based upon the findings presented by Law Engineering, Inc. a three well site check was performed at the subject site by ATEC Associates, Inc. in June of 1992. Results of this work are presented in ATEC's report dated September 24, 1993. Each of the three Type II monitoring wells were installed to a depth of 20 feet BLS with 10 feet of 0.010-inch slotted polyvinyl chloride (PVC) screen and 10 feet to PVC riser. Ground water was measured between 9 and 10 feet BLS.

Headspace analysis of soil collected from the three monitor-well soil borings yielded readings ranging from 0 to 119 ppm. Analysis of three soil samples collected from the approximate depth of ground water from each of the three monitoring well borings indicated concentrations of TPH (EPA Method 8015) in each sample ranging from 110 to 2,000 ppm. Analysis of the soil samples for benzene, toluene, ethylbenzene, and xylenes (BTEX) detected total BTEX concentrations in soil samples from monitor-well soil boirngs MW-1 and MW-2 from 155 parts per billion (ppb) to 5,530 ppb, respectively (ATEC, 1992).

Ground-water samples were collected from each of the three monitoring wells and were also analyzed for BTEX. Analytical results indicated total BTEX concentrations of 34 ppb in MW-2. BTEX was not detected in ground-water samples collected from MW-1 and MW-3 (ATEC, 1992).

Ground-water was determined to flow to the east (ATEC, 1992). The rate of ground-water flow in the surficial aquifer was calculated by assuming a porosity of 30 percent, a measured water table gradient of 0.005 ft/ft, and an assumed hydraulic conductivity of 0.28 ft/day for a fine sand aquifer. Based upon this information, a ground-water flow velocity of 0.005 ft per day was calculated (ATEC, 1992).

2.5 History of Corrective Action

The extent of corrective action has been the in-place abandonment of the UST and the associated fuel supply pipeline.

3.0 MIGRATION PATHWAYS AND POTENTIAL RECEPTORS

3.1 Water-Well Inventory

According to a map of the base water supply system provided by EMD/IRD at Camp LeJeune, the closest water supply well (T-15) appears to be located approximately 1000 feet to the northeast of the site. Other water supply wells located within a one-half mile radius of the site include wells TC-104, TC-100, TC-202, TC-325, TC-502, NC-52, TC-600 and TC-700. The approximate locations of these wells with respect to Building TC-341 are shown on Drawing 3.1. All of these wells are located to the west of the site. These wells do not appear to be located hydraulically downgradient of the site. According to Mr. Tom Morris of EMD, all water derived from water supply wells in the Camp Geiger area is treated before use. Drinking water for all Camp Geiger residents is provided by the Camp Geiger main water-treatment plant located near the intersection of 6th Street and Church Street.

3.2 Utility Survey

Subsurface utility trenches can often provide preferential pathways for migration of contaminants. Therefore, an attempt was made to identify and locate subsurface utilities in the vicinity of the site. Information on the location of utilities was provided by MCB Camp LeJeune Facilities Engineering in the form of plans and drawings. Additional information was obtained from interviews with personnel located at the subject site. Based on the information provided, utilities located within the project area include water and wastewater lines, and communication and electrical lines. The approximate locations of underground utility lines located proximal to the site are shown in Drawing 3.2 Typically, underground utilities are buried from 2 to 6 feet BLS. The presence of fill stone, sand or loosely consolidated soils around the below grade utilities could act as potential contaminant migration pathways.

3.3 Potential Receptor Survey

Biological Receptors

Fuel contamination, in any one of four physical states or "phases"' (residual, vapor, liquid, dissolved), may be transmitted to receptors via ingestion, inhalation, or absorption. As petroleum fuel seeps through the subsurface, it will undergo a transformation process that results in adsorption of hydrocarbons onto soil particles (residual phase) and release of volatile hydrocarbons into pore spaces (vapor phase). If any product remains after adsorption and volatilization takes place, it will continue to move vertically downward (in the absence of preferred lateral routes of migration) until reaching the capillary fringe area or a relatively impermeable barrier if one is located above the capillary fringe. At this point, the fuel (liquid phase) will tend to spread throughout the capillary fringe and the transformation process will continue with the dissolution of hydrocarbons into ground water (dissolved phase). An evaluation of the relationship between contaminated media and exposure pathways at the project site is summarized in Table 3.1.

Receptors may be potentially exposed to the hydrocarbons found in the soil primarily through inhalation of volatilized compounds and dermal contact with soil at hydrocarbon contamination sites. Based on laboratory test results, petroleum contamination is present in near-surface soil at the project site. Exposure to these soils is contingent upon site disturbance via construction or remediation activities. In

the event that soil remediation is required, there may be some inhalation exposure from volatilization of the hydrocarbons found in the soil. Volatile components will be released and the potential for exposure will occur at this time. Dermal exposure from soil contact by personnel may also occur if remediation activities include excavation. Since this is an occupational exposure, the receptor analysis for these exposure pathways should be considered as part of the site remediation design plan.

Exposure via ingestion most commonly occurs from consumption of drinking water obtained from contaminated wells or contaminated public water supplies. According to our review of available information, the nearest operational water supply well is located approximately 1000 feet northeast of the project site. Since our assessment indicates that the direction of ground-water flow within the surficial aquifer is to the east, the potential for exposure to drinking-water wells from contamination originating from the subject site appears to be minimal.

Structural Receptors

Buildings in the vicinity of TC-341 appear to be slab-on-grade types of structures. A 6-inch water main line is located approximately 30 feet to the west of the UST and also approximately 300 feet east of the UST. Due to the close proximity of the water line to the west, and the line to the east being hydraulically down-gradient, they may be considered as possible receptors.

Hydrologic Receptors

The nearest surface water body to the site is Brinson Creek which is located approximately 1000 feet (0.4 miles) to the east-northeast. Marsh areas associated with Brinson Creek are located approximately 800 feet to the east-northeast of the site (USGS, 1971).

4.0 SOILS INVESTIGATION

4.1 Site Topography

The project area is at an elevation of approximately 16 to 17 feet above mean sea level (USGS, 1971). The project area is relatively flat, gently sloping to the east towards Brinson Creek. The area surrounding the tank system of TC-341 consists of

open, grassed area to the north, east and west, with Buildings TC-341 and TC-342 located south-southeast.

4.2 Regional Geology

The study area is located within the Lower Coastal Plain Soil System (Wiscomico and Talbot System) and the Coastal Plain/Castle Hayne Limestone hydrologic area. The sediments of the Coastal Plain consist of interbedded sands, clays, calcareous clays, shell beds, sandstone, and limestone (LeGrand, 1959). These sediments are layered in interfingering beds and lenses that gently dip and thicken to the east and include ten aquifers and nine confining units. In the Camp LeJeune area, the sediments are about 1,500 feet thick and overlie igneous and metamorphic basement rocks. These sediments were deposited in marine or near-marine environments (Brown and others, 1972).

A brief summary of the geologic/hydrogeologic setting at the Building TC-341 site is provided in the CSA Workplan (Appendix A). In general, downward movement of ground water is obstructed by the presence of clay layers in Coastal Plain formations and consequently most of the ground-water recharge migrates laterally toward discharge areas through the surficial aquifer (Heath, 1980). Further details of regional geologic/hydrogeologic characteristics are provided in Section 5.1 of this report.

4.3 Site Soils and Geology

Drilling, soil sampling and monitoring well installation activities were initiated and completed in March, 1994. Locations of these borings/wells, shown in Drawing 4.1, were located in the field based on analysis of previous studies of the site.

All drilling was accomplished using the hollow stem auger (HSA) technique (ASTM D-1452). Augers of 6.25-inch inner diameter (I.D.) were used to advance the boreholes. Prior to work, all down-hole drilling equipment was steam-cleaned. Soil cuttings were disposed of on-site in a roll-off box provided by Waste Industries, Inc. for off-site disposal. Soil samples were collected from each of the boreholes. Soil samples collected for classification during the drilling operation were generally obtained at depths of 0.0 to 1.5 feet, 3.5 to 5.0 feet, 8.5 to 10.0 feet and on 5-foot centers thereafter to boring termination. Boring depths ranged from 13.0 feet BLS for Type II monitoring wells, to 32 feet BLS for Type III monitoring wells. Soil samples

were collected with a 24 inch long, 1.375-inch I.D. (2-inch outer diameter) split spoon sampler. Split spoon sampling was performed in general accordance with ASTM D-1586 and the number of blows required to drive the sampler each six-inch increment was recorded on the field boring log. The soil samples were identified in the field using visual/manual techniques described in ASTM D-2487 and ASTM D-2488. The soil was classified in accordance with the Unified Soil Classification System and a record of each test boring was produced. The soil test boring records are presented in Appendix B. Representative portions of each sample were placed in pre-labeled plastic bags and sealed for subsequent headspace testing.

Near-surface soils within 6.0 to 11.0 feet BLS generally consist of fine silty sands with occasional clayey fine sands and fine sandy clay lenses. Beneath these surficial materials, soils generally consist of slightly silty to silty fine to coarse sands to a depth of approximately 32 feet. This type of deposit appears to comprise much of the surficial aquifer at the subject site. Soils classified in the field as gray slightly silty fine sand with generally lower penetration resistance were encountered at depths of approximately 13.5 to 15.0 feet in borings completed for both the Type II wells and Type III wells. Sampling was stopped at approximately 30 feet in borings for monitoring wells MW-9 and MW-15. Moist soil conditions were generally encountered at depths of approximately 4 to 6 feet BLS.

Two cross-sections, the locations of which are shown in Drawing 4.2, were developed for the site to present lithologic interpretations. The cross-sections, as developed from the boring records, are illustrated in Drawings 4.3 and 4.4.

Representative soil samples collected at depths of 8.5 to 10.0 feet and 20.0 to 21.5 feet BLS from MW-7 and MW-9, respectively, were submitted for laboratory grain-size distribution tests. The results of the grain-size distribution tests, presented in Appendix C, reveal that the samples collected from 8.5 to 10.0 feet contained 59.0% fine to medium sand and 41.0% silt and clay, and that the sample from 20.0 to 21.5 feet contained 85.5% sand, 14.2% silt and clay, and .3% gravel.

4.4 Soil Contamination

The soil investigation activities were monitored with an HNu Photoionization Detector (PID) calibrated to 99.6 percent isobutylene, to determine the relative quantities of total volatile ionizable compounds in the borehole, in ambient air, and in the headspace of individual soil sample containers. Values recorded with the PID are qualitative only and are not directly comparable to actual laboratory analytical results. However, a PID is useful in providing a relative indication of the presence of total volatile ionizable compounds in soil samples.

Soil samples for headspace analysis were collected from each boring according to the following procedure:

- The decontaminated split-spoon sampler was driven to the desired depth interval.
- The split-spoon sampler was retrieved and immediately opened. A small portion of the sample was quickly removed from the split-spoon sampler and placed into a pre-labeled, airtight, plastic bag in a warm location. The remainder of the sample was placed in a second airtight, pre-labeled, laboratory container and stored on ice. Sample handling was executed carefully so as to minimize the loss of potential trace gases.
- At the conclusion of each sampling event, the headspace gas in the bags was measured for total ionizable compounds with the HNu, and the peak value was recorded for each bag sample.

Headspace sampling results are presented in Table 4.1. Results show elevated readings in soil samples collected from a depth of 3.5 to 15.0 feet BLS at location MW-14 and from a depth of 3.5 to 30.0 feet BLS at location MW-15. Results also show a slightly elevated reading in the 13.5 to 15.0 foot soil sample at location MW-16.

Two soil samples were retained from each soil boring for either on-site or off-site laboratory analysis. The on-site laboratory is owned and operated by Geochem Laboratories, Inc. of Morrisville, North Carolina. All off-site samples were submitted to Law Environmental National Laboratories in Pensacola, Florida. Approximately the

first fifty percent of soil samples collected from the monitoring well soil borings were packed on ice and submitted to the on-site lab to aid in locating the remaining borings. The remaining fifty percent of the soil samples were placed in a cooler, packed on ice and shipped to the off-site laboratory. The distribution of samples submitted to each respective laboratory is shown in Table 4.2. The soil samples submitted to both the on-site and off-site laboratories were analyzed for total petroleum hydrocarbons (TPH) according to EPA preparation/testing Methods 5030/8015 (volatile fraction), 3550/8015 (semi-volatile fraction) and 9071 (oil and grease). Selected soil samples were also analyzed for pH, flashpoint, TCLP metals and total lead. Custody of the samples was maintained by Law Engineering field staff until shipment or delivery to the on-site laboratory.

Chemical testing results for the soil samples collected are summarized in Table 4.3. The laboratory testing indicated the presence of detectable TPH-gasoline in soil samples collected at a depth of 3.5 to 5.0 feet at locations MW-14 and MW-15. The concentration of 4100 mg/Kg in MW-14 and 200 mg/Kg in MW-15 for TPH-gasoline at these locations is well above the State's action level of 10 mg/Kg. Laboratory testing also indicated the presence of detectable TPH-diesel in soil samples collected at a depth of 3.5 to 5.0 feet at locations MW-14 and MW-15. Concentration levels of 800 and 490 mg/Kg, which are above the State's action level of 40 mg/Kg for TPH-diesel, were detected respectively. Also, a concentration level of 11 of TPH diesel was detected in MW-11 and MW-17 at a depth of 0.0 to 1.5 feet. This level is below the State's action level of 40 mg/Kg. Drawing 4.5 shows the distribution of TPH results within the vadose zone soils at the site. Headspace analysis of soil samples analyzed by the on-site and off-site laboratories generally show a good correlation.

Laboratory testing indicated the presence of TCLP barium in soil samples collected from MW-11 and MW-14 at a depth of 3.5 to 5.0 feet at a concentration of 400 ug/L and 250 ug/L respectively, which are below the State's action level of 100,000 ug/L.

Laboratory results indicate that the pH of site soils falls generally in a range between 5.53 to 7.48 suggesting that the soils are slightly acidic to near neutral. TCLP metals barium, chromium, and cadmium were detected in two samples at concentrations below TCLP limits for the respective metals. Results of flashpoint analyses suggest that site soils are not flammable.

5.0 GROUND-WATER INVESTIGATION

5.1 Regional Hydrogeology

In the Camp Lejeune area, sediments deposited in marine or near-marine environments are about 1,500 feet thick and overlie igneous and metamorphic basement rocks. The aquifers of the Camp Lejeune area are the surficial, Castle Hayne, Beaufort, Peedee, Black Creek, and upper and lower Cape Fear aquifers. They are separated by less permeable clay and silt beds (confining units) that serve to impede the flow of ground water between the aquifers (Harned, 1989).

The surficial aquifer is a series of sediments, primarily sand and clay, which commonly extend to depths of 50 to 100 feet. This unit is not used for water supply on the Base. The principal water-supply aquifer for the Base is the series of sand and limestone beds that occur between 50 and 300 feet below land surface. This series of sediments generally is known as the Castle Hayne aquifer. The Castle Hayne aquifer is about 150 to 350 feet thick in the area and is the most productive aquifer in North Carolina. It is a critical water-supply source, not only for Camp Lejeune but also for the southern coast and east-central Coastal Plain of North Carolina (Harned, 1989).

Camp Lejeune is situated in an area where the Castle Hayne aquifer contains freshwater, although the proximity of saltwater in deeper layers just below the aquifer and in the New River estuary is of concern in managing water withdrawals from the aquifer. The aquifers that lie below the Castle Hayne consist of a thick sequence of sand and clay. Although some of these aquifers are used for water supply elsewhere in the Coastal Plain, they contain saltwater in the Camp Lejeune area (Harned, 1989).

Water levels in wells tapping the surficial aquifer vary seasonally. The surficial aquifer receives more recharge in the winter than in the summer when much of the water evaporates or is transpired by plants before it can reach the water table. Therefore, the water table generally is highest in the winter months and lowest in summer or early fall. The hydraulic head in a confined aquifer, such as the Castle Hayne, shows a different pattern of variation over time than that in an unconfined aquifer. Some seasonal variation also is common in the water levels of the Castle Hayne aquifer, but the changes tend to be slower and over a smaller range than for water-table wells (Harned, 1989).

5.2 Site Hydrogeology

Site specific data used to characterize the local hydrogeology was obtained through the installation of ground-water monitoring wells. A total of twelve Type II and two Type III ground-water monitoring wells were constructed during this investigation utilizing the materials and installation procedures described in the Workplan (Appendix A). These specifications included decontamination of the drilling equipment and well construction materials with a pressure steam cleaning unit. All monitoring well heads are protected by concrete pads and well head covers. Monitoring well installation details for the Type II and Type III wells are included in Appendix D.

Depths to ground water were measured in all monitoring wells on March 30, 1994. The measurements are included on the Monitoring Well Casing and Water Elevation Worksheets contained in Appendix E. Elevations of the monitoring wells installed by Law Engineering were determined by McKim and Creed Engineers and are also included in the Worksheets contained in Appendix E.

Based on measured ground-water elevations in the monitoring wells, a water-table elevation contour map was constructed to determine ground-water flow direction as shown in Drawing 5.1. A horizontal hydraulic gradient of approximately 0.006 within the surficial aquifer was determined from this map (see Appendix F). In general, ground-water within the surficial aquifer flows to the east toward Brinson Creek, which discharges into the New River. The stabilized ground-water table at the time of our field work appears to have been between 10.50 feet and 13.50 feet BLS within the area of investigation. The average hydraulic conductivity of the surficial aquifer as determined through recovery tests is estimated to be approximately 1.5 feet per day (see Appendix G).

As indicated by a comparison of water-level elevations in the following paired Type II and Type III monitoring wells: MW-9 (screened from 27.0 to 32.0 feet BLS) and MW-10 (screened from 3.0 to 13.0 feet BLS); MW-14 (screened from 3.0 to 13.0 feet BLS) and MW-15 (screened from 25.0 to 30.0 feet BLS); the direction of ground water flow within the surficial aquifer appears have a slight downward component in the vicinity of both pairs locations.

5.3 Extent of Free Product

In conformance with regulations promulgated by the North Carolina Department of Environment, Health and Natural Resources, the estimated extent of free product was delineated for the site. Free product is defined as a regulated substance that is present as a non-aqueous phase liquid (e.g., liquid not dissolved in water).

Type II monitoring wells were constructed to allow for detection of free product in the surficial aquifer. As indicated on the Monitoring Well Casing and Water Elevation Worksheet presented in Appendix E, free product thicknesses were measured in two on-site wells during this investigation. Free product was detected in monitoring wells MW-1 and MW-2, which were installed prior to this investigation. The estimated extent of free product is shown in Drawing 5.2.

5.4 Dissolved Ground-Water Contamination

Ground-water samples were collected from each of the fourteen newly installed monitoring wells. Prior to sampling, personnel donned laboratory grade gloves. These gloves were replaced after sampling each well to minimize the potential for cross-contamination. Prior to well sampling, the depths to ground water were determined using an electronic water-level meter. The distance from the measuring point to each respective depth was measured and recorded. The data collected and observations made were recorded on the Monitoring Well and Sampling Field Data Worksheets (Appendix H).

Approximate volumes of water removed during development and observations of turbidity are listed in Table 5.1. The development water, approximately 166 gallons total, was temporarily containerized on-site and then taken off-site to P & W Oil Company, Inc. in Leland, North Carolina.

All monitoring wells were purged prior to sample collection to remove stagnant water from the well casing and sand pack in an effort to collect samples representative of the water quality in the surficial aquifer. Each well was purged using a pre-cleaned teflon bailer. Specific conductance, pH, and water temperature were measured and recorded throughout the purging process. Well purging continued until three standing well volumes were removed and indicator parameters had stabilized. Water samples were then collected and immediately decanted gently from the bailer into pre-labeled

sample containers. These containers were sealed, and stored in chilled coolers. Custody of the samples was maintained by Law Engineering field staff until samples were relinquished for laboratory analysis. Water generated during the well purging and development process was temporarily containerized on-site and then disposed of at an off-site disposal facility.

Ground-water samples were analyzed for purgeable aromatic hydrocarbons according to EPA Method 602 for monitoring wells MW-1, MW-4, MW-7, MW-8 and MW-10. Samples from the monitoring wells were submitted to both the on-site and off-site laboratories for analysis. Table 5.2 shows the distribution of samples submitted to each of the laboratories. A summary of ground-water analytical results is presented in Table 5.3. Results suggest that dissolved phase purgeable aromatic hydrocarbons are present in the upper portion of the surficial aquifer.

The concentrations of constituents detected within shallow ground water were plotted on site maps to illustrate their spatial distribution in the vicinity of the site. Maps showing the extent of free product detected and concentrations of benzene, toluene, ethylbenzene, total xylenes, methyl-tertiary-butyl ether (MTBE), and total polynuclear aromatic hydrocarbon (PAH) compounds are presented in Drawings 5.2 through 5.8 respectively. Drawings 5.2, 5.3, 5.4, 5.5, 5.6 and 5.7 illustrate that the horizontal and vertical extent of free product, benzene, toluene, ethylbenzene, total xylenes and MTBE has been defined by the sampling network. Similarly, Drawing 5.8 suggests that the horizontal and vertical extent of total PAH compounds within shallow ground water in the vicinity of the subject UST has also been defined adequately by the network.

The distribution of of PAH compounds in groundwater shown in Drawing 5.8 illustrates that the extent of PAH contamination has been defined to the north, south and west of the subject tank system, and to levels of 10's of a ug/l, 300 feet downgradient of that tank system.

Laboratory testing of the ground-water sample collected from MW-14 indicates the presence of total PAH compounds at a concentration of 5240 ug/L. MW-14 is located approximately 350 feet east of the leaking UST. Concentrations of only 14.6 ug/L were detected in MW-8. In light of these data and the fact that other potential contaminant sources have been identified downgradient of the subject site, it does not appear that the contamination found in MW-14 is solely a result of the TC-341 UST.

5.5 Vertical Gradient Determinations

Ground water exhibits both horizontal and vertical components of flow within an aquifer. The hydraulic gradient is the difference in hydraulic head along a flow path divided by the distance between those points. The vertical component of the gradient may be either upward or downward within the aquifer. At the project site there are two well clusters which pair a shallow Type II monitoring well with a deeper Type III monitoring well. These well clusters are identified below:

Shallow Well	Deep Well
MW-10	MW-9
MW-14	MW-15

The vertical gradient is calculated by first determining the difference in the static water level elevations at each well. Second, the relative elevation of the middle of the screened interval is determined for each well. Finally, the difference in the static water-level elevations is divided by the difference in the midscreen elevations. This value is arbitrarily assigned a positive value if the ground water is moving vertically downward and a negative value if the ground water is moving vertically upward. Vertical gradients determined for the site and values used to calculate the gradient are summarized in Table 5.4. According the these data, the vertical gradient at both locations is downward.

5.6 Rate of Contaminant Migration

The rate at which contaminants migrate through the subsurface is affected by several geohydrochemical processes including molecular diffusion, mechanical mixing, sorption-desorption, ion-exchange, hydrolysis and biodegradation. Because the resources involved in attempting to model the effects of these processes at the project site are significant, we have chosen to apply a relatively simple analytical technique (USEPA, 1985) with which to arrive at a conservative (greater than anticipated) estimate of contaminant migration rates at the site. The analytical technique takes into account only sorption-desorption of the contaminant constituent (expressed in terms of the "retardation factor") and the average linear ground-water flow velocity at the site.

For purposes of these calculations, we used the average hydraulic conductivity of the surficial aquifer as determined by on-site recovery tests (1.5 feet/day), and the horizontal hydraulic gradient determined to be approximately 0.006. If an effective porosity of 20% is assumed for the surficial aquifer, a seepage velocity of approximately 0.05 feet per day can be determined using Darcy's Law. The approximate rates of movement for petroleum compounds detected within the surficial aquifer would likely be slower than the ground-water seepage rate due to reasons discussed previously. Below is the expected range of contaminant movement rates at the site.

COMPOUND	RATE Vc (Feet/Day)
MTBE	0.04
Benzo(a)anthracene	10^{-5}

It is important to note that these migration rates are only gross estimates and may vary considerably from actual field migration rates.

6.0 QUALITY CONTROL PROCEDURES

6.1 Equipment Decontamination

Quality control procedures for equipment handling and decontamination are detailed in the Workplan (Appendix A). Decontamination of the drilling equipment was performed at the wash rack located at Building FC200 and Building TC-341, where waste soil and water were collected and containerized on-site for subsequent proper disposal.

6.2 Sample Collection and Shipment

Details of quality control procedures for sample collection, handling and shipment are included in the CSA Workplan (Appendix A). To provide checks on the integrity and quality of the field sampling program performed at the project site, two quality control measures were employed. First, equipment rinse blanks were submitted to the laboratory for evaluation of procedures used to decontaminate the Teflon sampling

bailers. Second, trip blanks were submitted to the laboratory during shipment of the monitoring well samples to perform checks on the integrity of the sample containers and ascertain whether contaminants may have entered the samples during transport to and from the job site. Laboratory quality controls included the use of lab blanks throughout the analytical procedures to check for laboratory induced contamination.

Analysis of the rinse blank collected during the monitoring-well sampling for polynuclear aromatic hydrocarbon compounds did exhibit the presence of such compounds in excess of the laboratory detection limits. This result appears to be inconsequential however, because three of the five detected compounds were not detected in any other samples. Further, the two that were detected in samples from monitoring wells were one to two orders of magnitude greater in concentration than those detected in the rinse blank. It is likely that the rinse blank sample was contaminated by an external source during collection. Duplicate sample analysis produced results that were generally consistent.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon our assessment activities at the site, a spatial distribution of petroleum-hydrocarbon contamination at levels exceeding regulatory standards exists within ground water at the site. Preliminary recommendations describe additional activities that will be needed to meet remaining regulatory requirements.

7.1 Overview and Objectives of Soil and Ground-water Remediation

7.1.1 Soil

Results of this investigation indicate that the extent of vadose soil contamination has been defined and occurs within the immediate vicinity of the tank. Protection of public health and ground-water quality are the primary reasons for soil remediation at sites with elevated concentrations of TPH. As discussed in Section 3.0 of this report, the potential for exposure to contaminated soil at the project site is minimal as long as the subsurface remains undisturbed. However, guidelines for remediation of soil contaminated by petroleum have been established by the Groundwater Section of the Division of Environmental Management, DEHNR (1993).

Within these guidelines, the Groundwater Section has set "action levels" of 10 mg/Kg for soils contaminated with low boiling point hydrocarbons and 40 mg/Kg for soils contaminated with medium boiling point hydrocarbons in contact with ground water. Where petroleum contaminated soil is not in contact with the shallow ground water and other, specific conditions apply, the final clean-up levels for site soils may range up to 300 mg/Kg and 1200 mg/Kg for low and medium boiling point hydrocarbons respectively. Because free product is present on the water table in the vicinity of the UST system, and because TPH was not detected in unsaturated soils at the remaining boring/monitoring well locations, completion of a Site Sensitivity Evaluation was not required. Therefore, the objectives for remediation of contaminated soil at the project site should focus on 1) eliminating the adsorbed hydrocarbons as an ongoing source of ground-water contamination through leaching and desorption and 2) complying with NCDEHNR guidelines which require remediation of all soil containing petroleum hydrocarbons in excess of DEM action levels.

7.1.2 Ground Water

The results of this investigation indicate that ground water flows primarily to the east and that contamination has occurred in mainly the upper portion of the surficial aquifer.

The necessity of remediation efforts designed to restore ground-water quality is often not easily quantified. The decision ultimately rests upon regulatory requirements, the measured and/or perceived present and future utility of the ground-water resource, the risks associated with the potential exposure to the contaminants, and the availability of resources with which to implement and operate a ground-water restoration project. Obviously, remediation is warranted in a situation where the risk to public health or welfare is unavoidable and unacceptable as a result of exposure to ground-water contaminants. As indicated in Section 3.0 and Table 3.1 of this report, present exposure to ground-water contaminants in the vicinity of the project site is considered unlikely.

With respect to regulatory requirements, the North Carolina Environmental Management Commission (EMC) has adopted maximum allowable concentrations for contaminant constituents in ground water. The maximum regulatory concentration for compounds detected in ground water beneath the site are included in Table 5.3. For compounds which do not have a numerical standard, a petition may be filed with

the North Carolina Division of Environmental Management (DEM) in order to establish such a standard. Otherwise, a maximum allowable concentration for the compound not listed is equal to its laboratory detection limit. As indicted in Table 5.3, Law Engineering has documented the occurrence of several constituents at levels which exceed the maximum allowable concentrations for at the project site.

At sites where ground-water standards have been exceeded, rules adopted by the EMC and enforced by DEM require that a corrective action plan for the restoration of ground-water quality be prepared. The feasibility and justification for alternative remedial options ranging from natural attenuation (no action) to active remediation are addressed in the corrective action plan with the addition of limited confirmation sampling. This comprehensive site assessment will provide the data needed for preparation of such a plan.

7.2 Conclusions

Based upon the results of our investigation, petroleum related contamination is present within soils and ground water within the area of investigation. The majority of soil contamination appears to occur within the immediate vicinity of the UST subject system. Ground-water contamination was detected primarily in the upper portion of the surficial aquifer.

The extent of benzene, ethylbenzene, toluene, total xylenes, methyl-tertiary-butyl ether and polynuclear aromatic hydrocarbons within site ground water has been adequately defined by the sampling network used in this study. Elevated concentrations of PAH compounds at the furthest downgradient well location suggest that other petroleum sources located east of TC-341 have contributed petroleum compounds to the shallow ground water in that area.

Results of this assessment suggest that the majority of soil and ground-water contamination originating from the tank system at Building TC-341 has been adequately defined for the purposes of preparing a Corrective Action Plan.

7.3 Recommendations

Based on our assessment of the subject site, soil and ground water both indicated the presence of compounds characteristic of fuel oil that leaked from the UST system at TC-341 and possibly gasoline or Jet fuel from the petroleum source located east of TC-341. The presence of free product in ground-water coupled with elevated concentrations of petroleum constituents requires additional measures to satisfy groundwater requirements set forth by the state.

Our recommendations are as follows:

- Initiate free product recovery activities in the vicinity of the TC-341 UST system.
- Provide a copy of this comprehensive site assessment to the State for their review and files.
- Perform additional investigation to determine the limits of soil and ground-water contamination to the east of Building TC-341.
- Begin preparation of a Corrective Action Plan.

8.0 REFERENCES

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TABLES

TABLE 2.1
CONTAMINANT SOURCE INVENTORY
SITE ASSESSMENT REPORT
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

SOURCE ID NO.	PRODUCT TYPE	INSTALLATION DATE	SIZE OF TANK (GAL.)	STATUS
TC-341 TANK	NUMBER 6 HEATING OIL	1941	UNKNOWN	ABANDONED IN PLACE
TC341 TANK FUEL SUPPLY LINE	NUMBER 6 HEATING OIL	1941	6" DIAMETER	ABANDONED IN PLACE
BUILDING NO. TC-480	NUMBER 2 FUEL OIL	1976	550 GALLON UST	ACTIVE
BUILDING NO. TC-474	WASTE OIL	1946	550 GALLON	ABANDONED
FUEL TANK FARM	GASOLINE, DIESEL, KEROSENE	1940'S	5-15,000 GALLON TANKS	ACTIVE
GAS STATION BUILDING 341	GASOLINE, DIESEL	UNKNOWN	UNKNOWN	DEMOLISHED

NOTE:

Underground lines associated with these tanks, the fuel farm above ground tanks, and the oil-water separator located southeast of the fuel farm are also potential contaminant sources.

TABLE 3.1
WELL INVENTORY SUMMARY
SITE ASSESSMENT REPORT
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

USGS WELL NO.	MCB WELL NO.	TOTAL WELL DEPTH (FT)	SCREENED INTERVAL (FT)	CASING DIAMETER (INCH)	APPROXIMATE DISTANCE FROM BUILDING TC-341 (FT)	WELL USAGE
3444300772729.1	TC-104	182.0'	107'-182' (OPEN HOLE)	10.0"	2000.0'	ABANDONED
3444280772729.1	TC-100	67.0'	OPEN HOLE	18.0"	1950.0'	ABANDONED
3444120772755.1	TC-202	80.0'	35'-80'	8.0"	1950.0'	ABANDONED
3444120772755.2	TC-325	--	--	--	1950.0'	ABANDONED
3444070772728.1	TC-502	184.0'	110'-184' (OPEN HOLE)	10.0"	1500.0'	WATER SUPPLY
3444180772729.1	NC-52	70.0'	25'-66' (OPEN HOLE)	--	1700.0'	WATER SUPPLY
3444050772728.1	TC-600	70.0'	48'-70'	8.0"	1800.0'	WATER SUPPLY
3443560772727.1	TC-700	76.0'	27.5'-76' (OPEN HOLE)	18.0"	2600.0'	WATER SUPPLY
3444250772707.1	T-15	477.0'	OPEN TEST HOLE	--	1000.0'	WATER SUPPLY

-- Not Available

TABLE 3.2
SUMMARY OF EXPOSURE PATHWAYS
SITE ASSESSMENT REPORT
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

CONTAMINATED MEDIUM	INGESTION (EATING)	INGESTION (DRINKING)	INHALATION	ADSORPTION
Free Product	NA	Exposure Unlikely (1)	NA	Exposure Unlikely (1)
Soil	Contingent Exposure (2)	NA	NA	Contingent Exposure (2)
Ground Water	Exposure Unlikely (3)	Exposure Unlikely (3)	NA	Exposure Unlikely (3)
Surface Water	Exposure Unlikely (4)	Exposure Likely (4)	NA	Exposure Likely (4)
Vapor	NA	NA	Exposure Unlikely (5)	NA

NOTES:

NA Not Applicable
(1) Free product detected in surficial waters; water supply wells draw from Castle Hayne aquifer.
(2) Potential for exposure only if subsurface below approximately 1.0 foot BLS is disturbed.
(3) Via use of MCAS water supply lines that extend through the project area for drinking, cooking and bathing.
(4) Preliminary ground-water sampling results indicated that petroleum constituents may extend to Brinson Creek that may carry constituents to the New River.
(5) Limited assessment indicates sunsurface vaults, manways, or other exposure routes in vicinity of known soil/product contamination.

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TABLE 4.01 (Page 1 of 2)
SUMMARY OF HEADSPACE ANALYSIS
SITE ASSESSMENT REPORT
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

SAMPLE LOCATION I.D. #	SAMPLE DEPTH (FT.)	PID READING (PPM)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
MW-4 SS1	0.0'-1.5'	ND	✓
MW-4 SS2	3.5'-5.0'	ND	✓
MW-4 SS3	8.5'-10.0'	ND	
MW-4 SS4	13.5'-15.0'	ND	
MW-5 SS1	0.0'-1.5'	ND	✓
MW-5 SS2	3.5'-5.0'	ND	✓
MW-5 SS3	8.5'-10.0'	ND	
MW-5 SS4	13.5'-15.0'	ND	
MW-6 SS1	0.0'-1.5'	ND	✓
MW-6 SS2	3.5'-5.0'	ND	✓
MW-6 SS3	8.5'-10.0'	ND	
MW-6 SS4	13.5'-15.0'	ND	
MW-7 SS1	0.0'-1.5'	ND	✓
MW-7 SS2	3.5'-5.0'	ND	✓
MW-7 SS3	8.5'-10.0'	ND	
MW-7 SS4	13.5'-15.0'	ND	
MW-8 SS1	0.0'-1.5'	ND	✓
MW-8 SS2	3.5'-5.0'	ND	✓
MW-8 SS3	8.5'-10.0'	ND	
MW-8 SS4	13.5'-15.0'	ND	
MW-9 SS1	0.0'-1.5'	ND	✓
MW-9 SS2	3.5'-5.0'	ND	✓
MW-9 SS3	8.5'-10.0'	ND	
MW-9 SS4	13.5'-15.0'	ND	
MW-9 SS5-A	18.5'-20.0'	ND	
MW-9 SS5-B	20.0'-21.5'	ND	
MW-9 SS6	23.5'-25.0'	ND	
MW-9 SS7	28.5'-30.0'	ND	
MW-10 SS1	0.0'-1.5'	ND	✓
MW-10 SS2	3.5'-5.0'	ND	✓
MW-10 SS3	8.5'-10.0'	ND	
MW-10 SS4	13.5'-15.0'	ND	

ND None Detected

TABLE 4.1 (Page 2 of 2)
SUMMARY OF HEADSPACE ANALYSIS
SITE ASSESSMENT REPORT
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

SAMPLE LOCATION I.D. #	SAMPLE DEPTH (FT.)	PID READING (PPM)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
MW-11 SS1	0.0'-1.5'	ND	✓
MW-11 SS2	3.5'-5.0'	ND	✓
MW-11 SS3	8.5'-10.0'	ND	✓
MW-11 SS4	13.5'-15.0'	ND	
MW-12 SS1	0.0'-1.5'	ND	✓
MW-12 SS2	3.5'-5.0'	ND	✓
MW-12 SS3	8.5'-10.0'	ND	✓
MW-12 SS4	13.5'-15.0'	ND	
MW-13 SS1	0.0'-1.5'	ND	✓
MW-13 SS2	3.5'-5.0'	ND	✓
MW-13 SS3	8.5'-10.0'	ND	✓
MW-13 SS4	13.5'-15.0'	ND	
MW-14 SS1	0.0'-1.5'	ND	✓
MW-14 SS2	3.5'-5.0'	40	✓
MW-14 SS3	8.5'-10.0'	40	✓
MW-14 SS4	13.5'-15.0'	32	
MW-15 SS1	0.0'-1.5'	ND	✓
MW-15 SS2	3.5'-5.0'	42	✓
MW-15 SS3	8.5'-10.0'	60	✓
MW-15 SS4	13.5'-15.0'	17	✓
MW-15 SS5	18.5'-20.0'	2	
MW-15 SS6	23.5'-25.0'	9	
MW-15 SS7	28.5'-30.0'	10	✓
MW-16 SS1	0.0'-1.5'	ND	✓
MW-16 SS2	3.5'-5.0'	ND	✓
MW-16 SS3	8.5'-10.0'	ND	✓
MW-16 SS4	13.5'-15.0'	8	
MW-17 SS1	0.0'-1.5'	ND	✓
MW-17 SS2	3.5'-5.0'	ND	✓
MW-17 SS3	8.5'-10.0'	ND	
MW-17 SS4	13.5'-15.0'	ND	

ND None Detected

TABLE 4.2
SUMMARY OF ON-SITE/OFF-SITE LABORATORY DISTRIBUTION
SOIL SAMPLES
MARINE CORPS AIR STATION
BUILDING TC-341
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

	ANALYSIS						
	EPA Method 5030 (Gasoline)	EPA Method 3550 (Diesel)	EPA Method 9071 (Oil & Grease)	EPA Method 1311 (TCLP Metals)	EPA Method 7470 (Mercury)	FLASH POINT	pH
MW-4 SS1	X	X					
MW-4 SS2	X	X					
MW-5 SS1	X	X					
MW-5 SS2	X	X					
MW-6 SS1	X	X					
MW-6 SS2	X	X					
MW-7 SS1	X	X					
MW-7 SS2	X	X					
MW-8 SS1	X	X					
MW-8 SS2	X	X					
MW-9 SS1	X	X					
MW-9 SS2	X	X					
MW-10 SS1	X	X					
MW-10 SS2	X	X					
MW-10 SS2*	X	X					
MW-11 SS1	O	O					
MW-11 SS2	O	O		O	O	O	O
MW-11 SS3			O				
MW-12 SS1	O	O	O			O	
MW-12 SS2	O	O				O	O
MW-12 SS3			O				
MW-13 SS1	O	O				O	O
MW-13 SS2	O	O					O
MW-13 SS3			O				
MW-14 SS1	O	O				O	O
MW-14 SS2	O	O	O	O	O	O	
MW-14 SS3			O				
MW-15 SS1	O	O					
MW-15 SS2	O	O				O	O
MW-15 SS3						O	O
MW-15 SS4			O				
MW-15 SS7			O				
MW-16 SS1	O	O					O
MW-16 SS2	O	O				O	O
MW-16 SS3			O				
MW-17 SS1	O	O	O			O	O
MW-17 SS2	O	O					
MW-17 SS2*	O	O					

X = On-Site Laboratory Analysis
O = Off-Site Laboratory Analysis
* Duplicate Sample

TABLE 4.3 (Page 1 of 2)
SUMMARY OF LABORATORY ANALYTICAL RESULTS
SOIL SAMPLES
SITE ASSESSMENT REPORT
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

SAMPLE LOCATION		LABORATORY RESULTS					
		TPH-GASOLINE (mg/Kg)	TPH-DIESEL (mg/Kg)	TPH-OIL & GREASE (mg/Kg)	TCLP-METALS (ug/l)	FLASH POINT (DEGREES F)	pH
MW-4 SS1	0.0'-1.5'	ND	ND	--	--	--	--
MW-4 SS2	3.5'-5.0'	ND	ND	--	--	--	--
MW-5 SS1	0.0'-1.5'	ND	ND	--	--	--	--
MW-5 SS2	3.5'-5.0'	ND	ND	--	--	--	--
MW-6 SS1	0.0'-1.5'	ND	ND	--	--	--	--
MW-6 SS2	3.5'-5.0'	ND	ND	--	--	--	--
MW-7 SS1	0.0'-1.5'	ND	ND	--	--	--	--
MW-7 SS2	3.5'-5.0'	ND	ND	--	--	--	--
MW-8 SS1	0.0'-1.5'	ND	ND	--	--	--	--
MW-8 SS2	3.5'-5.0'	ND	ND	--	--	--	--
MW-9 SS1	0.0'-1.5'	ND	ND	--	--	--	--
MW-9 SS2	3.5'-5.0'	ND	ND	--	--	--	--
MW-10 SS1	0.0'-1.5'	ND	ND	--	--	--	--
MW-10 SS2	3.5'-5.0'	ND	100	--	--	--	--
MW-10 SS2*	3.5'-5.0'	ND	ND	--	--	--	--
MW-11 SS1	0.0'-1.5'	ND	11	--	--	--	--
MW-11 SS2	3.5'-5.0'	ND	ND	--	400	NF	6.52
MW-11 SS3	8.5'-10.0'	--	--	ND	--	--	--
MW-12 SS1	0.0'-1.5'	ND	ND	ND	--	NF	--

ND Not detected; see laboratory reports for applicable detection limit
NF No Flash
-- Not analyzed
* Duplicate Sample
Shaded Area = Concentrations detected above NC soil remediation guidelines

NC Action Level for:
Low Boiling Point Hydrocarbons (Gasoline) = 10 mg/Kg
Medium Boiling Point Hydrocarbons (Diesel) = 40 mg/Kg
High Boiling Point Hydrocarbons (Oil & Grease) = 250 mg/Kg

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TABLE 4 (Page 2 of 2)
SUMMARY OF LABORATORY ANALYTICAL RESULTS
SOIL SAMPLES
SITE ASSESSMENT REPORT
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

SAMPLE LOCATION		LABORATORY RESULTS					
		TPH-GASOLINE (mg/Kg)	TPH-DIESEL (mg/Kg)	TPH-OIL & GREASE (mg/Kg)	TCLP-METALS (ug/l)	FLASH POINT (DEGREES F)	pH
MW-12 SS2	3.5'-5.0'	ND	ND	--	--	NF	7.62
MW-12 SS3	8.5'-10.0'	--	--	ND	--	--	--
MW-13 SS1	0.0'-1.5'	ND	ND	--	--	NF	6.02
MW-13 SS2	3.5'-5.0'	ND	ND	--	--	--	5.93
MW-13 SS3	8.5'-10.0'	--	--	ND	--	--	--
MW-14 SS1	0.0'-1.5'	ND	ND	--	--	NF	7.48
MW-14 SS2	3.5'-5.0'	4100	800	ND	260	NF	--
MW-14 SS3	8.5'-10.0'	--	--	350	--	--	--
MW-15 SS1	0.0'-1.5'	ND	ND	--	--	--	--
MW-15 SS2	3.5'-5.0'	200	490	--	--	NF	5.53
MW-15 SS3	8.5'-10.0'	--	--	--	--	NF	5.53
MW-15 SS4	13.5'-15.0'	--	--	ND	--	--	--
MW-15 SS7	28.5'-30.0'	--	--	ND	--	--	--
MW-16 SS1	0.0'-1.5'	ND	ND	--	--	--	5.56
MW-16 SS2	3.5'-5.0'	ND	ND	--	--	NF	6.55
MW-16 SS3	8.5'-10.0'	--	--	ND	--	--	--
MW-17 SS1	0.0'-1.5'	ND	ND	11	--	NF	7.23
MW-17 SS2	3.5'-5.0'	ND	ND	--	--	--	--
MW-17 SS2*	3.5'-5.0'	ND	ND	--	--	--	--

ND Not detected; see laboratory reports for applicable detection limit
NF No Flash
-- Not analyzed
* Duplicate Sample
Shaded Area = Concentrations detected above NC soil remediation guidelines

NC Action Level for:
Low Boiling Point Hydrocarbons (Gasoline) = 10 mg/Kg
Medium Boiling Point Hydrocarbons (Diesel) = 40 mg/Kg
High Boiling Point Hydrocarbons (Oil & Grease) = 250 mg/Kg

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TABLE 5.1
SUMMARY OF MONITORING WELL DEVELOPMENT
SITE ASSESSMENT REPORT
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

MONITORING WELL IDENTIFICATION NO.	FINAL TURBIDITY (SUBJECTIVE)*	APPROXIMATE VOLUME OF WATER REMOVED (GAL.)
MW-1**	FREE PRODUCT IN WELL	
MW-2**	FREE PRODUCT IN WELL	
MW-3**	4	29.1
MW-4	4	10
MW-5	4	7.7
MW-6	4	6.9
MW-7	4	10
MW-8	4	7.2
MW-9	3	21.2
MW-10	4	10
MW-11	4	7.2
MW-12	4	7.4
MW-13	4	7.2
MW-14	4	3.5
MW-15	3	21.0
MW-16	4	7.4
MW-17	4	7.1

NOTES:

* (1) Clear; (2) Slight; (3) Moderate; (4) High
** Existing Wells

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TABLE 5.2
SUMMARY OF ON-SITE/OFF-SITE LABORATORY DISTRIBUTION
GROUND WATER SAMPLES (MONITORING WELLS)
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

	ANALYSIS			
	EPA Method 6010	EPA Method 602	EPA Method 610	EPA Method 7470
MW-1	O	X	X	O
MW-2			X	
MW-3			X	
MW-4	O	X	X	O
MW-5			X	
MW-6			X	
MW-7		X	X,O	
MW-8		X	O	
MW-9			O	
MW-10		X	X	
MW-11			X	
MW-12			X	
MW-13			O	
MW-14			O	
MW-15			O	
MW-16			O	
MW-17			O	
RINSE BLANK		X	X	
TRIP BLANK			O	

X = Sample analyzed at On-site laboratory
O = Sample analyzed at Off-site laboratory

TABLE 5.3 (Page 1 of 3)
SUMMARY OF LABORATORY ANALYTICAL RESULTS
GROUND WATER SAMPLES (MONITORING WELLS)
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

PARAMETER	WELL #	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7**		N.C. GROUNDWATER STANDARDS
	SCREENED INTERVAL (FT.)	19.0'[1]	20.0'[1]	19.5'[1]	3.0'-13.0'	3.0'-13.0'	3.0'-13.0'	3.0'-13.0'		
	DATE SAMPLED	3/22/94	3/22/94	3/22/94	3/16/94	3/22/94	3/22/94	3/16/94		
EPA METHOD 6010										
Arsenic		44	--	--	ND	--	--	--		50
Barium		390	--	--	590	--	--	--		2000
Cadmium		ND	--	--	11	--	--	--		5
Chromium		ND	--	--	31	--	--	--		50
Lead		ND	--	--	60	--	--	--		15
EPA METHOD 602										
Benzene		ND	--	--	ND	--	--	0.6		1
Toluene		ND	--	--	0.7	--	--	ND		1000
Ethylbenzene		4.0	--	--	ND	--	--	ND		29
Xylenes (Total)		1.8	--	--	ND	--	--	ND		530
Methyl tert-butyl ether (MTBE)		NA	--	--	NA	--	--	NA		200
EPA METHOD 610										
Acenaphthene		247	108	ND	ND	ND	ND	ND	ND	•
Anthracene		114	ND	ND	ND	ND	ND	ND	ND	•
Benzo (a) anthracene		ND	ND	ND	ND	ND	ND	ND	ND	•
Benzofluoranthenes		ND	ND	ND	ND	ND	ND	ND	ND	•
Chrysene		ND	ND	ND	ND	ND	ND	ND	ND	•
Fluoranthene		45.6	12.2	ND	ND	ND	ND	ND	ND	•
Fluorene		326	166	ND	ND	ND	ND	ND	ND	280
1-Methylnaphthalene		ND	ND	ND	ND	ND	ND	ND	ND	•
2-Methylnaphthalene		ND	ND	ND	ND	ND	ND	ND	ND	•
Naphthalene		214	457	ND	ND	ND	ND	ND	ND	21
Phenanthrene		ND	ND	ND	ND	ND	ND	ND	ND	210
Pyrene		133	138	ND	ND	ND	ND	ND	ND	•

All results are ug/l
Shaded Area = Concentrations detected above NC groundwater standards
• Maximun detection limit is equal to laboratory detection limit
** Split Sample; 610 analysis for sample done by both on-site and off-site laboratories
ND Not Detected; see laboratory reports for applicable detection limits
-- Sample not analyzed for this parameter
NA Not Analyzed; MTBE is not included in on-site laboratory EPA 602 analysis

NOTES:
[1] Indicates existing well depth

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TABLE 5.3 (Page 2 of 3)
SUMMARY OF LABORATORY ANALYTICAL RESULTS
GROUND WATER SAMPLES (MONITORING WELLS)
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

PARAMETER	WELL #	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	N.C. GROUNDWATER STANDARDS
	SCREENED INTERVAL (FT.)	3.0'-13.0'	27.0'-32.0'	3.0'-13.0'	3.0'-13.0'	3.0'-13.0'	3.0'-13.0'	3.0'-13.0'	
	DATE SAMPLED	3/22/94	3/22/94	3/16/94	3/22/94	3/22/94	3/22/94	3/22/94	
EPA METHOD 6010									
Arsenic		--	--	--	--	--	--	--	50
Barium		--	--	--	--	--	--	--	2000
Cadmium		--	--	--	--	--	--	--	5
Chromium		--	--	--	--	--	--	--	50
Lead		--	--	--	--	--	--	--	15
EPA METHOD 602									
Benzene		ND	--	ND	--	--	--	--	1
Toluene		ND	--	ND	--	--	--	--	1000
Ethylbenzene		ND	--	ND	--	--	--	--	29
Xylenes (Total)		ND	--	1.6	--	--	--	--	530
Methyl tert-butyl ether (MTBE)		NA	--	NA	--	--	--	--	200
EPA METHOD 610									
Acenaphthene		ND	ND	18.3	ND	ND	ND	ND	*
Anthracene		3.1	ND	2.1	ND	ND	ND	520	*
Benzo (a) anthracene		ND	ND	ND	ND	ND	ND	ND	*
Benzofluoranthenes		ND	ND	ND	ND	ND	ND	ND	*
Chrysene		ND	ND	ND	ND	ND	ND	ND	*
Fluoranthene		ND	ND	ND	ND	ND	ND	ND	*
Fluorene		ND	ND	ND	ND	ND	ND	ND	280
1-Methylnaphthalene		1.4	ND	ND	ND	ND	ND	990	*
2-Methylnaphthalene		4.3	ND	ND	ND	ND	ND	2500	*
Naphthalene		ND	ND	32.6	ND	ND	ND	620	21
Phenanthrene		5.8	ND	8.9	ND	ND	ND	510	210
Pyrene		ND	ND	ND	ND	ND	ND	ND	*

All results are ug/l
Shaded Area = Concentrations detected above NC groundwater standards
* Maximun detection limit is equal to laboratory detection limit
** Split Sample; 610 analysis for sample done by both on-site and off-site laboratories
-- Not Detected; see laboratory reports for applicable detection limits
Sample not analyzed for this parameter
NA Not Analyzed; MTBE is not included in on-site laboratory EPA 602 analysis

NOTES:
[1] Indicates existing well depth

TABLE . (Page 3 of 3)
SUMMARY OF LABORATORY ANALYTICAL RESULTS
GROUND WATER SAMPLES (MONITORING WELLS)
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

PARAMETER	WELL #	MW-15	MW-16	MW-17	RINSE BLANK	TRIP BLANK			N.C. GROUNDWATER STANDARDS
	SCREENED INTERVAL (FT.)	25.0'-30.0'	3.0'-13.0'	3.0'-13.0'					
	DATE SAMPLED	3/22/94	3/22/94	3/22/94	3/22/94	3/22/94			
EPA METHOD 6010									
Arsenic		--	--	--	--	--			50
Barium		--	--	--	--	--			2000
Cadmium		--	--	--	--	--			5
Chromium		--	--	--	--	--			50
Lead		--	--	--	--	--			15
EPA METHOD 602									
Benzene		--	--	--	ND	--			1
Toluene		--	--	--	ND	--			1000
Ethylbenzene		--	--	--	ND	--			29
Xylenes (Total)		--	--	--	ND	--			530
Methyl tert-butyl ether (MTBE)		--	--	--	NA	--			200
EPA METHOD 610									
Acenaphthene		ND	ND	ND	ND	ND			*
Anthracene		ND	ND	ND	ND	ND			*
Benzo (a) anthracene		ND	ND	ND	1.4	ND			*
Benzofluoranthenes		ND	ND	ND	2.0	ND			*
Chrysene		ND	ND	ND	1.0	ND			*
Fluoranthene		ND	ND	ND	0.7	ND			*
Fluorene		ND	ND	ND	ND	ND			280
1-Methylnaphthalene		ND	ND	ND	ND	ND			*
2-Methylnaphthalene		ND	ND	ND	ND	ND			*
Naphthalene		ND	ND	ND	ND	ND			21
Phenanthrene		ND	ND	ND	ND	ND			210
Pyrene		ND	ND	ND	0.9	ND			*

All results are ug/l
Shaded Area = Concentrations detected above NC groundwater standards
* Maximun detection limit is equal to laboratory detection limit
** Split Sample; 610 analysis for sample done by both on-site and off-site laboratories
ND Not Detected; see laboratory reports for applicable detection limits
-- Sample not analyzed for this parameter
NA Not Analyzed; MTBE is not included in on-site laboratory EPA 602 analysis

NOTES:
1 Indicates existing well depth

TABLE 5.4
SUMMARY OF VERTICAL HYDRAULIC GRADIENT DETERMINATIONS
SITE ASSESSMENT REPORT
BUILDING TC-341
MARINE CORPS AIR STATION
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-09183-01

	WELL PAIR			
	MW-10	MW-9	MW-14	MW-15
TOCE (ft.)	19.31	19.36	16.31	16.20
Approx. Mid-Screen Depth (ft.)	8.00	29.50	8.00	27.50
Approx. Mid-Screen Elevation (ft.)	11.31	-10.14	8.31	-11.30
SWLE (ft.)	12.46	12.04	10.79	10.51
ΔSWLE (ft.)	.42		.28	
ΔMid-Screen Elevation (ft.)	21.45		19.61	
Vertical Gradient	.02		.01	

NOTES:

TOCE Top of Casing Elevation
SWLE Static Water Level Elevation
Negative gradient indicates upward movement
Positive gradient indicates downward movement

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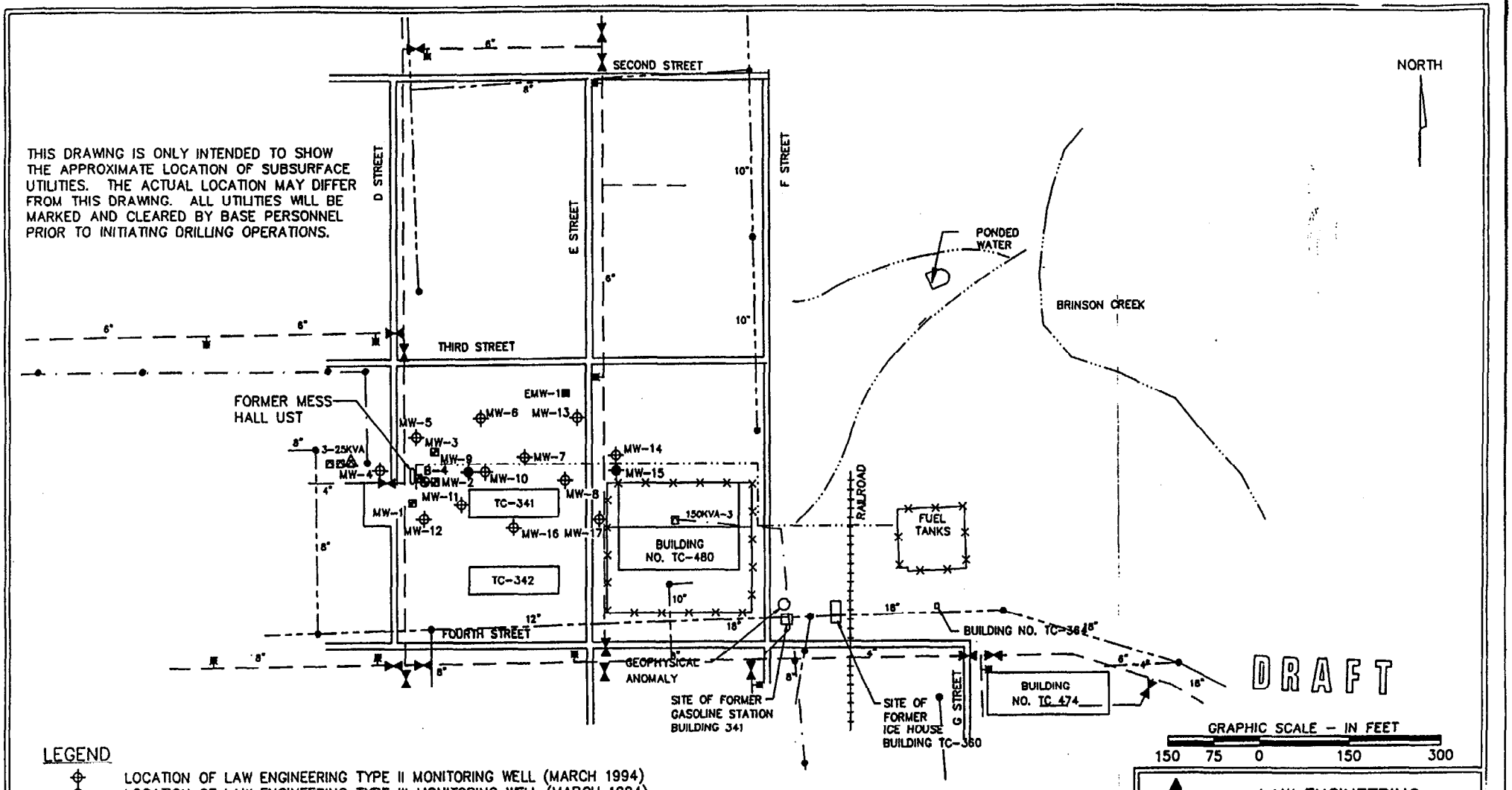
DRAWINGS



LEGEND

- LOCATION OF LAW ENGINEERING TYPE II MONITORING WELL (MARCH 1994)
- LOCATION OF LAW ENGINEERING TYPE III MONITORING WELL (MARCH 1994)
- ⊠MW-3 LOCATION OF ATEC WELL
- EMW-1■ LOCATION OF PRE-EXISTING MONITORING WELL
- 6-INCH UNDERGROUND FUEL LINE
- FENCE
- 6" POTABLE WATER MAIN WITH CORRESPONDING SIZE
- GATE VALVE
- FIRE HYDRANT
- 15" WASTEWATER LINES WITH CORRESPONDING LINE SIZE
- MANHOLE
- ELECTRICAL LINES
- TRANSFORMERS

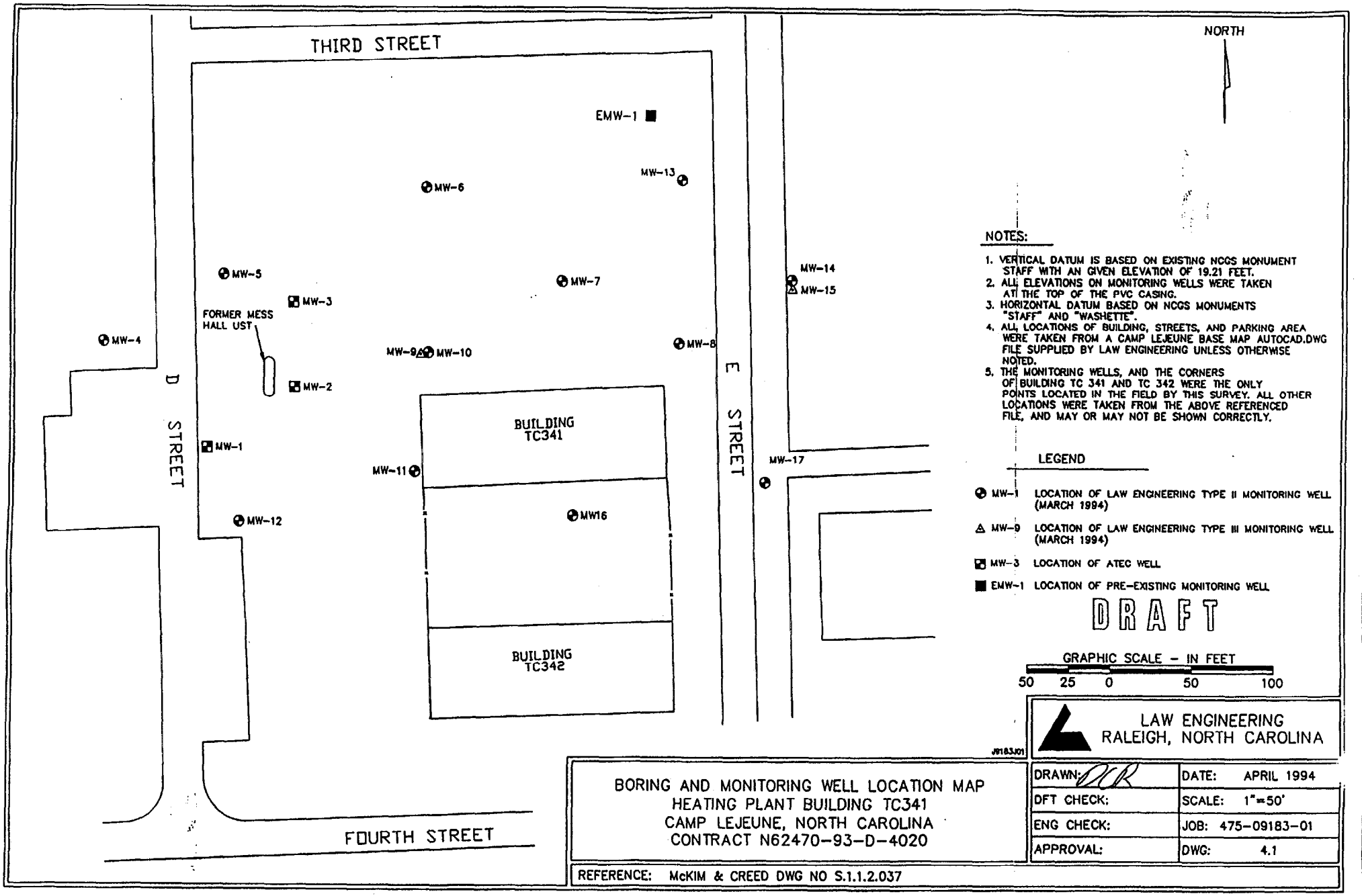
J9183-03

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

SITE UTILITIES MAP
HEATING PLANT BUILDING TC-341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: WBJ	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 3.2

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.



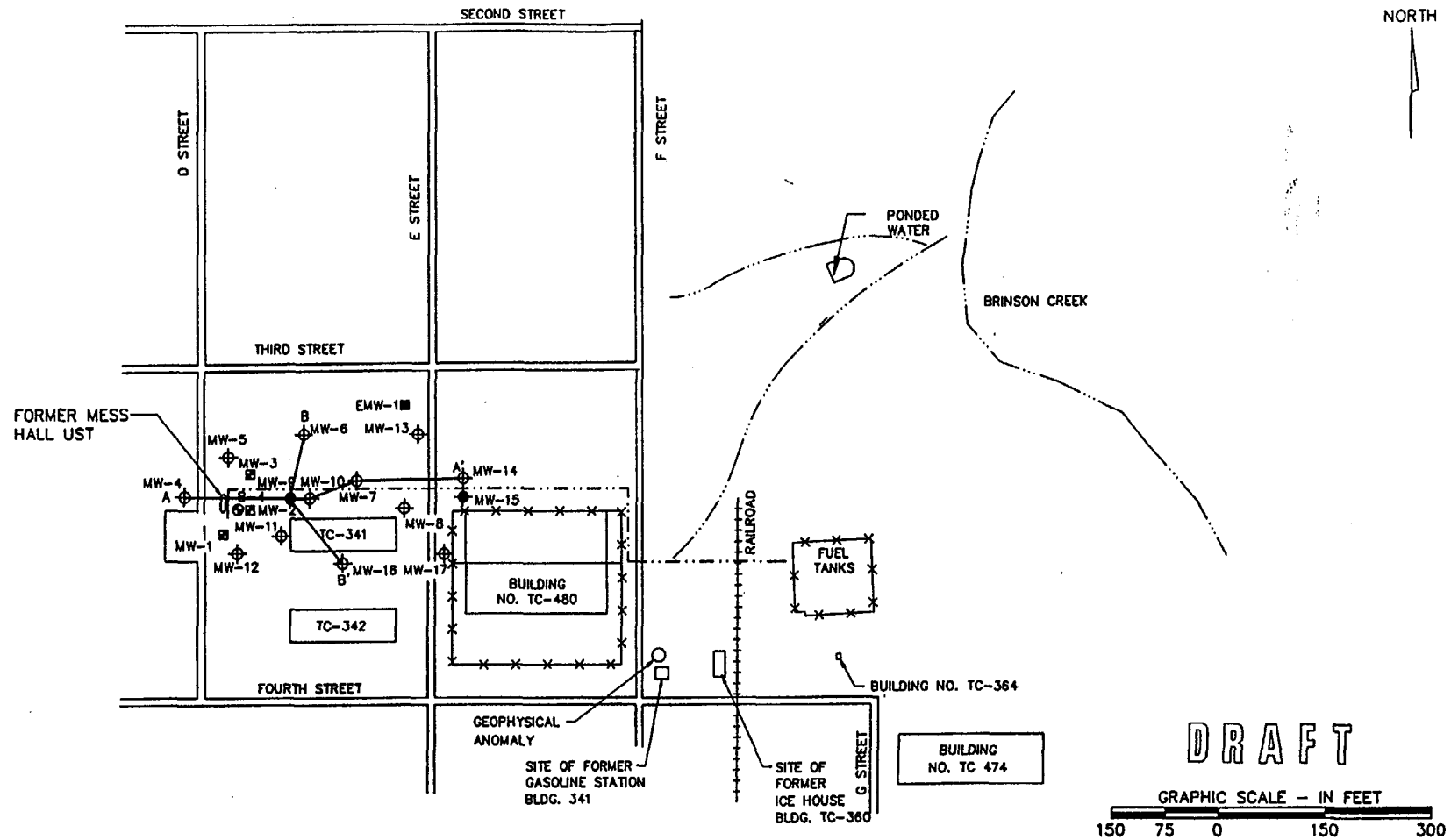
J9183J01

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

BORING AND MONITORING WELL LOCATION MAP
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 4.1

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037



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LEGEND

- LOCATION OF LAW ENGINEERING TYPE II MONITORING WELL (MARCH 1994)
- LOCATION OF LAW ENGINEERING TYPE III MONITORING WELL (MARCH 1994)
- MW-3 LOCATION OF ATEC WELL
- EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- 6-INCH UNDERGROUND FUEL LINE
- FENCE

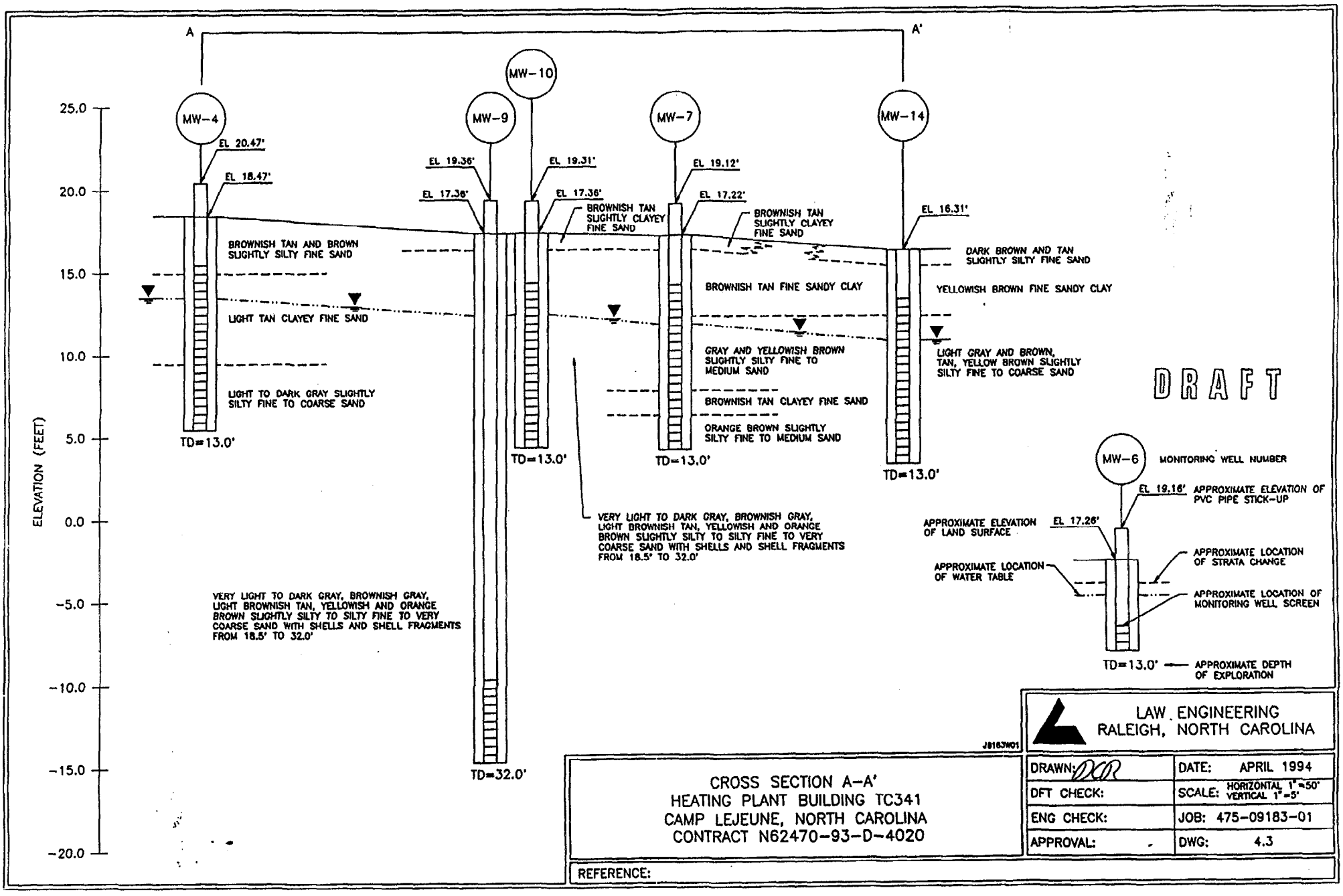
J9183J04

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

CROSS-SECTION PLAN VIEW
HEATING PLANT BUILDING TC-341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=150'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 4.2

REFERENCE: JAMES E. STEWART AND ASSOC.;SHT 1&2 OF 2;9/13/91:USGS JACKSONVILLE SOUTH,N.C.



J8163W01

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

CROSS SECTION A-A'
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: HORIZONTAL 1"=50' VERTICAL 1"=5'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 4.3

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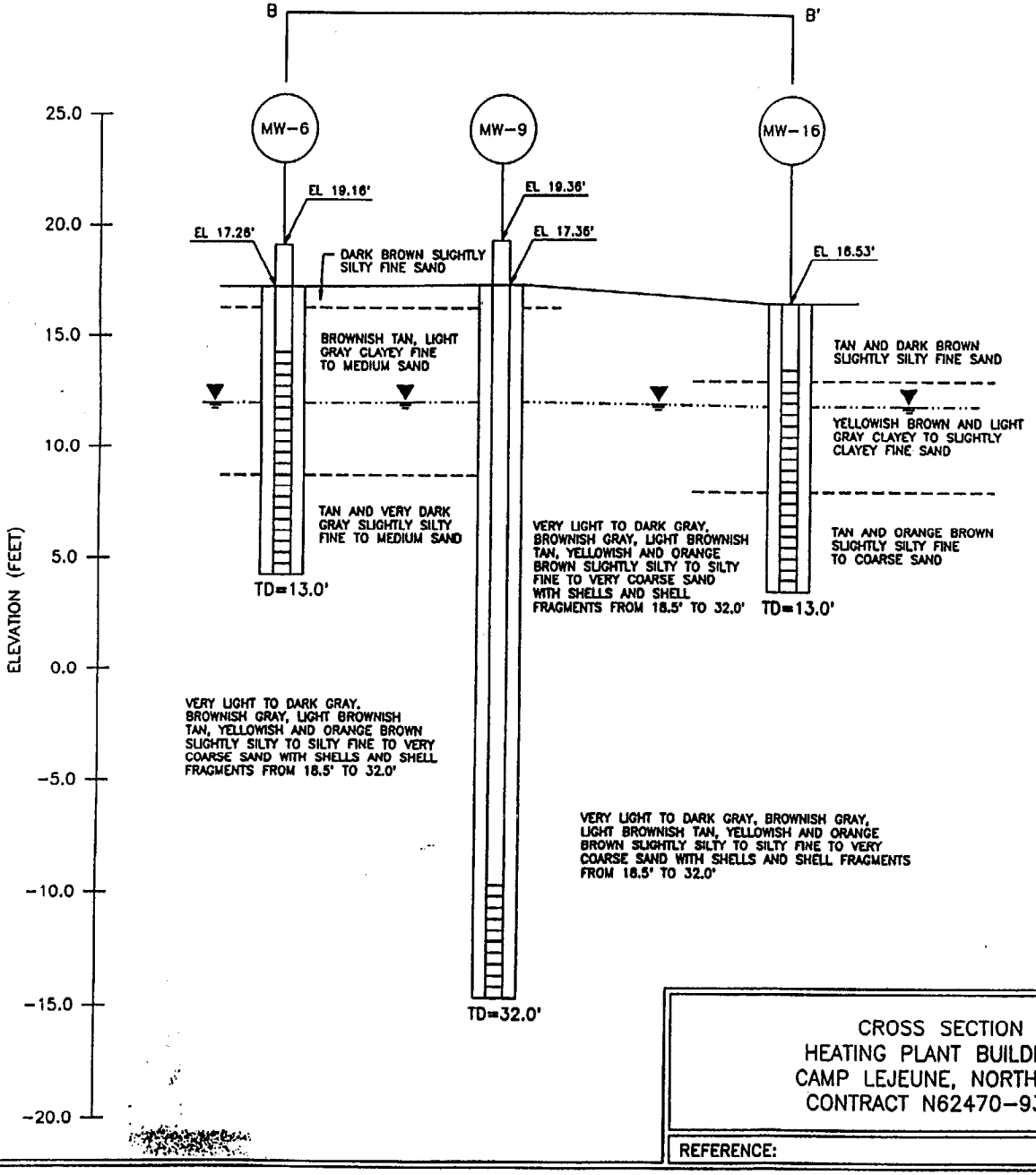
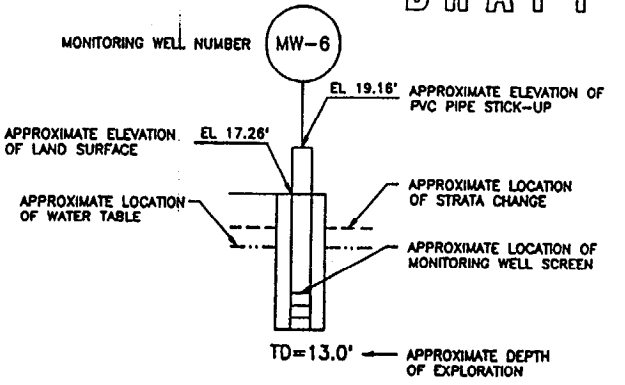


DRAFT



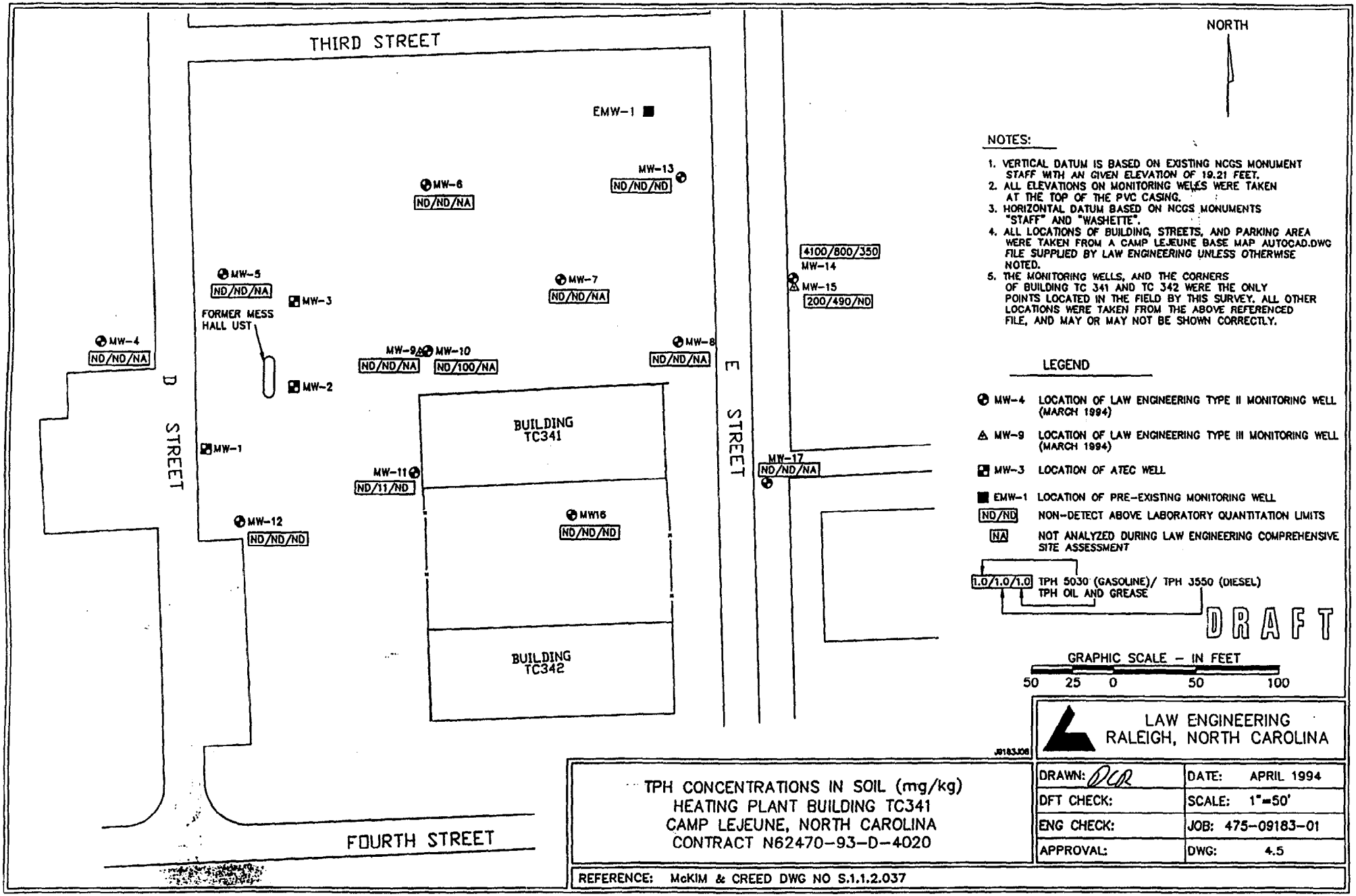
J9183W02

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

CROSS SECTION B-B'
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: HORIZONTAL 1"=50' VERTICAL 1"=5'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 4.4

REFERENCE:

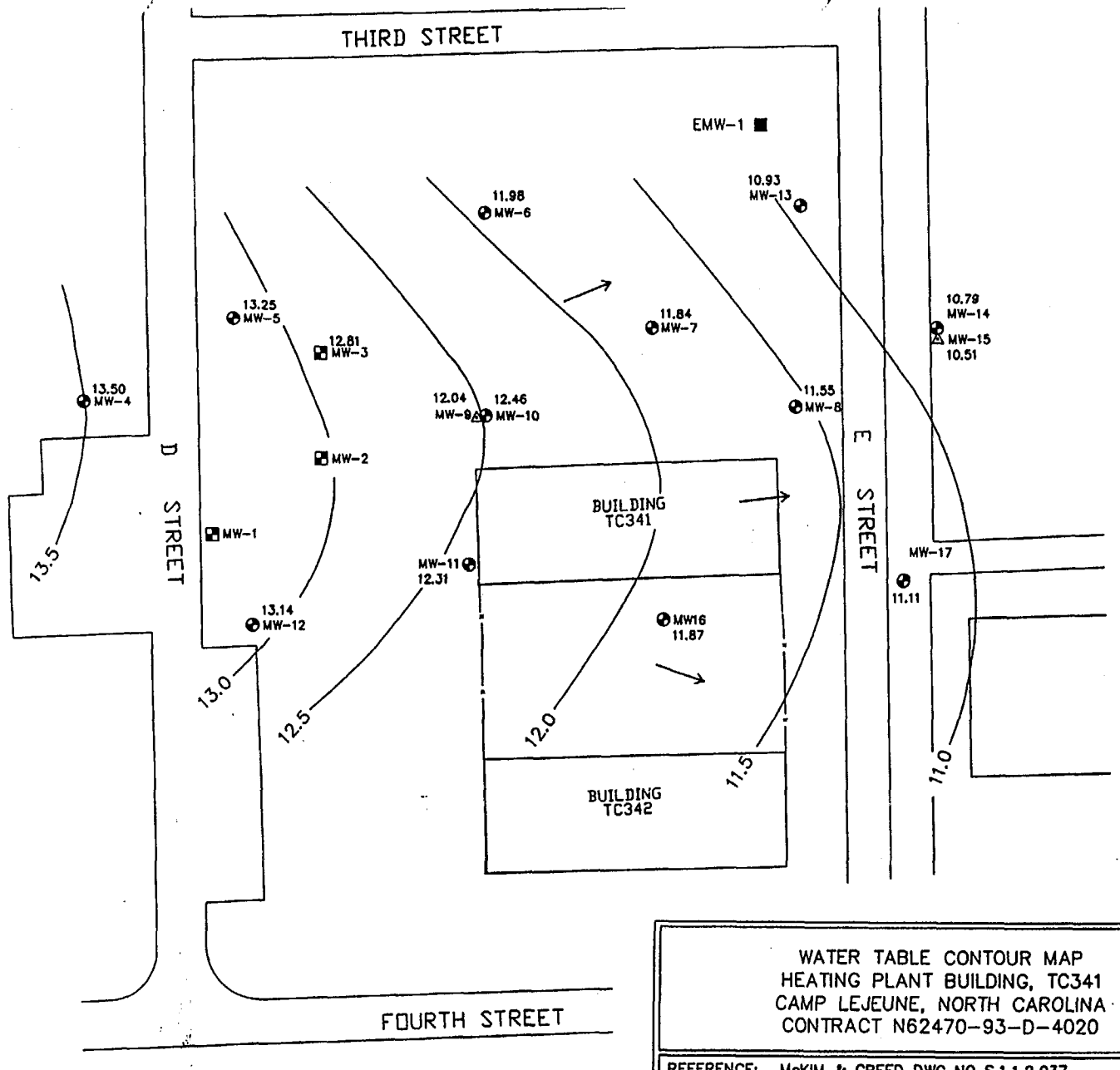


TPH CONCENTRATIONS IN SOIL (mg/kg)
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 4.5

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037



NOTES:

1. VERTICAL DATUM IS BASED ON EXISTING NCGS MONUMENT STAFF WITH AN GIVEN ELEVATION OF 19.21 FEET.
2. ALL ELEVATIONS ON MONITORING WELLS WERE TAKEN AT THE TOP OF THE PVC CASING.
3. HORIZONTAL DATUM BASED ON NCGS MONUMENTS "STAFF" AND "WASHETTE".
4. ALL LOCATIONS OF BUILDING, STREETS, AND PARKING AREA WERE TAKEN FROM A CAMP LEJEUNE BASE MAP AUTOCAD.DWG FILE SUPPLIED BY LAW ENGINEERING UNLESS OTHERWISE NOTED.
5. THE MONITORING WELLS, AND THE CORNERS OF BUILDING TC 341 AND TC 342 WERE THE ONLY POINTS LOCATED IN THE FIELD BY THIS SURVEY. ALL OTHER LOCATIONS WERE TAKEN FROM THE ABOVE REFERENCED FILE, AND MAY OR MAY NOT BE SHOWN CORRECTLY.

LEGEND

DRAFT

- MW-1 LOCATION OF LAW ENGINEERING TYPE II MONITORING WELL (MARCH 1994)
- MW-9 LOCATION OF LAW ENGINEERING TYPE III MONITORING WELL (MARCH 1994)
- MW-3 LOCATION OF ATEC WELL
- EMW-1 LOCATION OF PRE-EXISTING MONITORING WELL
- DIRECTION OF SHALLOW GROUNDWATER FLOW
- CHAIN LINK FENCE
- WATER TABLE ELEVATION CONTOUR (3-30-94)

NOTE: NUMBERS BESIDE WELLS ARE GROUND-WATER ELEVATIONS MEASURED ON 3/30/94. FREE PRODUCT WAS DETECTED IN WELLS MW-2 AND MW-1. THEREFORE WATER TABLE ELEVATIONS ARE NOT SHOWN FOR THESE WELLS.

GRAPHIC SCALE – IN FEET

50 25 0 50 100

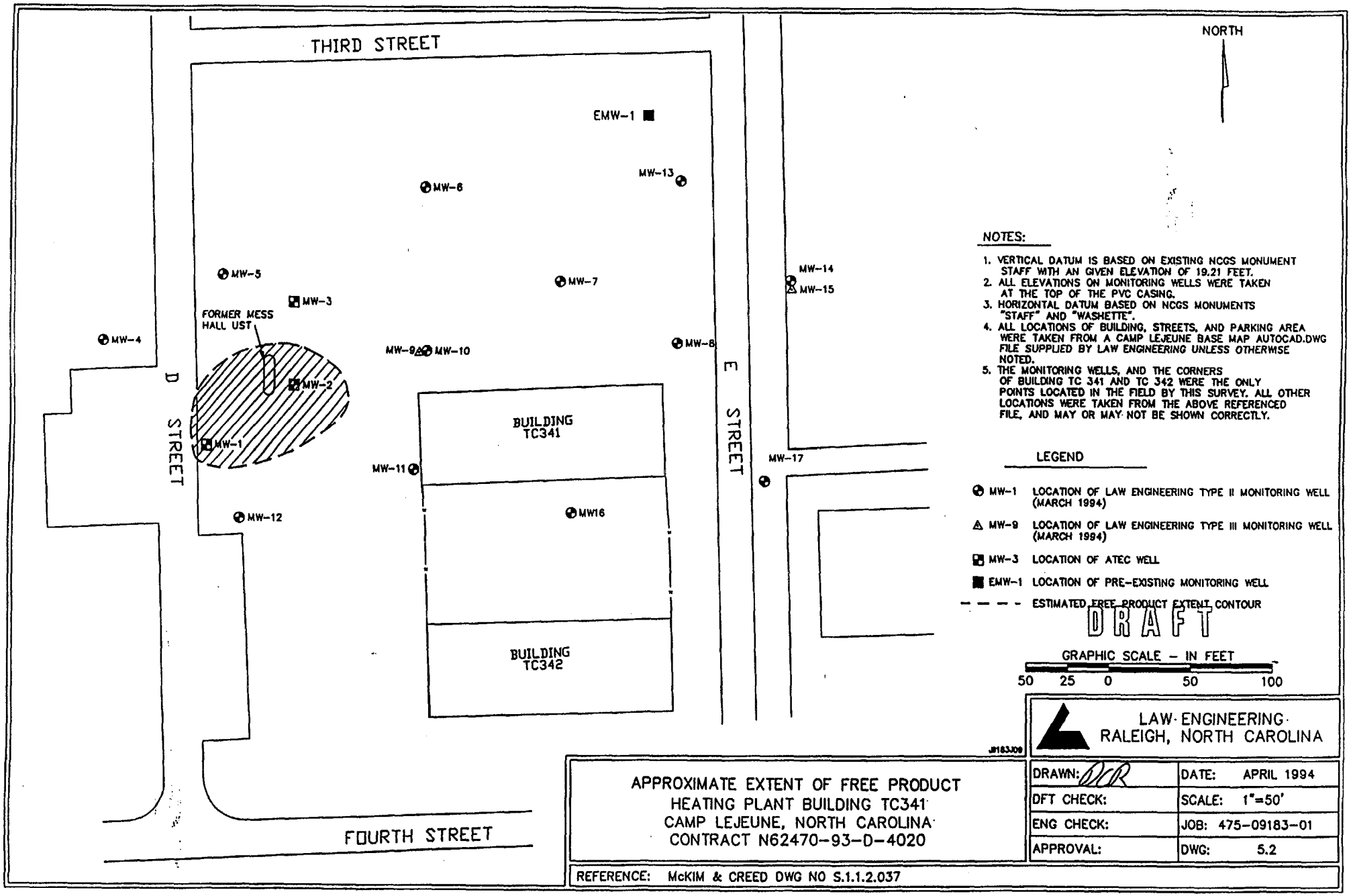
J0183J05

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

WATER TABLE CONTOUR MAP
HEATING PLANT BUILDING, TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 5.1

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037

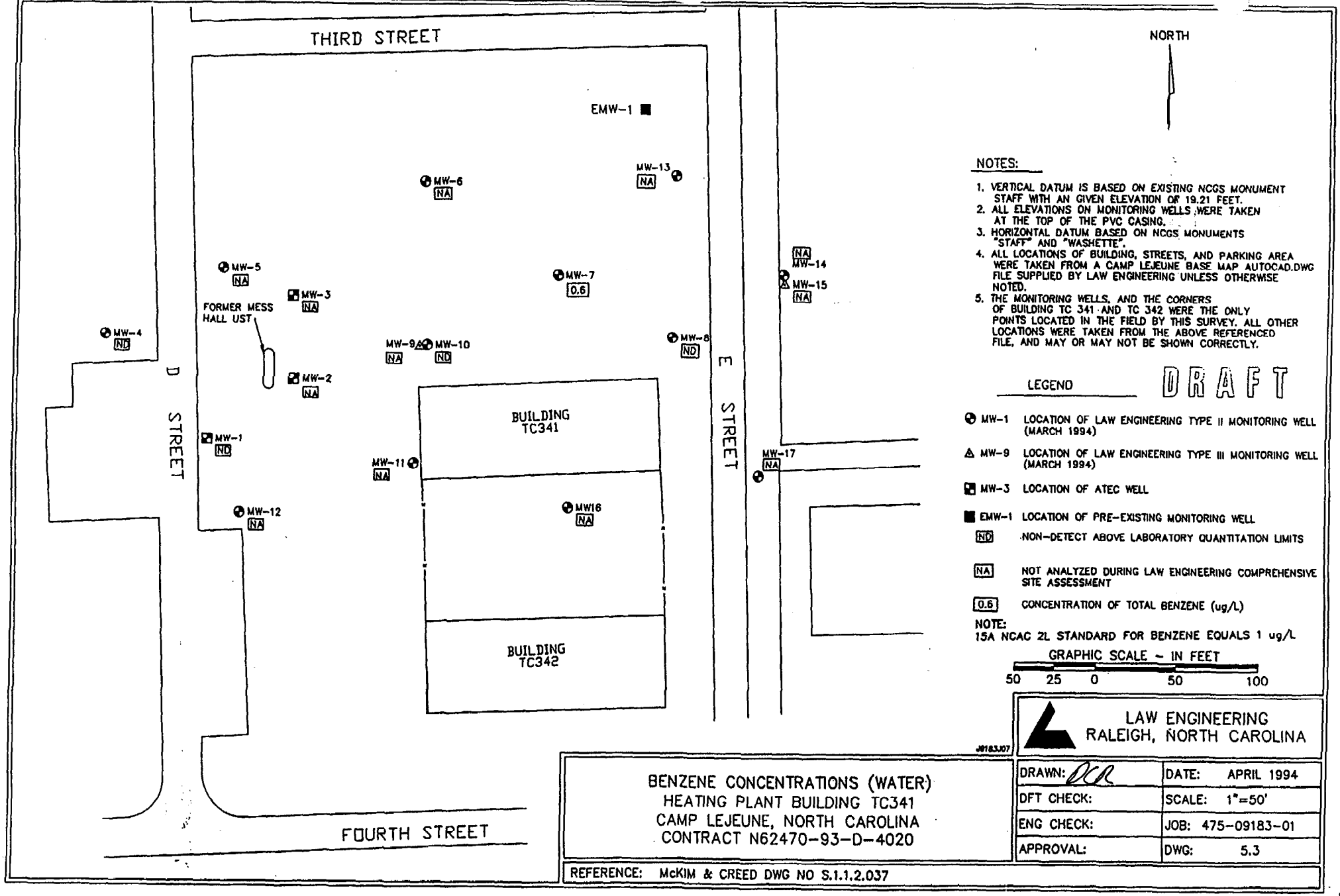


LAW ENGINEERING
RALEIGH, NORTH CAROLINA

APPROXIMATE EXTENT OF FREE PRODUCT
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 5.2

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037



NOTES:

1. VERTICAL DATUM IS BASED ON EXISTING NCGS MONUMENT STAFF WITH AN GIVEN ELEVATION OF 19.21 FEET.
2. ALL ELEVATIONS ON MONITORING WELLS WERE TAKEN AT THE TOP OF THE PVC CASING.
3. HORIZONTAL DATUM BASED ON NCGS MONUMENTS "STAFF" AND "WASHETTE".
4. ALL LOCATIONS OF BUILDING, STREETS, AND PARKING AREA WERE TAKEN FROM A CAMP LEJEUNE BASE MAP AUTOCAD.DWG FILE SUPPLIED BY LAW ENGINEERING UNLESS OTHERWISE NOTED.
5. THE MONITORING WELLS, AND THE CORNERS OF BUILDING TC 341 AND TC 342 WERE THE ONLY POINTS LOCATED IN THE FIELD BY THIS SURVEY. ALL OTHER LOCATIONS WERE TAKEN FROM THE ABOVE REFERENCED FILE, AND MAY OR MAY NOT BE SHOWN CORRECTLY.

DRAFT

LEGEND

- MW-1 — LOCATION OF LAW ENGINEERING TYPE II MONITORING WELL (MARCH 1994)
- MW-9 — LOCATION OF LAW ENGINEERING TYPE III MONITORING WELL (MARCH 1994)
- MW-3 — LOCATION OF ATEC WELL
- EMW-1 — LOCATION OF PRE-EXISTING MONITORING WELL
- ND — NON-DETECT ABOVE LABORATORY QUANTITATION LIMITS
- NA — NOT ANALYZED DURING LAW ENGINEERING COMPREHENSIVE SITE ASSESSMENT
- 0.6 — CONCENTRATION OF TOTAL BENZENE (ug/L)

NOTE:
15A NCAC 2L STANDARD FOR BENZENE EQUALS 1 ug/L

GRAPHIC SCALE - IN FEET
50 25 0 50 100

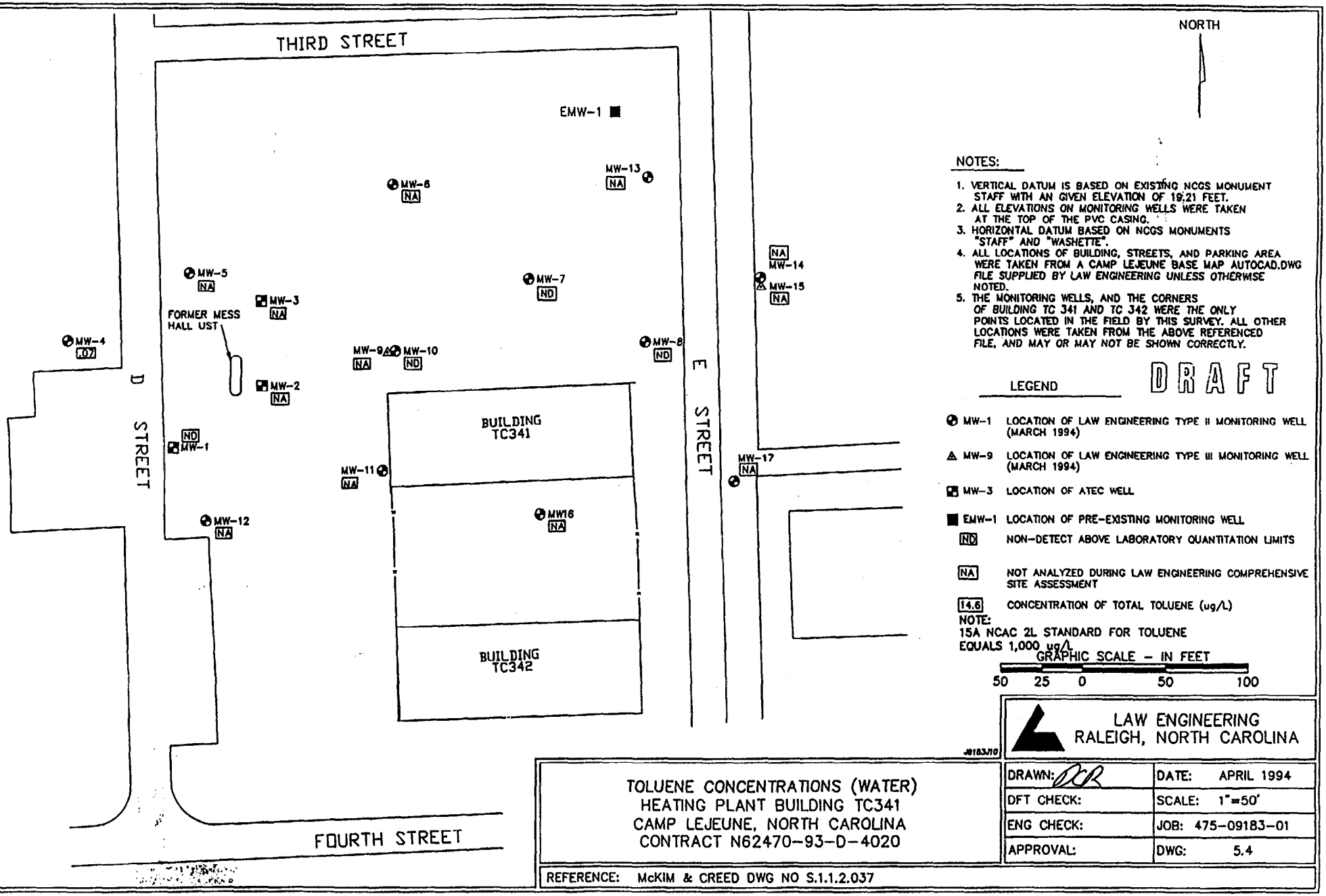
J0183J07

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

BENZENE CONCENTRATIONS (WATER)
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 5.3

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037

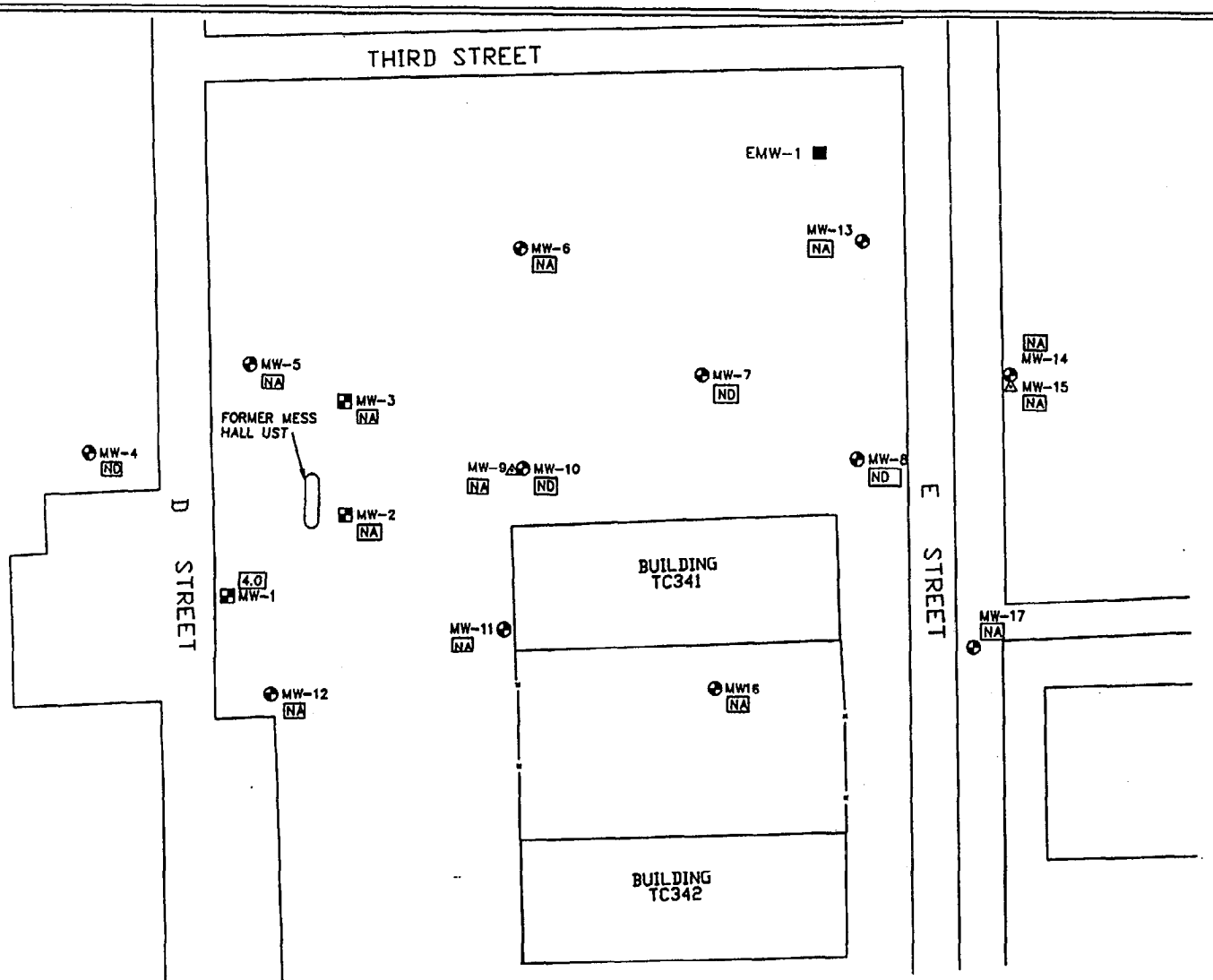


TOLUENE CONCENTRATIONS (WATER)
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 5.4

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037



NORTH

NOTES:

1. VERTICAL DATUM IS BASED ON EXISTING NCGS MONUMENT STAFF WITH AN GIVEN ELEVATION OF 19.21 FEET.
2. ALL ELEVATIONS ON MONITORING WELLS WERE TAKEN AT THE TOP OF THE PVC CASING.
3. HORIZONTAL DATUM BASED ON NCGS MONUMENTS "STAFF" AND "WASHETTE".
4. ALL LOCATIONS OF BUILDING, STREETS, AND PARKING AREA WERE TAKEN FROM A CAMP LEJEUNE BASE MAP AUTOCAD.DWG FILE SUPPLIED BY LAW ENGINEERING UNLESS OTHERWISE NOTED.
5. THE MONITORING WELLS, AND THE CORNERS OF BUILDING TC 341 AND TC 342 WERE THE ONLY POINTS LOCATED IN THE FIELD BY THIS SURVEY. ALL OTHER LOCATIONS WERE TAKEN FROM THE ABOVE REFERENCED FILE, AND MAY OR MAY NOT BE SHOWN CORRECTLY.

DRAFT

LEGEND

- MW-1 — LOCATION OF LAW ENGINEERING TYPE II MONITORING WELL (MARCH 1994)
- MW-9 — LOCATION OF LAW ENGINEERING TYPE III MONITORING WELL (MARCH 1994)
- MW-3 — LOCATION OF ATEC WELL
- EMW-1 — LOCATION OF PRE-EXISTING MONITORING WELL
- ND — NON-DETECT ABOVE LABORATORY QUANTITATION LIMITS
- NA — NOT ANALYZED DURING LAW ENGINEERING COMPREHENSIVE SITE ASSESSMENT
- 14.6 — CONCENTRATION OF TOTAL ETHYL BENZENE (ug/L)

NOTE:
15A NCAC 2L STANDARD FOR ETHYL BENZENE EQUALS 29 ug/L

GRAPHIC SCALE – IN FEET

50 25 0 50 100

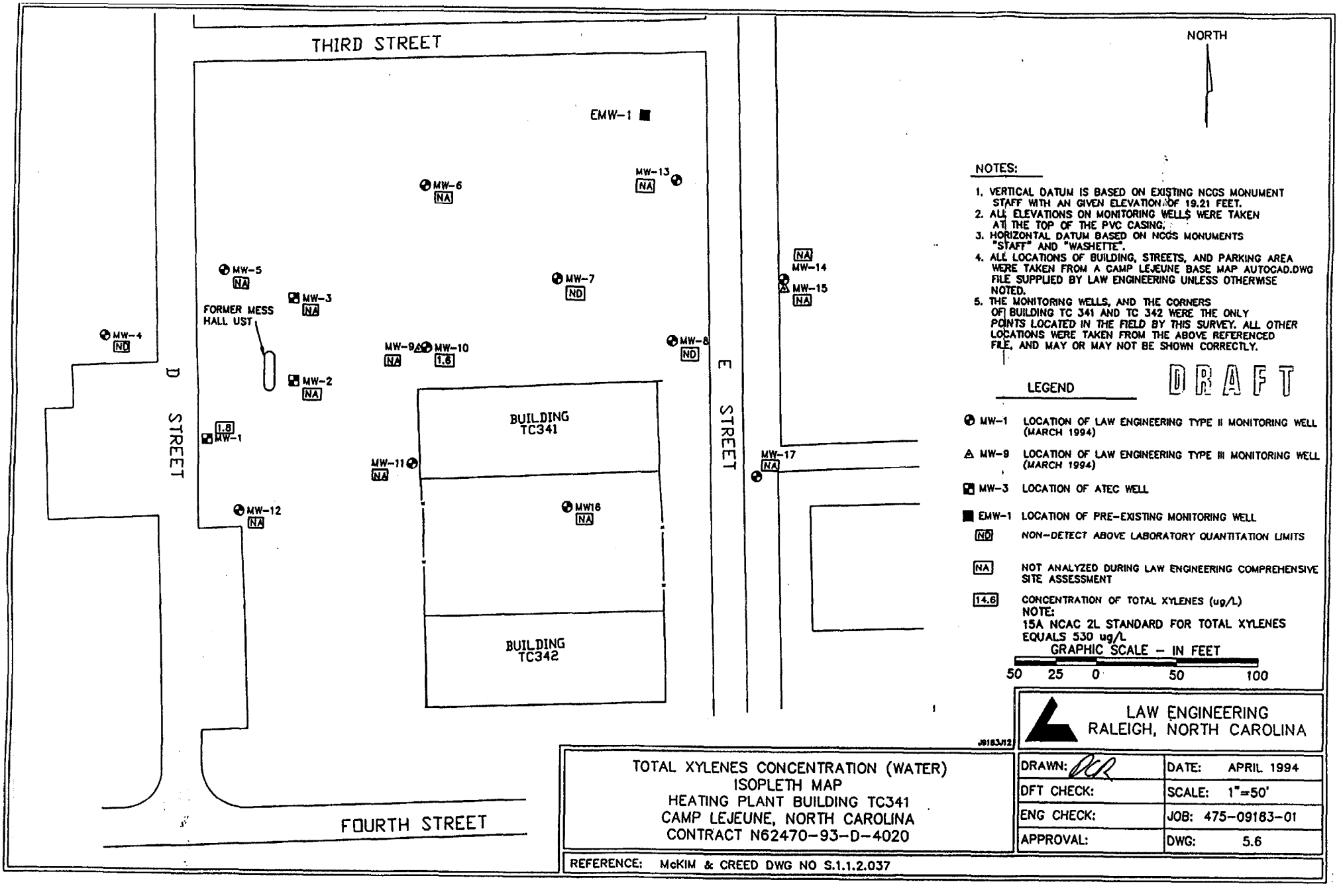
J9183J11

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

ETHYL BENZENE CONCENTRATION (WATER) ISOPLETH MAP
HEATING PLANT BUILDING, TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: DCR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 5.5

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037



NOTES:

1. VERTICAL DATUM IS BASED ON EXISTING NCGS MONUMENT STAFF WITH AN GIVEN ELEVATION OF 19.21 FEET.
2. ALL ELEVATIONS ON MONITORING WELLS WERE TAKEN AT THE TOP OF THE PVC CASING.
3. HORIZONTAL DATUM BASED ON NCGS MONUMENTS "STAFF" AND "WASHETTE".
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DRAFT

LEGEND

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- MW-9 — LOCATION OF LAW ENGINEERING TYPE III MONITORING WELL (MARCH 1994)
- MW-3 — LOCATION OF ATEC WELL
- EMW-1 — LOCATION OF PRE-EXISTING MONITORING WELL
- ND — NON-DETECT ABOVE LABORATORY QUANTITATION LIMITS
- NA — NOT ANALYZED DURING LAW ENGINEERING COMPREHENSIVE SITE ASSESSMENT
- 14.6 — CONCENTRATION OF TOTAL XYLENES (ug/L)

NOTE:
15A NCAC 2L STANDARD FOR TOTAL XYLENES EQUALS 530 ug/L

GRAPHIC SCALE – IN FEET

50 25 0 50 100

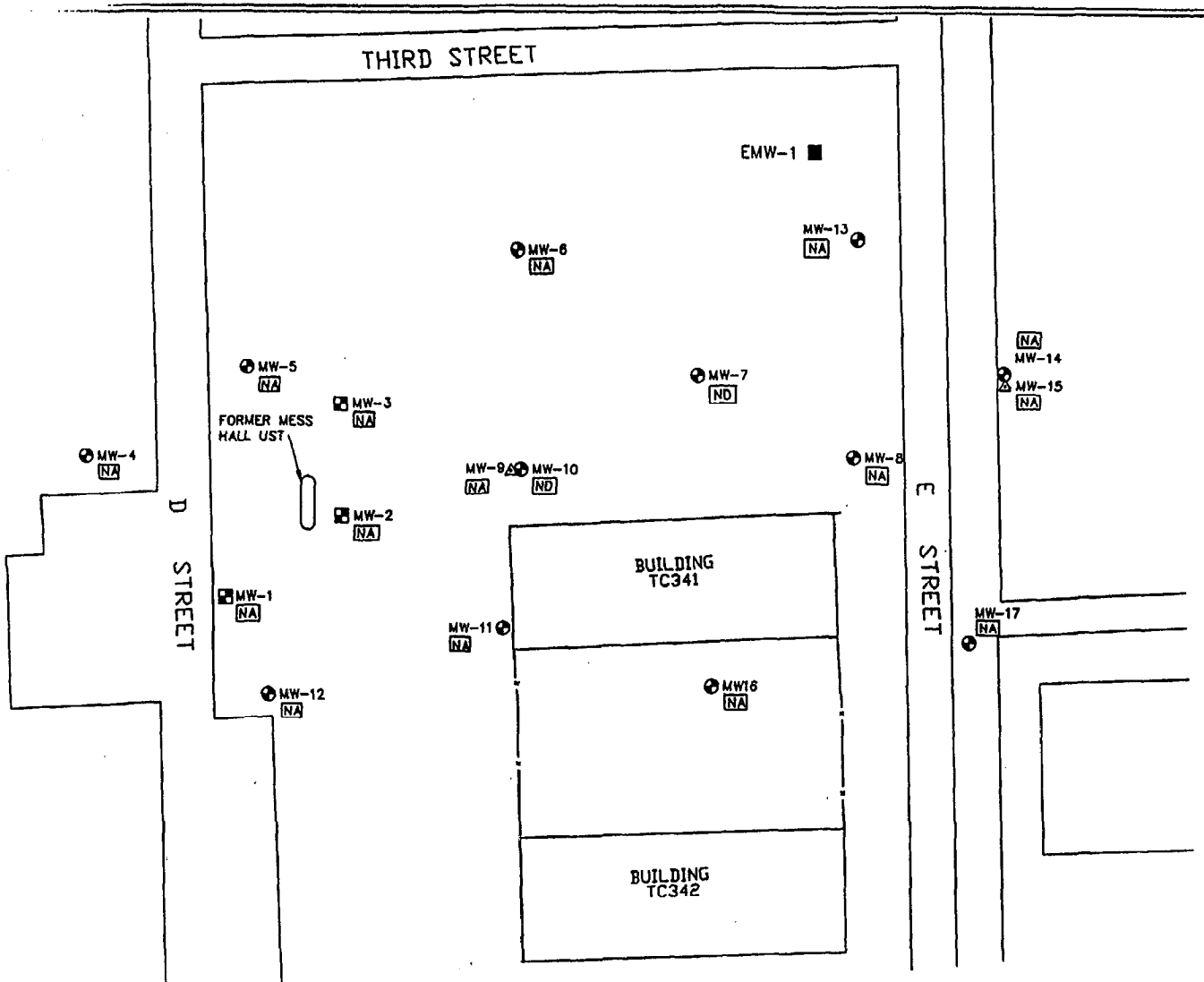
JB183J12

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

TOTAL XYLENES CONCENTRATION (WATER)
ISOPLETH MAP
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN:	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 5.6

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037



NOTES:

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DRAFT

LEGEND

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- MW-9 — LOCATION OF LAW ENGINEERING TYPE III MONITORING WELL (MARCH 1994)
- MW-3 — LOCATION OF ATEC WELL
- EMW-1 — LOCATION OF PRE-EXISTING MONITORING WELL
- ND — NON-DETECTED ABOVE LABORATORY QUANTITATION LIMITS
- NA — NOT ANALYZED DURING LAW ENGINEERING COMPREHENSIVE SITE ASSESSMENT
- 14.6 — CONCENTRATION OF TOTAL MBTE (ug/L)

NOTE:
15A NCAC 2L STANDARD FOR MTBE EQUALS 200 ug/L

GRAPHIC SCALE – IN FEET
50 25 0 50 100

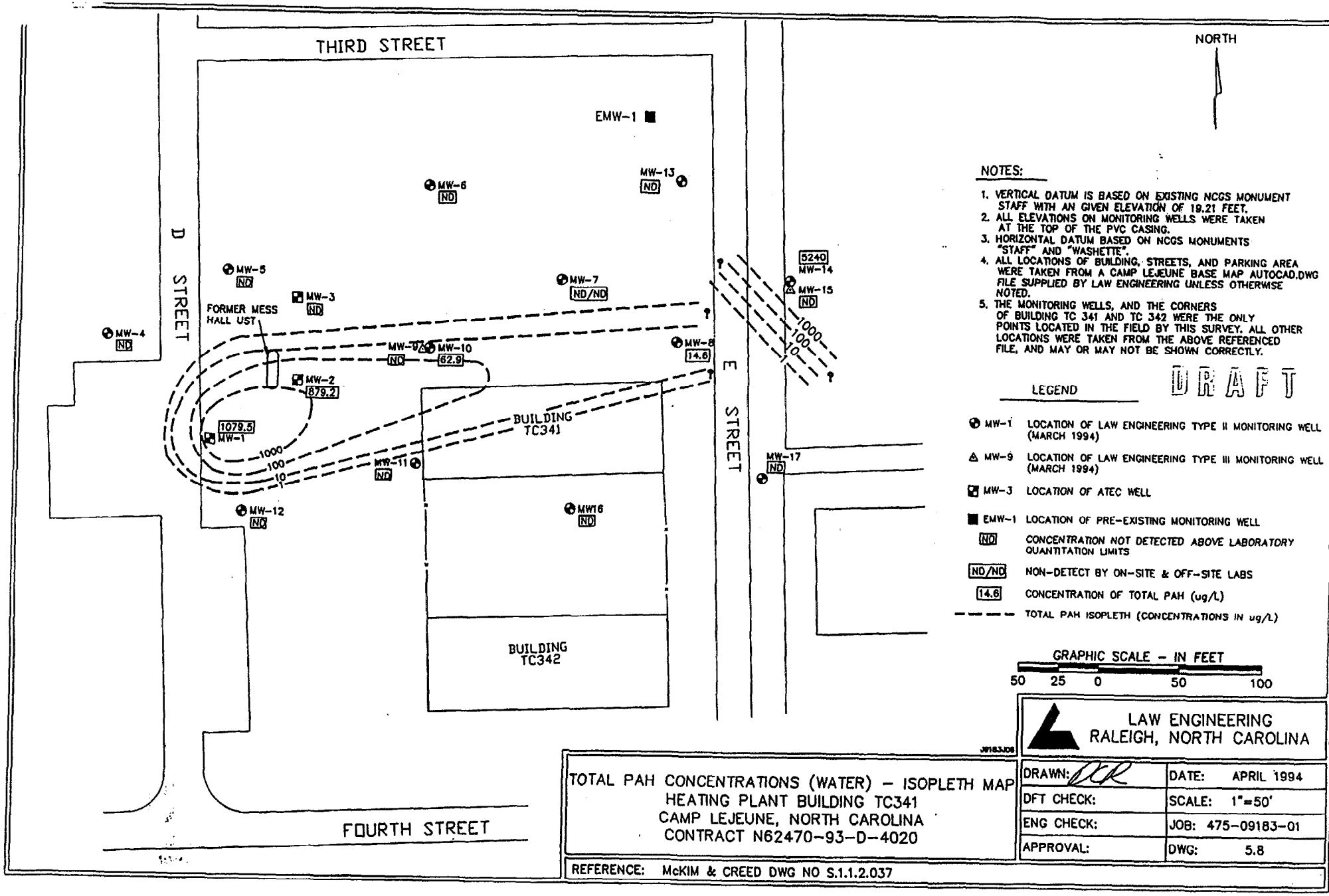
J9183-13

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

MTBE CONCENTRATIONS (WATER)
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: RCR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 5.7

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037



NOTES:

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2. ALL ELEVATIONS ON MONITORING WELLS WERE TAKEN AT THE TOP OF THE PVC CASING.
3. HORIZONTAL DATUM BASED ON NCGS MONUMENTS "STAFF" AND "WASHETTE".
4. ALL LOCATIONS OF BUILDING, STREETS, AND PARKING AREA WERE TAKEN FROM A CAMP LEJEUNE BASE MAP AUTOCAD.DWG FILE SUPPLIED BY LAW ENGINEERING UNLESS OTHERWISE NOTED.
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DRAFT

LEGEND

- MW-1 — LOCATION OF LAW ENGINEERING TYPE II MONITORING WELL (MARCH 1994)
- MW-9 — LOCATION OF LAW ENGINEERING TYPE III MONITORING WELL (MARCH 1994)
- MW-3 — LOCATION OF ATEC WELL
- EMW-1 — LOCATION OF PRE-EXISTING MONITORING WELL
- ND — CONCENTRATION NOT DETECTED ABOVE LABORATORY QUANTITATION LIMITS
- ND/ND — NON-DETECT BY ON-SITE & OFF-SITE LABS
- 14.6 — CONCENTRATION OF TOTAL PAH (ug/L)
- ---- TOTAL PAH ISOPLETH (CONCENTRATIONS IN ug/L)

GRAPHIC SCALE – IN FEET

50 25 0 50 100

J9183J06

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

TOTAL PAH CONCENTRATIONS (WATER) – ISOPLETH MAP
HEATING PLANT BUILDING TC341
CAMP LEJEUNE, NORTH CAROLINA
CONTRACT N62470-93-D-4020

DRAWN: JLR	DATE: APRIL 1994
DFT CHECK:	SCALE: 1"=50'
ENG CHECK:	JOB: 475-09183-01
APPROVAL:	DWG: 5.8

REFERENCE: McKIM & CREED DWG NO S.1.1.2.037

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

LEAKING UNDERGROUND STORAGE TANK SITE ASSESSMENT REPORT

VOLUME II
APPENDICES

Building TC-341
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

Prepared For:

Commander
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia 23511-6287

Prepared By:

Law Engineering, Inc.
3301 Atlantic Avenue
Raleigh, North Carolina 27604

April 13, 1994

Law Engineering Job No. 475-09183-01

DRAFT

APPENDIX B

SOIL TEST BORING RECORDS

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	● PENETRATION - BLOWS/FOOT	
0.0			0 10 20 30 40 60 80 100	
1.0	Topsoil (medium to dark brown slightly silty fine SAND). (SM)		●	11
	Brownish tan slightly silty fine SAND. (SM)			
3.5	Light tan with orange brown mottling clayey fine SAND to slightly clayey fine sand. (SC)		●	7
8.5				
8.8	Light tan clayey fine SAND. (SC)		●	8
9.2	Light gray slightly silty medium to coarse SAND. (SM)			
	Orange slightly silty medium to coarse SAND. (SM)			
13.5				
15.0	Medium to dark gray slightly silty fine SAND. (SM)		●	*WH

REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Records for details.
*Weight of hammer

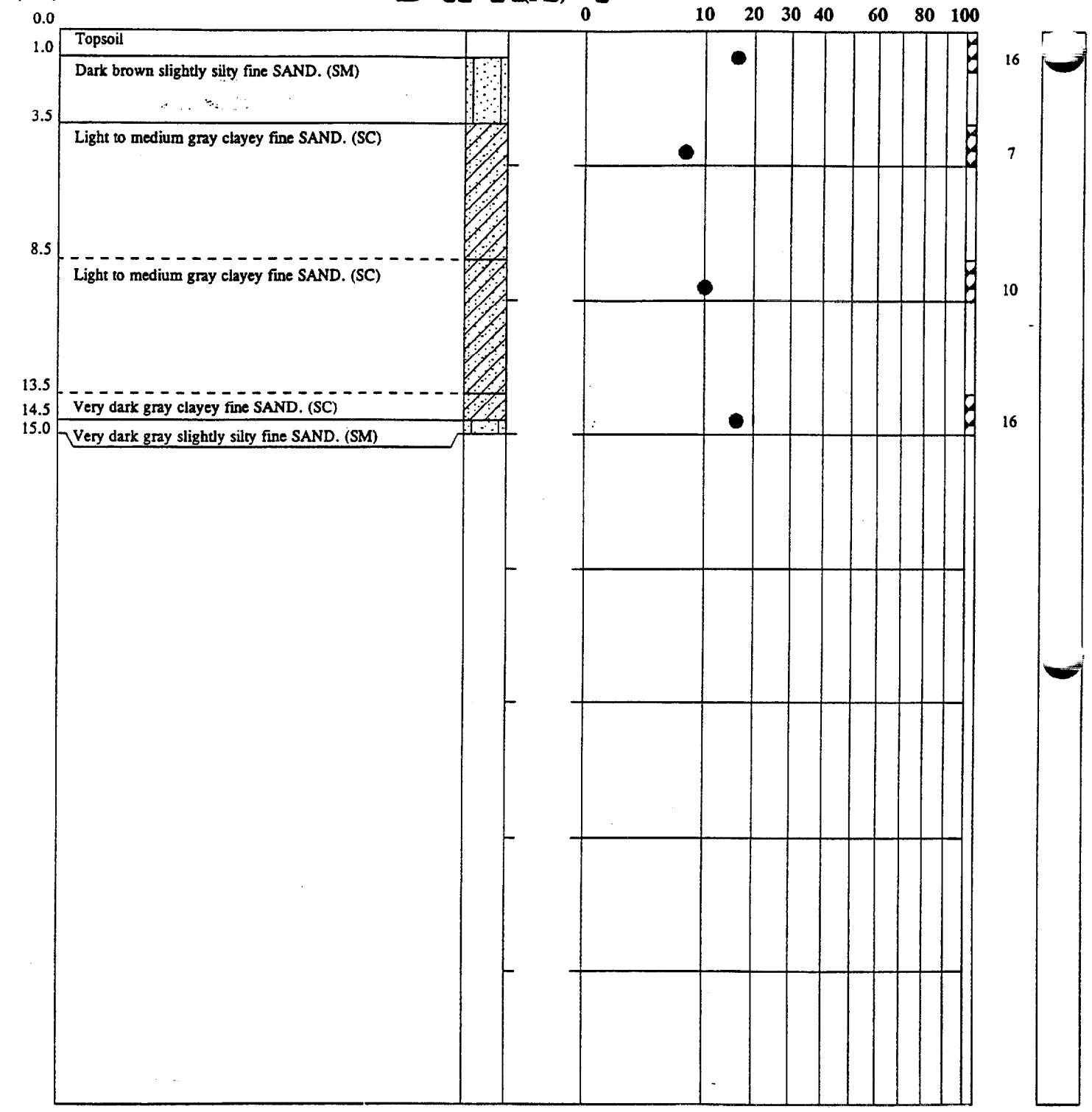
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-4
DATE DRILLED	March 1, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT



REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-5
DATE DRILLED	March 1, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	● PENETRATION - BLOWS/FOOT 0 10 20 30 40 60 80 100	
0.0				
1.0	Topsoil, dark brown slightly silty fine SAND. (SM)		●	5
	Brownish tan clayey fine SAND. (SC)			
3.5	Brownish tan to light gray clayey fine sand to silty clayey fine to medium SAND. (SC)		●	4
8.5	Tan slightly clayey, slightly silty fine to medium SAND. (SM)		●	16
13.5	Very dark gray slightly silty fine SAND. (SM)		●	3
15.0				

REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.

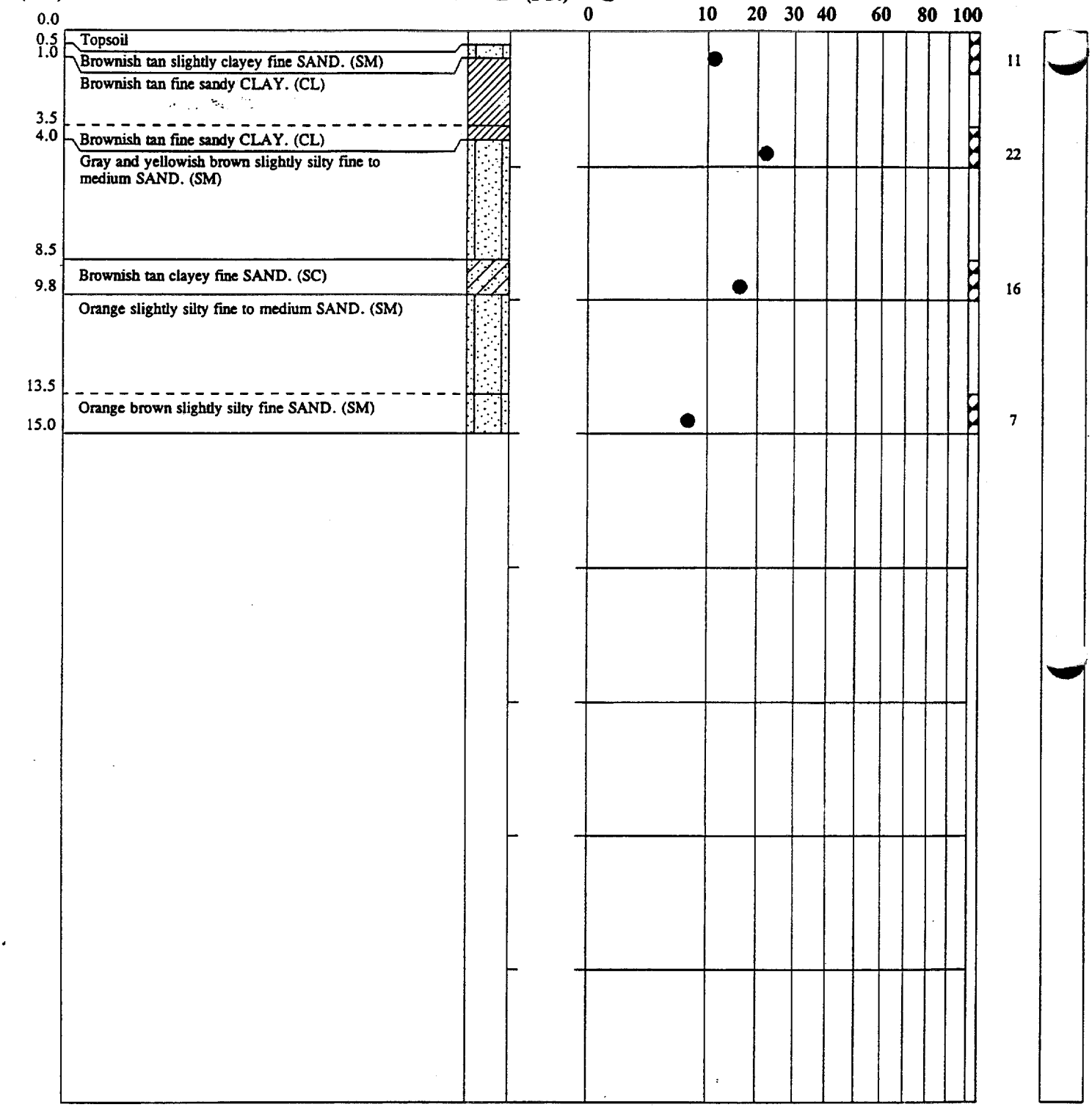
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-6
DATE DRILLED	March 1, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT



REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-7
DATE DRILLED	March 1, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)
0.0		
0.5	Topsoil Dark brown slightly silty fine SAND. (SM)	
3.5		
4.0	Gray and orange slightly fine sandy CLAY. (CL) Light gray slightly silty fine SAND. (SM)	
8.5		
9.3	Grayish brown slightly silty fine sandy CLAY. (CL) Dark gray to tan to black slightly silty fine SAND. (SM)	
13.5		
14.0	Grayish brown slightly silty fine to coarse SAND. (SM)	
15.0	Grayish brown slightly silty fine to very coarse SAND. (SM)	

● PENETRATION - BLOWS/FOOT

0 10 20 30 40 60 80 100

13 15 6 10

REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.

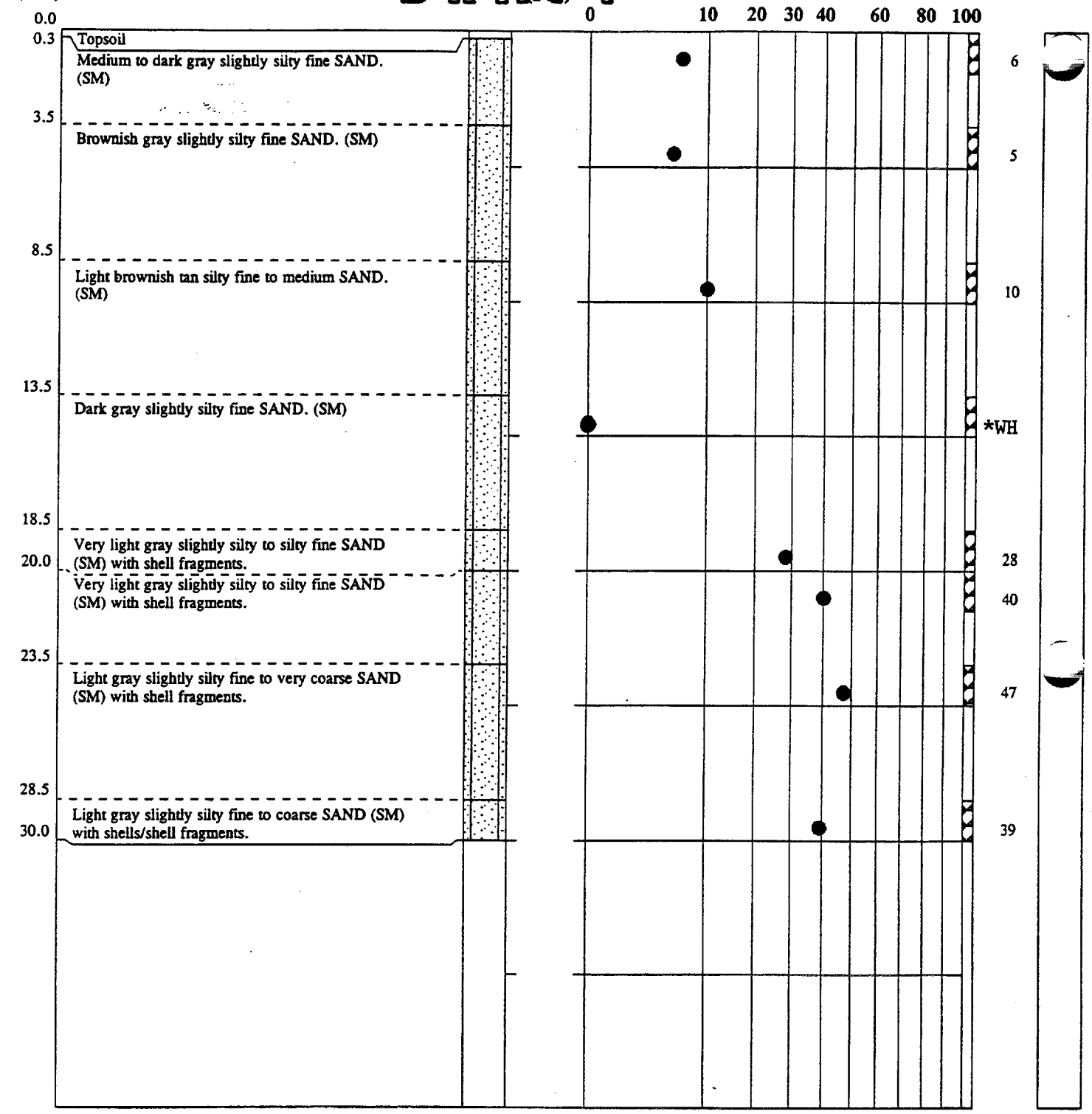
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-8
DATE DRILLED	March 1, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT



REMARKS:

Boring terminated at 30.0 feet. Type III monitoring well installed upon boring completion. See Well Construction Record for details.
*Weight of hammer

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-9
DATE DRILLED	March 3, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	● PENETRATION - BLOWS/FOOT 0 10 20 30 40 60 80 100	
0.0	Tan and brown silty to slightly silty fine SAND. (SM)		●	9
3.5	Yellowish brown to tan silty to slightly silty fine SAND. (SM)		●	12
8.5	Orange brown silty fine to coarse SAND (SM) trace of pebbles.		●	7
13.5	Dark gray slightly silty fine SAND. (SM)		●	*WH
15.0				

REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.
*Weight of hammer

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-10
DATE DRILLED	March 3, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	● PENETRATION - BLOWS/FOOT 0 10 20 30 40 60 80 100
0.0			
0.5	Topsoil Tan and dark brown silty to slightly silty fine SAND. (SM)		7
3.5	Medium gray, yellowish brown and dark brown clayey fine SAND. (SC)		11
8.5			
9.2	Tan and dark brown slightly clayey fine SAND. (SC) Orange brown and tan slightly silty to silty fine to very coarse SAND. (SM)		7
13.5			
14.3	Orange brown and tan slightly silty medium to very coarse SAND. (SM)		6
15.0	Very dark grayish brown slightly silty fine SAND. (SM)		

REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

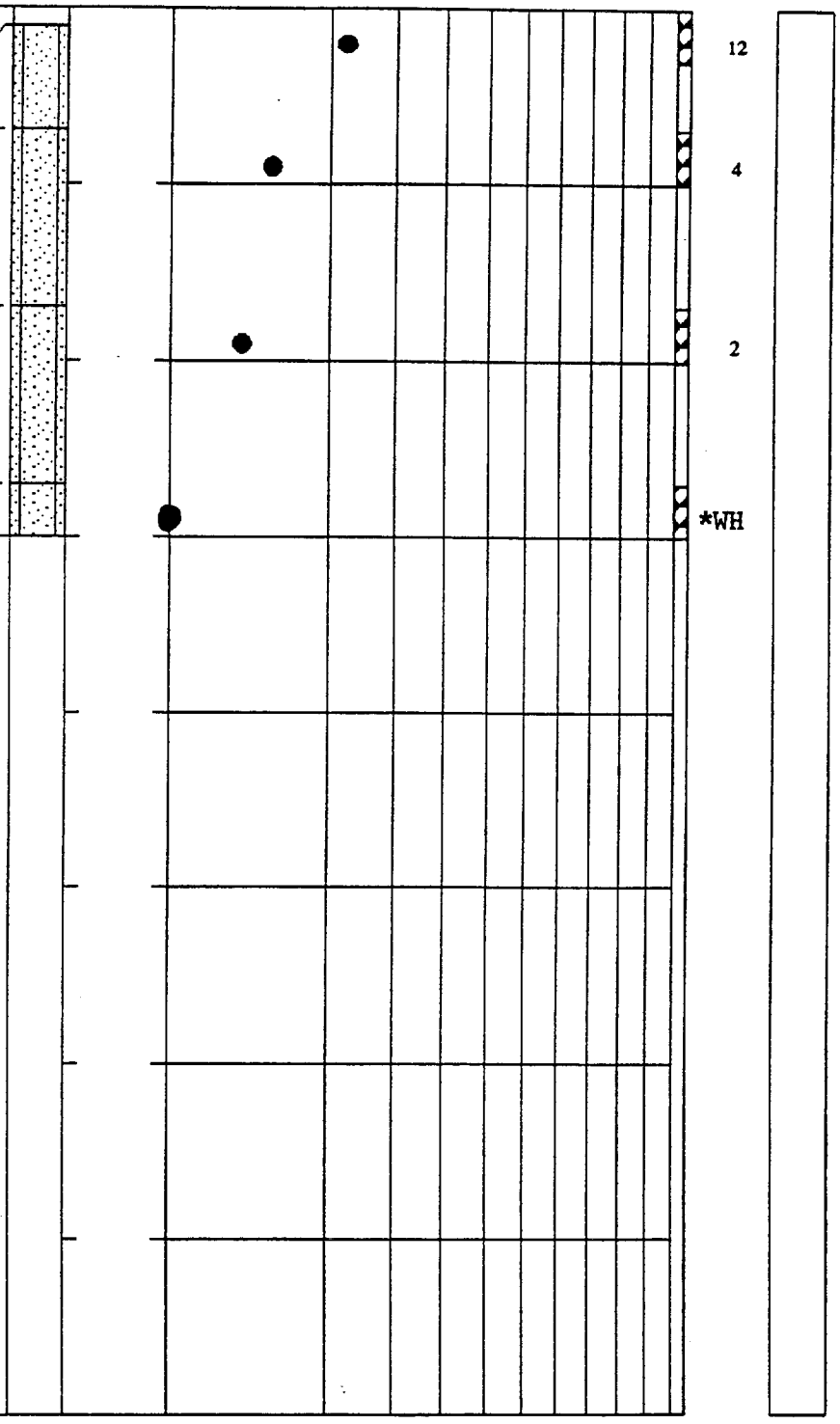
TEST BORING RECORD

BORING NUMBER	MW-11
DATE DRILLED	March 4, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION FT.	● PENETRATION - BLOWS/FOOT	
0.0			0 10 20 30 40 60 80 100	
0.5	Topsoil Black and dark tan slightly silty fine SAND. (SM)		●	12
3.5	Medium to dark gray slightly silty fine SAND. (SM)		●	4
8.5	Tan to yellowish brown slightly silty to silty fine to coarse SAND. (SM)		●	2
13.5	Dark gray slightly silty fine SAND. (SM)		●	*WH
15.0				



REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.
*Weight of hammer

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-12
DATE DRILLED	March 7, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	● PENETRATION - BLOWS/FOOT (0 10 20 30 40 60 80 100)
0.0			
0.5	Yellowish brown slightly clayey fine SAND. (SC)		
	Yellowish brown fine sandy CLAY. (CL)		● 7
3.5	Brownish tan slightly silty fine to medium SAND. (SM)		● 7
8.5			
9.0	Brownish tan slightly silty fine to coarse SAND. (SM)		● 10
9.5	Brownish orange fine sandy CLAY. (SC)		
	Dark gray slightly silty fine SAND. (SM)		
13.5			
15.0	Light gray to dark gray slightly silty fine SAND. (SM)		● 2

REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-13
DATE DRILLED	March 7, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)
0.0		
0.5	Topsoil	
1.0	Dark brown and tan slightly silty fine SAND. (SM)	
	Yellowish brown fine sandy CLAY. (CL)	
3.5		
4.0	Yellowish brown fine sandy CLAY. (CL)	
	Yellowish brown and tan slightly silty fine SAND. (SM)	
8.5		
	Light gray to light brown slightly silty fine to coarse SAND. (SM)	
13.5		
	Light brown slightly silty fine SAND. (SM)	
15.0		

● PENETRATION - BLOWS/FOOT

0 10 20 30 40 60 80 100

8
13
9
5

REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-14
DATE DRILLED	March 8, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	● PENETRATION - BLOWS/FOOT (0 10 20 30 40 60 80 100)
0.0			
0.5	Topsoil Orange brown clayey fine SAND. (SC)		8
3.5			
4.0	Yellowish brown fine sandy CLAY. (CL) Yellowish brown and tan slightly silty fine SAND. (SM)		14
8.5	Light gray slightly silty fine to coarse SAND. (SM)		9
13.5	Reddish brown slightly silty fine SAND. (SM)		2
18.5			
19.3	Dark gray slightly silty fine SAND. (SM) Light gray slightly silty fine SAND (SM) with shell fragments.		14
23.5	Light gray slightly silty fine to coarse SAND (SM) with shell fragments.		34
28.5			
30.0	Light gray slightly silty fine to coarse SAND (SM) with shell fragments.		49

REMARKS:

Boring terminated at 30.0 feet. Type III monitoring well installed upon boring completion. See Well Construction Record for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-15
DATE DRILLED	March 8, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT)
0.0		
0.4	Gravel Tan and dark brown slightly silty fine SAND. (SM)	
3.5		
4.0	Yellowish brown clayey fine SAND. (SC) Light gray and yellowish brown slightly clayey fine SAND. (SC)	
8.5	Tan slightly silty fine to coarse SAND. (SM)	
13.5		
15.0	Orange brown slightly silty fine SAND. (SM)	

● PENETRATION - BLOWS/FOOT

0 10 20 30 40 60 80 100

7 9 11 4

REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

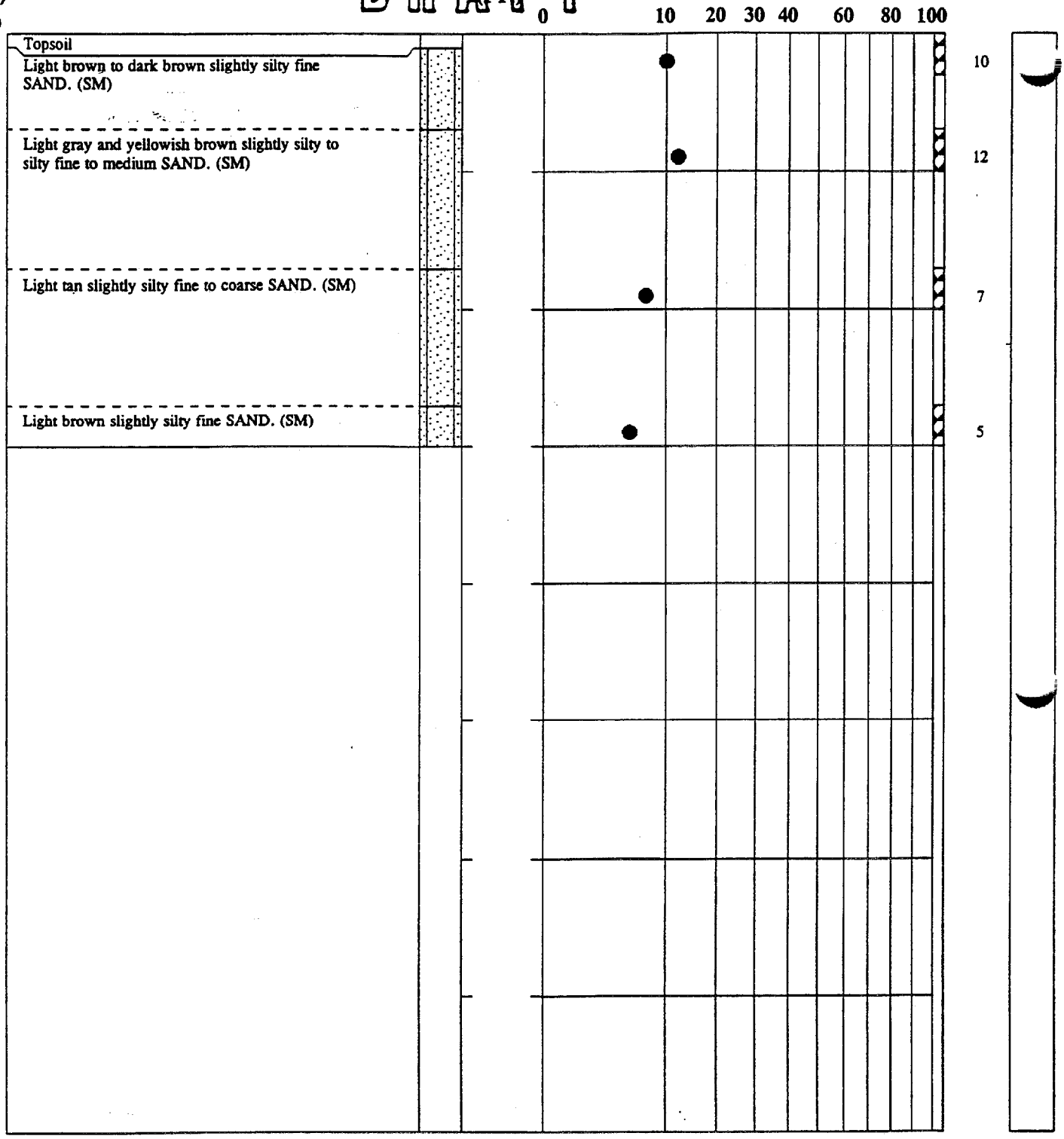
TEST BORING RECORD

BORING NUMBER	MW-16
DATE DRILLED	March 8, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

DRAFT

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)
0.0		
0.5	Topsoil Light brown to dark brown slightly silty fine SAND. (SM)	
3.5	Light gray and yellowish brown slightly silty to silty fine to medium SAND. (SM)	
8.5	Light tan slightly silty fine to coarse SAND. (SM)	
13.5	Light brown slightly silty fine SAND. (SM)	
15.0		



REMARKS:

Boring terminated at 15.0 feet. Type II monitoring well installed upon boring completion. See Well Construction Record for details.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-17
DATE DRILLED	March 8, 1994
PROJECT NUMBER	475-09183-01
PROJECT	TC-341
PAGE 1 OF 1	

LAW ENGINEERING

North Carolina - Department of Environment, Health and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

DRAFT

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QUAD. NO: _____ SERIAL NO: _____
Lat. _____ Long. _____ RO: _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent: _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-4

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-1-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [X] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.0 FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	0.0	To 3.0 Ft.	2"	SCH 40	PVC
From		To Ft.			
From		To Ft.			

13. GROUT:

	Depth		Material	Method
From	0.0	To 2.0 Ft.	Concrete	Cast-in-Place
From		To Ft.		

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From	3.0	To 13.0 Ft	2" in.	0.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From	2.0	To 14.0 Ft.	Torpedo	Sand
From		To Ft.		

16. REMARKS: _____

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	13.0	
		See attached

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 Report

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

Wayne L. Nielsen 4-11-94
SIGNATURE OF CONTRACTOR OR AGENT DATE

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

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Lat.	Long. RO:
Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent:

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-5

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-1-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [X] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 1.9 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To 3.0	Ft.	2"	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

13. GROUT:

	Depth		Material	Method
From 0.0	To 2.0	Ft.	Concrete	Cast-in-Place
From	To	Ft.		

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From 3.0	To 13.0	Ft	2 in.	0.010 in.	PVC
From	To	Ft.	in.	in.	
From	To	Ft.	in.	in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2.0	To 14.0	Ft.	Torpedo	PVC
From	To	Ft.		

16. REMARKS:

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

Wayne J. Strickland 4-11-94
SIGNATURE OF CONTRACTOR OR AGENT DATE

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	13.0	See attached

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 Report.

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
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Phone (919) 733-3221

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Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent:

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-6

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Geiger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-1-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 1.9 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To 3.0	Ft.	2"	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

13. GROUT:

	Depth		Material	Method
From 0.0	To 2.0	Ft.	Concrete	Cast-in-Place
From	To	Ft.		

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 3.0	To 13.0	Ft	2"	in.	0.010	in.	PVC
From	To	Ft.		in.		in.	
From	To	Ft.		in.		in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2.0	To 14.0	Ft.	Torpedo	Sand
From	To	Ft.		

16. REMARKS: _____

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	13.0	See attached

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 Report.

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

Wayne R. Hickman 4-11-94

SIGNATURE OF CERTIFIED WELL CONTRACTOR OR AGENT DATE

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

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Basin Code	
Header Ent.	GW-1 Ent:

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-7

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-1-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 1.9 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To 3.0	Ft.	2"	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

13. GROUT:

	Depth		Material	Method
From 0.0	To 2.0	Ft.	Concrete	Cast-in-Place
From	To	Ft.		

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 3.0	To 13.0	Ft	2"	in.	0.010	in.	PVC
From	To	Ft.		in.		in.	
From	To	Ft.		in.		in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2.0	To 14.0	Ft.	Torpedo	Sand
From	To	Ft.		

16. REMARKS:

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	13.0	See attached

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 Report.

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

SIGNATURE OF CONTRACTOR OR AGENT

4-11-94
DATE

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

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Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent:

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-8

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-1-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS flush FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	0.0	To 3.0 Ft.	2"	SCH 40	PVC
From		To Ft.			
From		To Ft.			

13. GROUT:

	Depth		Material	Method
From	0.0	To 2.0 Ft.	Concrete	Cast-in-Place
From		To Ft.		

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From	3.0	To 13.0 Ft	2" in.	0.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From	2.0	To 14.0 Ft.	Torpedo	Sand
From		To Ft.		

16. REMARKS:

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	13.0	See attached

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 Report

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

Thomas J. Feikema 4-11-94

SIGNATURE OF CONTRACTOR OR AGENT DATE

North Carolina - Department of Environment, Health and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

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Lat. ______ Long. ______ RO: ______
Minor Basin ______
Basin Code ______
Header Ent. ______ GW-1 Ent: ______

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-9

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-3-94 USE OF WELL Monitoring
4. TOTAL DEPTH 32.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: ______ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.0 FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To 22.0 Ft.	6"	SCH 40	PVC
From 0.0	To 27.0 Ft.	2"	SCH 40	PVC
From	To Ft.			

13. GROUT:

Depth		Material	Method
From 0.0	To 3.0 Ft.	Concrete	Cast-in-Place
From 0.0	To 22.0 Ft.	Portland Cement and Bentonite	Tremie

14. SCREEN:

Depth		Diameter	Slot Size	Material
From 27.0	To 32.0 Ft.	2" in.	0.010 in.	PVC
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

Depth		Size	Material
From 24.5	To 33.0 Ft.	Torpedo	Sand
From	To Ft.		

16. REMARKS: ______

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	32.0	See attached

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 Report

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

[signature] 4-1-94

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Phone (919) 733-3221

DRAFT

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QUAD. NO:		SERIAL NO:	
Lat.	Long.	RO:	
Minor Basin			
Basin Code			
Header Ent.		GW-1 Ent:	

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-10

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U. S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville, NC
   City or Town State Zip Code
3. DATE DRILLED 3-3-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: ______ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 1.95 FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

Depth From	To		Diameter	Wall Thickness or Weight/Ft.	Material
0.0	3.0	Ft.	2"	SCH 40	PVC
		Ft.			
		Ft.			

13. GROUT:

Depth From	To		Material	Method
0.0	2.0	Ft.	Concrete	Cast-in-Place
		Ft.		

14. SCREEN:

Depth From	To		Diameter		Slot Size		Material
3.0	13.0	Ft	2"	in.	0.010	in.	PVC
		Ft.		in.		in.	
		Ft.		in.		in.	

15. SAND/GRAVEL PACK:

Depth From	To		Size	Material
2.0	14.0	Ft.	Torpedo	Sand
		Ft.		

16. REMARKS:

DEPTH From	To	DRILLING LOG Formation Description
0.0	13.0	See attached

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 Report.

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[signature] 4-11-94

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Lat. _____ Long. _____ RO: _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent: _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-11

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TE-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-4-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 1.95 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To 3.0	Ft. 2"	SCH 40	PVC
From _____	To _____	Ft. _____	_____	_____
From _____	To _____	Ft. _____	_____	_____

13. GROUT:

	Depth		Material	Method
From 0.0	To 2.0	Ft.	Concrete	Cast-in-Place
From _____	To _____	Ft. _____	_____	_____

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From 3.0	To 13.0	Ft	2" in.	0.010 in.	PVC
From _____	To _____	Ft. _____	in. _____	in. _____	
From _____	To _____	Ft. _____	in. _____	in. _____	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2.0	To 14.0	Ft.	Torpedo	Sand
From _____	To _____	Ft. _____	_____	_____

16. REMARKS: _____

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	13.0	See attached

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 Report

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_____ 4-11-94

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Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent:

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-12

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-7-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.0 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	0.0	To 3.0 Ft.	2"	SCH 40	PVC
From		To Ft.			
From		To Ft.			

13. GROUT:

	Depth		Material	Method
From	0.0	To 2.0 Ft.	Concrete	Cast-in-Place
From		To Ft.		

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From	3.0	To 13.0 Ft	2" in.	0.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From	2.0	To 14.0 Ft.	Torpedo	Sand
From		To Ft.		

16. REMARKS:

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

_____ 4-01-94

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	13.0	See attached

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 Report.

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Lat. _____ Long. _____ RO: _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent.: _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-13

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-7-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.0 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	0.0	To 3.0 Ft.	2"	SCH 40	PVC
From		To Ft.			
From		To Ft.			

13. GROUT:

	Depth		Material	Method
From	0.0	To 2.0 Ft.	Concrete	Cast-in-Place
From		To Ft.		

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From	3.0	To 13.0 Ft	2" in.	0.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From	2.0	To 14.0 Ft.	Torpedo	Sand
From		To Ft.		

16. REMARKS: _____

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	13.0	See attached

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 Report.

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

Wayne F. Wilson 4-1-94

SIGNATURE OF CONTRACTOR OR AGENT DATE

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Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent:

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-14

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-8-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS flush FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth From	Depth To		Diameter	Wall Thickness or Weight/Ft.	Material
	0.0	3.0	Ft.	2"	SCH 40	PVC
			Ft.			
			Ft.			

13. GROUT:

	Depth From	Depth To		Material	Method
	0.0	2.0	Ft.	Concrete	Cast-in-Place
			Ft.		

14. SCREEN:

	Depth From	Depth To		Diameter		Slot Size		Material
	3.0	13.0	Ft	2"	in.	0.010	in.	PVC
			Ft.		in.		in.	
			Ft.		in.		in.	

15. SAND/GRAVEL PACK:

	Depth From	Depth To		Size	Material
	2.0	14.0	Ft.	Torpedo	Sand
			Ft.		

16. REMARKS:

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0	13.0	See attached.

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.

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

Wayne F. Pelkman 4-11-94

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Phone (919) 733-3221

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QUAD. NO:	SERIAL NO:
Lat.	Long. RO:
Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent:

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-15

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-8-94 USE OF WELL Monitoring
4. TOTAL DEPTH 30.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: ____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS flush FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
0.0	22.0 Ft.	6"	SCH 40	PVC
0.0	25.0 Ft.	2"	SCH 40	PVC
	Ft.			

13. GROUT: /Cement

Depth From	To	Material	Method
0.0	22.0 Ft.	Cement/Bentonite	Tremie
0.0	2.0 Ft.	Concrete	~~Cast-in-Place~~

14. SCREEN:

Depth From	To	Diameter	Slot Size	Material
25.0	30.0 Ft	2" in.	0.010 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

15. SAND/GRAVEL PACK:

Depth From	To	Size	Material
23.0	30.0 Ft.	Torpedo	Sand
	Ft.		

16. REMARKS:

DEPTH / DRILLING LOG

From	To	Formation Description
0.0	30.0	See attached.

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 Report.

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

[signature] 4-11-94

SIGNATURE OF CONTRACTOR OR AGENT DATE

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QUAD. NO:		SERIAL NO:	
Lat.	Long.	RO:	
Minor Basin			
Basin Code			
Header Ent.		GW-1 Ent:	

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-16

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-8-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: ______ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS flush FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To 3.0 Ft.	2"	SCH 40	PVC
From	To Ft.			
From	To Ft.			

13. GROUT:

Depth		Material	Method
From 0.0	To 2.0 Ft.	Concrete	Cast-in-Place
From	To Ft.		

14. SCREEN:

Depth		Diameter	Slot Size	Material
From 3.0	To 13.0 Ft	2" in.	0.010 in.	PVC
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

Depth		Size	Material
From 2.0	To 14.0 Ft.	Torpedo	Sand
From	To Ft.		

16. REMARKS:

DRILLING LOG

DEPTH From	To	Formation Description
0.0	13.0	See attached

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 Report.

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[signature] 4-11-94
DATE

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Phone (919) 733-3221

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Lat. _____ Long. _____ RO: _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent: _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: MW-17

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville County: Onslow
   TC-341 Camp Gieger
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Marine Corps
   ADDRESS Camp LeJeune
   (Street or Route No.)
   Jacksonville NC
   City or Town State Zip Code
3. DATE DRILLED 3-8-94 USE OF WELL Monitoring
4. TOTAL DEPTH 13.0
5. CUTTINGS COLLECTED YES [x] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS fl ush FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To 3.0	Ft.	2"	SCH 40	PVC
From	To	Ft.			
From	To	Ft.			

13. GROUT:

	Depth		Material	Method
From 0.0	To 2.0	Ft.	Concrete	Cast-in-Place
From	To	Ft.		

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From 3.0	To 13.0	Ft	2" in.	0.010 in.	PVC
From	To	Ft.	in.	in.	
From	To	Ft.	in.	in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 2.0	To 14.0	Ft.	Torpedo	Sand
From	To	Ft.		

16. REMARKS:

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DRILLING LOG

From	To	Formation Description
0.0	13.0	See attached

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 Report.

APPENDIX G
SHALLOW SOIL GAS AND GROUNDWATER INVESTIGATION (TRACER, 1994)

Tracer Research Corporation

Shallow Soil Gas and Groundwater Investigation

CAMP GEIGER AREA FUEL FARM
Jacksonville, North Carolina

April 13 thru 16, 1994

Shallow Soil Gas
and Groundwater Investigation

CAMP GEIGER AREA FUEL FARM
Jacksonville, North Carolina

April 13 thru 16, 1994

Prepared for:

BAKER ENVIRONMENTAL
Airport Office Park, Bldg. 3
420 Rouser Road
Coraopolis, Pennsylvania 15108

Telephone: (412) 269-2043
FAX: (412) 269-6097

Prepared by:

TRACER RESEARCH CORPORATION
3755 North Business Center Drive
Tucson, Arizona 85705-2944

Telephone: (602) 888-9400
FAX: (602) 293-1306

EASTERN REGIONAL OFFICE
One Deerpark Road, Suite G, Box 15
Monmouth Junction, New Jersey 08852

Telephone: (908) 274-1888
FAX: (908) 274-2922

Submitted by:

Marjorie D. Stivers

John R. Marsh

1240169S

TABLE OF CONTENTS

TABLES

1.0 CAMP GEIGER AREA FUEL FARM SITE INVESTIGATION

Tracer Research Corporation (Tracer Research) performed a shallow soil gas and groundwater investigation at the Camp Geiger Area Fuel Farm, Camp Geiger, Jacksonville, North Carolina. The investigation was conducted April 13 through 16, 1994 for Baker Environmental of Coraopolis, Pennsylvania.

1.1 Objective

The purpose of the investigation was to evaluate and delineate possible subsurface contamination by screening shallow soil gas and groundwater for the presence of volatile organic compounds (VOCs). Soil gas and groundwater samples were collected and analyzed for the following analyte classes and compounds:

Analyte Class: Hydrocarbon:
benzene

Analyte Class: Halocarbon:
trichloroethene (TCE)

1.2 Overview of Results

For this investigation, sixty-seven soil gas and seventy-two groundwater samples were collected from seventy-three sample locations. Soil gas samples were collected at 2 to 7 feet below ground surface (bgs). Groundwater samples were collected at 1 to 10 feet bgs. A summary of the results of the soil gas and groundwater investigation is presented in Table 1 and Table 2 on the following page.

Table 1. Soil Gas Sample Summary

Compound	# of samples in which compound was detected	Low conc. µg/L	High conc. µg/L	Sample(s) with high conc.
Benzene	11	0.01	2	35-SG61-4'
TCE	19	0.00009	0.8	35-SG13-5'

Table 2. Groundwater Sample Summary

Compound	# of samples in which compound was detected	Low conc. µg/L	High conc. µg/L	Sample(s) with high conc.
Benzene	13	0.06	16,000	35-SGW56-10'
TCE	32	0.0004	160	35-SGW69-6'

2.0 SITE DESCRIPTION

The investigation was conducted near various buildings and along Brinson Creek at the Camp Geiger Area Fuel Farm. Samples were collected through asphalt and grass cover.

The subsurface of the site was characterized by sand and silt. Groundwater was reported to be approximately 6 to 8 feet bgs. The direction of groundwater flow was not reported.

3.0 SOIL GAS SAMPLING PROCEDURES

Soil gas sampling probes consisted of 7-foot lengths of 3/4-inch diameter hollow steel pipe. The probes were fitted with detachable drive tips and hydraulically pushed and/or pounded to a depth of 2 to 7 feet bgs. An electric rotary hammer was used to drill through the asphalt.

The aboveground end of each probe was fitted with an aluminum reducer (manifold) and a length of polyethylene tubing leading to a vacuum pump. Soil gas was pulled by the vacuum pump into the probe. Samples were collected in a glass syringe by inserting a syringe needle through a silicone rubber segment in the evacuation line and down into the steel probe. The vacuum was monitored by a vacuum gauge to ensure an adequate gas flow from the vadose zone was maintained.

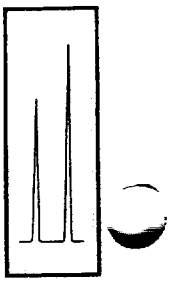
The volume of air within the probe was purged by evacuating 2 to 5 probe volumes of gas. The evacuation time in minutes versus the vacuum in inches of mercury (Hg) was used to calculate the necessary evacuation time. The vacuum in inches Hg was recorded at each sampling location. Probe vacuums ranged from 2 to 12 inches Hg. The maximum capacity of the pump was approximately 22 inches Hg.

4.0 GROUNDWATER SAMPLING PROCEDURES

When groundwater was encountered, water samples were collected. Sampling probes consisted of 7- to 14-foot lengths of 3/4-inch diameter hollow steel pipe. Groundwater samples were collected at 1 to 10 feet bgs. The hollow probes with detachable drive points were advanced below the water table. Once at the desired depth, the probes were withdrawn several inches to permit water to flow into the resulting hole. The aboveground end of the sampling probes were fitted with a vacuum adaptor (metal reducer) and a length of polyethylene tubing leading to a vacuum pump. A vacuum of up to 22 inches Hg was applied to the interior of the probe for 10 to 15 minutes or until water was drawn up the probe. The water accumulated in the hole was removed by vacuum through a 1/4-inch polyethylene tube inserted down into the probe to the bottom of the hole. Because the water is induced to flow into a very narrow hole, it can be sampled with little exposure to air and, consequently, the loss of volatile compounds by evaporation is reduced. The polyethylene tubing was used only once and discarded to avoid cross contamination.

Groundwater samples were collected in 40 milliliter (mL) VOA vials that were filled to exclude air and capped with Teflon-lined septa caps. Approximately half of the liquid in the bottle was decanted, the vials were shaken vigorously, and a sample of the headspace from the container was injected into the gas chromatograph (GC).

Indirect (headspace) analysis is the preferred technique when a large number of water samples are to be performed daily. The method is more time efficient for the measurement of volatile organics than direct injection of the water sample into the GC because there is less chance of semi-volatile and non-volatile organics contaminating the system. Depending upon the partitioning coefficient of a given compound, the



indirect analysis method may be more sensitive than the direct injection method. The precision and accuracy of both methods are similar.

5.0 ANALYTICAL PARAMETERS

Up to 10 mL of soil gas and 40 mL of groundwater were collected for immediate analyses in the Tracer Research analytical van. Analytical instruments were calibrated daily using fresh working standards made from National Institute of Sciences and Technology traceable standards and reagent blanked solvents.

The GC was calibrated for indirect analysis by decanting 20 mL of the known standard, leaving approximately the same amount of headspace as in the water headspace samples. The standard bottle was resealed and shaken vigorously for 30 seconds. An analysis of the headspace in the bottle determined the Response Factor (RF) which was then used to calculate the sample concentrations.

5.1 Chromatographic System

A Hewlett Packard 5890 Series II gas chromatograph, equipped with a flame ionization detector (FID), electron capture detector (ECD) and two computing integrators, was used for the soil gas and groundwater headspace analyses. Compounds were separated on two 6 foot by 1/8 inch OD packed analytical column (10% OV101 stationary phase bonded to 80/100 mesh Chromosorb W support) in a temperature controlled oven. Benzene was detected on the FID and TCE was detected on the ECD. Nitrogen was used as the carrier gas. The following paragraphs explain the GC, FID, and ECD processes.

GC Process

The soil gas and groundwater headspace vapor is injected into the GC where it is swept through the analytical column by the carrier gas. The detector senses the presence of a component different from the carrier gas and converts that information to an electrical signal. The components of the sample pass through the column at different rates, according to their individual properties, and are detected by the detector. Compounds are identified by the time it takes them to pass through the column (retention time).

FID Process

The FID utilizes a flame produced by the combustion of hydrogen and air. When a component, which has been separated on the GC analytical column, is introduced into the flame, a large increase in ions occurs. A collector with a polarizing voltage is applied near the flame and the ions are attracted and produce a current, which is proportional to the amount of the sample compound in the flame. The electrical current causes the computing integrator to record a peak on a chromatogram. By measuring the area of the peak and comparing that area to the integrator response of a known aqueous standard, the concentration of the analyte in the sample is determined.

ECD Process

The ECD captures low energy thermal electrons that have been ionized by beta particles. The flow of these captured electrons into an electrode produces a small current, which is collected and measured. When the halogen atoms (halocarbons) are introduced into the detector, electrons that would otherwise be collected at the electrode are captured by the sample, resulting in decreased current. The current causes the computing integrator to record a peak on a chromatogram. The area of the peak is compared to the peak generated by a known standard to determine the concentration of the analyte.

5.2 Analyses

Subsamples (replicate injections) of each soil gas and groundwater headspace sample were injected into the GC in volumes of 1 to 1,000 microliters (µL). The detection limits for target compounds depend on the sensitivity of the detector to the individual compound as well as the volume of the injection. The detection limits of the target compounds were calculated from the response factor, the sample size, and the calculated minimum peak size (area) observed under the conditions of the analyses. If any compound was not detected in an analysis, the detection limit is given as a "less than" value, e.g., <0.1 µg/L. The following table presents the approximate detection limits of the soil gas and groundwater targeted compounds.

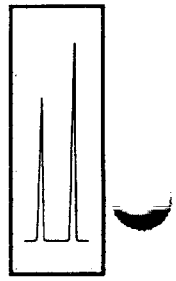


Table 3. Detection Limits for Targeted Compounds

Compound	Detection Limits (µg/L)
Benzene	0.01 sg 0.06 gr. water
TCE	0.00009 sg 0.0004 gr. water

sg = Soil Gas gr. water = Ground Water

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

Tracer Research's Quality Assurance (QA) and Quality Control (QC) program was followed to maintain data that was reproducible through the investigation. An overview presenting the significant aspects of this program is presented below.

Soil Gas/Groundwater Sampling Quality Assurance

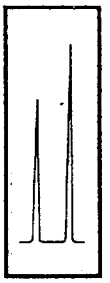
To ensure consistent collection of samples, the following procedures are performed.

- Sampling Manifolds

Tracer Research's custom designed sampling manifold connects the sample probe to the vacuum line and pump. The manifold is designed to eliminate sample exposure to the polymeric (plastic) materials that connect the probe to the vacuum pump.

The sampling manifold is attached to the end of the probe, forming an air tight union between the probe and the silicone tubing septum. The septum connects the manifold to the pump vacuum line and permits syringe sampling.

This sampling system allows the sample to be taken upstream of the sampling pump, manifold, and septum. Since cross contamination of sampling equipment can be a major problem, Tracer Research replaces the materials (probe and syringe), between sampling points, that contact the soil gas before or during sampling.



-Sampling Probes

Steel probes are used only once each day. To eliminate the possibility of cross contamination, they are washed with high pressure soap and hot water spray, or steam-cleaned. Enough sampling probes are carried on each van to avoid the need to re-use any during the day.

-Glass Syringes

Glass syringes are used for only one sample a day and are washed and baked out at night. If they must be used twice, they are purged with carrier gas (nitrogen) and baked out between probe samplings.

- Polyethylene Tubing and VOA Vials

Polyethylene tubing and VOA vials used for the collection of groundwater samples are used only once and then discarded to avoid cross contamination.

-Sampling Efficiency

Soil gas/groundwater pumping is monitored by a vacuum gauge to ensure that an adequate flow of gas from the soil is maintained. A reliable gas sample can be obtained if the sample vacuum gauge reading is at least 2 inches Hg less than the maximum measured vacuum of the vacuum pump.

Analytical Quality Assurance Samples

Quality assurance samples are performed at the listed, or greater, frequencies in Table 4. The frequency depends on the number of samples analyzed and the length of time of the survey.

Table 4. Quality Assurance Samples

Sample type	Frequency
Ambient Air Samples	3 per day or 1 per site
Analytical Method Blanks	5% (1 per 20 samples or 1 a day)
Continuing Calibration Check	20% (1 every 5 samples)
Field System Blank	10% (1 every 10 samples or 1 a day)
Reagent Blank	1 per set of working standards
Replicate Samples	10 to 100% of samples collected

The ambient air samples are obtained on site by sampling the air immediately outside the mobile analytical van and directly injecting it into the GC. Analytical method blanks are taken to demonstrate that the analytical instrumentation is not contaminated. These are performed by injecting carrier gas (nitrogen) into the GC with the sampling syringe. Subsampling syringes are also checked in this fashion.

The injector port septa through which samples are injected into the GC are replaced daily to prevent possible gas leaks from the chromatographic column. All sampling and subsampling syringes are decontaminated after use and are not used again until they have been decontaminated by washing in anionic detergent and baking at 90°C.

Continuing calibration checks are analyzed to verify the detector response for the target VOCs. If the response changes by more than 25 percent, the gas chromatograph is recalibrated and new response factors are calculated.

Field system blanks are analyzed to check for contamination of the sampling apparatus, e.g., probe and sampling syringe. A sample is collected using standard soil gas sampling procedures, but without putting the probe into the ground. The results are compared to those obtained from a concurrently sampled ambient air analysis.

If the blanks detect compounds of interest at concentrations that indicate equipment contamination or concentrations that exceed normal background levels (ambient air analysis), corrective actions are performed. If the problem cannot be corrected, an out-of-control event is documented and reported.

A reagent blank is performed to ensure the solvent used to dilute the stock standards is not contaminated. Analytical instruments are calibrated daily using fresh working standards made from National Institute of Sciences and Technology (NIST) traceable standards and reagent blanked solvents.

Quantitative precision is assured by replicating analysis of 10 to 100 percent of the samples. The percentage is based upon sample analysis time. Replicate analyses are performed by subsampling vapors from the original syringe and VOA.

7.0 RESULTS

The analytical results from this soil gas and groundwater investigation are condensed in Appendix A. The data are presented by location and by analyte concentration. When the compound was not detected, the detection limit is presented as a "less than" value, e.g., <0.1 µg/L.

Samples are identified by sample type, sample location, and sampling depth. For example, 35-SG46-7' represents a soil gas sample collected from location 46 at a depth of 7 feet bgs. Sample 35-SGW56-10' represents a groundwater sample collected from location 56 at a depth of 10 feet bgs.

APPENDIX A Condensed Data

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
BAKER ENVIRONMENTAL/ CAMP GEIGER AREA FUEL FARM/ JACKSONVILLE, NORTH CAROLINA/ 124-0169-S
04/13/94

SAMPLE	BENZENE µg/L	TCE µg/L
AIR	0.1	<0.00004
35-SG46-7'	<0.02	<0.00009
35-SG47-7'	0.01	<0.00009
35-SG48-7'	0.05	<0.00009
35-SG49-7	<0.01	0.00009
35-SG44-7'	<0.01	<0.00009
35-SG42-6'	<0.01	<0.00009
35-SG41-6'	<0.01	0.0003
35-SG40-6'	<0.01	0.05
35-SG39-6'	<0.01	0.03
35-SG38-6'	<0.01	<0.0004
35-SG37-6'	<0.01	<0.00009
35-SG36-6'	<0.01	0.006
35-SG28-6'	<0.01	<0.00009
AIR	<0.01	<0.00004

Analyzed by: D. Bonner
Proofed by: M. Shiers

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
BAKER ENVIRONMENTAL/ CAMP GEIGER AREA FUEL FARM/ JACKSONVILLE, NORTH CAROLINA/ 124-0169-S
04/13/94

SAMPLE	BENZENE µg/L	TCE µg/L
35-SGW46-9'	<0.06	<0.0004
35-SGW47-9'	0.06	<0.0004
35-SGW48-9'	0.06	<0.0004
35-SGW49-9'	<0.06	0.0004
35-SGW44-9'	<0.06	0.0004
35-SGW42-9'	<0.2	0.1
35-SGW41-8'	<0.05	<0.002
35-SGW40-8'	<1	0.02
35-SGW39-8'	0.1	0.002
35-SGW38-8'	<0.06	0.01
35-SGW37-8'	<0.06	<0.0004
35-SGW36-8'	<0.06	0.005
35-SGW28-8'	<0.06	0.4

Analyzed by: D. Bonner
Proofed by: M. Shiflett

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
BAKER ENVIRONMENTAL/ CAMP GEIGER AREA FUEL FARM/ JACKSONVILLE, NORTH CAROLINA/ 124-0169-S
04/14/94

SAMPLE	BENZENE µg/L	TCE µg/L
AIR	<0.01	<0.00004
35-SG33-5'	<0.01	<0.00009
35-SG32-4.5'	<0.4	<0.00009
35-SG31-5'	<0.01	0.0003
35-SG30-5'	<0.01	<0.00009
35-SG29-5'	<0.01	<0.00009
35-SG23-5'	<0.01	<0.00009
35-SG24-5'	0.04	<0.00009
35-SG25-4'	0.02	0.0005
35-SG18-4'	0.03	0.0004
35-SG17-5'	0.05	<0.00009
35-SG26-2'	<0.01	<0.00009
AIR	<0.01	<0.00004
35-SG27-5'	<0.01	<0.00009
35-SG20-3'	<0.01	<0.00009
35-SG19-4'	<0.01	<0.00009
35-SG14-3'	<0.01	<0.00009
35-SG15-5'	<0.01	<0.00009
AIR	0.02	<0.00004

Analyzed by: D. Bonner
Proofed by: M. Shiva

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
BAKER ENVIRONMENTAL/ CAMP GEIGER AREA FUEL FARM/ JACKSONVILLE, NORTH CAROLINA/ 124-0169-S
04/14/94

SAMPLE	BENZENE µg/L	TCE µg/L
AIR	<0.06	<0.0004
35-SGW33-6'	<0.06	<0.0004
35-SGW32-7'	<2	<0.0004
35-SGW31-6'	<0.06	0.0009
35-SGW30-7'	<0.06	0.002
35-SGW29-7'	<0.2	<0.002
35-SGW23-7'	9	<0.0004
35-SGW24-7'	INT	<0.0004
35-SGW25-7'	0.2	0.0008
35-SGW18-6'	<0.06	<0.0004
35-SGW17-7'	<0.06	<0.0004
35-SGW16-6'	<0.06	<0.0004
AIR	<0.06	<0.0002
35-SGW26-7'	<0.06	<0.0004
35-SGW27-7'	<0.06	<0.0004
35-SGW20-6'	<0.06	<0.0004
35-SGW19-6'	<0.06	<0.0004
35-SGW14-5'	<0.06	<0.0004
AIR	<0.06	<0.0002

INT = Interference

Analyzed by: D. Bonner
Proofed by: M. Shiver

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
BAKER ENVIRONMENTAL/ CAMP GEIGER AREA FUEL FARM/ JACKSONVILLE, NORTH CAROLINA/ 124-0169-S
04/15/94

SAMPLE	BENZENE µg/L	TCE µg/L
AIR	<0.01	<0.00005
35-SG13-5'	<0.01	0.8
35-SG21-4'	<0.01	<0.0001
35-SG22-5'	<0.01	0.002
35-SG7-4'	<0.01	<0.0001
35-SG6-5'	<0.01	<0.0001
35-SG5-5'	INT	<0.0001
35-SG1-4'	<0.01	<0.0001
35-SG2-5'	<0.01	<0.0001
35-SG3-4'	<0.01	<0.0001
35-SG4-5'	<0.01	<0.0001
AIR	<0.01	<0.00005
35-SG8-5'	<0.01	<0.0001
35-SG9-4'	<0.01	<0.0001
35-SG10-4'	<0.01	<0.0001
35-SG11-4'	<0.01	<0.0001
35-SG12-5'	<0.01	<0.0001
35-SG45-6'	<0.01	0.003
35-SG43-6'	<0.01	0.0005
35-SG35-6'	<0.01	<0.0001
AIR	<0.01	<0.0001

INT = Interference

Analyzed by: D. Bonner
Proofed by: M. Shiles

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
BAKER ENVIRONMENTAL/ CAMP GEIGER AREA FUEL FARM/ JACKSONVILLE, NORTH CAROLINA/ 124-0169-S
04/15/94

SAMPLE	BENZENE µg/L	TCE µg/L
35-SGW15-7'	<1	<0.0004
35-SGW13-7'	0.6	4
35-SGW21-7'	<0.06	0.003
35-SGW22-7'	<0.06	0.003
35-SGW7-6'	<2	<0.0004
35-SGW6-9'	<35	0.006
35-SGW5-8'	<0.06	0.008
35-SGW1-7'	<0.06	0.0009
35-SGW2-7'	<0.06	<0.0004
35-SGW3-7'	<0.06	0.0009
35-SGW4-8'	<0.06	<0.0004
35-SGW8-8'	<0.06	<0.0004
35-SGW9-8'	<0.06	<0.0004
35-SGW10-8'	<0.06	<0.0004
35-SGW11-8'	<0.06	<0.0004
35-SGW12-8'	<0.06	<0.0004
35-SGW45-8'	0.8	0.5
35-SGW43-8'	<0.06	0.01
35-SGW35-8'	<0.06	<0.0004

Analyzed by: D. Bonner
Proofed by: M. Stivers

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
BAKER ENVIRONMENTAL/ CAMP GEIGER AREA FUEL FARM/ JACKSONVILLE, NORTH CAROLINA/ 124-0169-S
04/16/94

SAMPLE	BENZENE µg/L	TCE µg/L
AIR	<0.01	<0.00004
35-SG56-6'	<370	<0.00009
35-SG58-4'	0.06	0.0004
35-SG57-6'	<0.01	0.0004
35-SG59-4'	<0.01	<0.00009
35-SG60-4'	<0.01	0.01
35-SG61-4'	2	0.0009
35-SG63-4'	<0.03	<0.00009
35-SG64-5'	<0.01	<0.00009
35-SG65-5'	0.04	<0.00009
35-SG66-5'	<0.01	<0.00009
35-SG62-6'	<0.01	<0.00009
35-SG50-4'	<0.01	<0.00009
35-SG34-2'	<0.01	<0.00009
AIR	<0.01	<0.00004
35-SG67-4'	<0.01	<0.0004
35-SG68-4'	<0.01	0.002
35-SG69-4'	0.03	0.2
35-SG70-4'	0.3	0.1
35-SG71-4'	<0.01	<0.00009
35-SG72-4'	<0.01	<0.00009
35-SG73-4'	<0.01	<0.00009
AIR	<0.01	<0.00004

Analyzed by: D. Bonner
Proofed by: M. Sikes

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
BAKER ENVIRONMENTAL/ CAMP GEIGER AREA FUEL FARM/ JACKSONVILLE, NORTH CAROLINA/ 124-0169-S
04/16/94

SAMPLE	BENZENE µg/L	TCE µg/L
35-SGW56-10	16000	0.004
35-SGW58-6'	<0.06	0.0008
35-SGW57-8'	<0.06	<0.0004
35-SGW60-6'	<0.06	0.0006
35-SGW59-6'	<0.06	<0.002
35-SGW61-6'	<0.06	<0.0004
35-SGW63-7'	<0.06	<0.0004
35-SGW64-7'	<0.06	<0.0004
35-SGW65-7'	0.2	<0.0004
35-SGW66-7'	<0.06	0.0008
35-SGW62-8'	<0.06	<0.0004
35-SGW55-1'	7	0.05
35-SGW54-1'	<0.1	2
35-SGW52-1'	<0.1	0.008
35-SGW53-1'	<0.1	0.3
35-SGW50-6'	0.2	<0.0004
35-SGW51-3'	0.1	<0.0004
35-SGW67-6'	<0.06	<0.0004
35-SGW68-6'	<0.06	<0.0004
35-SGW69-6'	<0.06	160
35-SGW70-7'	<0.06	1
35-SGW71-9'	0.1	0.9
35-SGW72-7'	<0.06	0.04
35-SGW73-7'	<0.06	<0.0004

Analyzed by: D. Bonner
Proofed by: M. Stivers

Tracer Research Corporation appreciates the opportunity of being of service to your organization. Because we are constantly striving to improve our service to you, we welcome any comments or suggestions you may have about how we can be more responsive to the needs of your organization. If you have any questions about the field work, analytical results, or this report, please give Mike Gervasini a call at (908) 274-1888.

APPENDIX H
RI/FS TEST BORING AND WELL CONSTRUCTION RECORDS

TEST BORING LOG AND WELL CONSTRUCTION LEGEND

SOIL DESCRIPTIONS

GRAIN SIZE IDENTIFICATION

NAME	SIZE LIMITS
Boulder	12" OR MORE
Cobbles	3" - 12"
Coarse Gravel	3/4" - 3"
Fine Gravel	4.76 mm (#4) - 3/4"
Coarse Sand	2 mm (#10) - 4.76 mm (#4)
Medium Sand	0.42 mm (#40) - 2 mm (#10)
Fine Sand	0.074 mm (#200)-0.42 mm (#40)
Silt	0.002 mm-0.074 mm (#200)
Clay	Less than 0.002 mm

RELATIVE DENSITY

NONCOHESIVE SOIL

TERM	SPT (Blows/ft)
Very Loose	BELOW 4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	OVER 50

COHESIVE SOILS

TERM	SPT (Blows/ft)
Very Soft	BELOW 2
Soft	2-4
Medium Stiff	4-8
Stiff	8-15
Very Stiff	15-30
Hard	OVER 30

MOISTURE	DESCRIPTIVE TERMS	
Dry	Trace	0-10%
Damp	Little	10-20%
Moist	Some	20-35%
Wet	And	35-50%

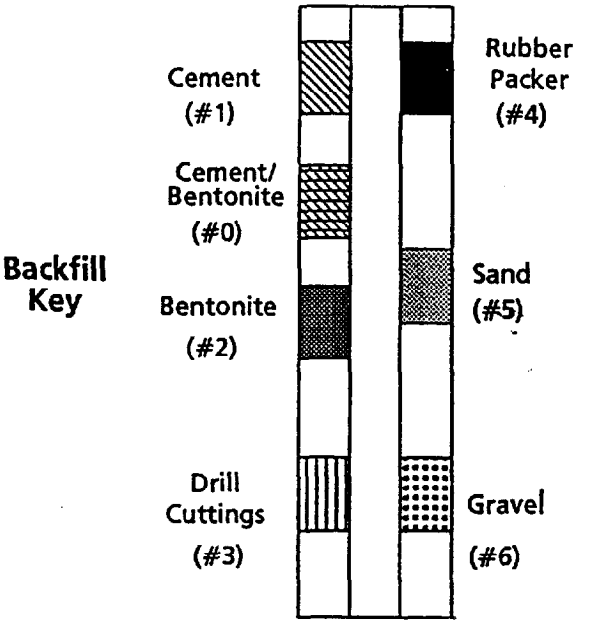
CONTACTS:

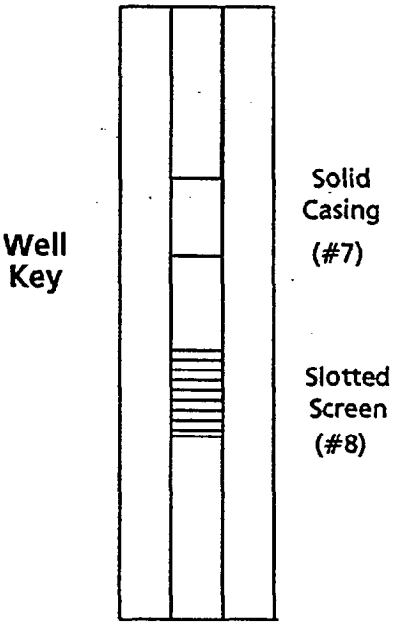
_____ = DEFINITE

_ _ _ _ = INDEFINITE

. . . . . = GRADATIONAL

WELL SYMBOLS AND BACKFILL





SAMPLE TYPE	ABBREVIATIONS	
S = Split Spoon	HS =	Hollow Stem
T = Shelby Tube	NP =	Non Plastic
R = Air Rotary	-PL =	Below the Plastic Limit
D = Denison	PL =	At the Plastic Limit
A = Auger	+PL =	Above the Plastic Limit
W = Wash (Roller Bit)	+LL =	Above the Liquid Limit
C = Core	SPT =	Standard Penetration Test
P = Piston		
N = No Sample Taken	RQD =	Rock Quality Designation

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35GWD-1
COORDINATES: EAST: 2464369.4100 NORTH: 363751.2360
ELEVATION: SURFACE: 18.0 TOP OF STEEL CASING: 19.95

RIG: R35-Mobile Drill									
	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	4-15-94	46.0	OVERCAST, COOL		
LENGTH	2'				4-25-94	7.0'	HOT, HUMID, BREEZY		
TYPE	STD.			ROLLER	4-26-94	14.0'	HOT, BREEZY (85+)		
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.95	-57.0
Screen	2"	.10 Slot, Schedule 40 PVC	-57.0	-61.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Visual Description	Well Installation Detail	Elevation
1	S-1	1.9/2.0 95%	10 11 12 15		SILTY SAND, fine grained, trace roots, dark brown to black, medium dense, damp.		
2					1.9 SAND, fine grained, some silt, light grey, medium dense, damp 3.0		17.1
3	S-2	1.5/2.0 75%	12 10 7 9		SILTY SAND, fine grained, dark brown, medium dense, moist.		15.0
4							
5	35-GWDS-03 S-3	2.0/2.0 100%	5 7 10 15		NOTE: Sample Collected from 4'-6'		
6							
7	S-4	2.0/2.0 100%	4 5 8 8		7.0 SAND, Medium grained, well graded, little silt, Medium dense, wet.		11.0
8							
9	S-5	1.0/2.0 50%	4 3 5 3		NOTE: Groundwater at 7.5 Feet.		
10					9.5 Match to Sheet 2		8.5

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35GWD-1 SHEET 1 OF 4

Baker

Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm

S.O. NO.: 62470-232 BORING NO.: 35GWD-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Visual Description	Well Installation Detail	Elevation
11	S-6	1.0/2.0 50%	7 8 5 5		Continued from Sheet 1 SAND, Medium grained, well graded, trace gravel, trace shell fragments, trace silt, light gray, medium dense, wet		
12					12.0		6.0
13	S-7	1.0/2.0 50%	4 4 4 3		SAND, Coarse grained, well graded, light gray, loose, wet		
14					13.3 SAND, fine grained, poorly graded, trace silt, dark gray, loose to very loose, wet		4.7
15	S-8	1.1/2.0 55%	1 1 1 2		NOTE: 2" silt stringer, trace sand at 15.1'	#10	
16							
17	S-9	1.0/2.0 50%	2 2 1 2		NOTE: Light brown		
18					18.0		0
19	S-10	1.4/2.0 70%	4 5 3 4		SAND and GRAVEL, Coarse grained, light gray, loose, wet	#7 #4	
20							
21	S-11	1.0/2.0 50%	1 1 1 WOH		20.5 SAND, fine grained, poorly graded, trace silt, dark grey, loose to very loose, wet		-2.5
22							
23	S-12	1.5/2.0 75%	2 3 18 34		23.0 GRAVEL, trace sand, light gray, medium dense, wet. 23.5	#4	-5.0
24							-5.5
25	S-13	1.3/2.0 65%	29 40 29 30		SAND, fine grained, poorly graded, trace gravel, trace silt, light gray, very dense, wet, cemented with calcium carbonate		
26					NOTE: Partially Cemented		
27	S-14	1.2/2.0 65%	5 15 21 22		NOTE: Lost Circulation of Drilling fluids.	#10	
28							
29	S-15	2.0/2.0 100%	17 25 41 43				
30							

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp

DRILLER: Brian Van Doren BORING NO.: 35GWD-1 SHEET 2 OF 4

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: SITE 35 - CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62470-232 BORING NO.: 35GWD-1

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description	Well Installation Detail	Elevation
31	S-16	2.0/2.0 100%	17 19 15 13			Continued from Sheet 2 SAND, fine grained, poorly graded, trace gravel, trace silt, light gray, dense, wet, partially cemented with calcium carbonate.	#0	
33	S-17	2.0/2.0 100%	20 22 20 21					
35	S-18	1.0/2.0 50%	21 30 22 39			NOTE: Very dense		
37	S-19	1.0/2.0 50%	9 15 15 21			NOTE: dense	#7	
39	S-20	2.0/2.0 100%	9 11 12 14			NOTE: medium dense		
41	S-21	1.0/2.0 50%	7 10 10 20			NOTE: dense	#0	
43	S-22	1.0/2.0 50%	20 21 25 26			43.7 SAND, fine grained, little clay, trace shell fragments, light gray, dense, wet	#0	-25.7
45	S-23	2.0/2.0 100%	12 15 17 17			44.6 SAND, fine grained, some silt, trace clay, trace to little shell fragments, greenish gray, dense, wet 46.0		-26.0
47	A.N.					END OF LOG FOR 4-15-94, SET 6" CASING	#2 #7 #2	-28
49	SHELBY TUBE	1.75/2.0 87.5%	N/A			NOTE: PUSHED SHELBY TUBE FROM 47'-49'. SAMPLE COLLECTED FOR GRAIN SIZE, PERMEABILITY, ATTERBURG LIMITS, ETC.		
50	S-25	2.0/2.0	6 5			SAND, fine grained, some silt, trace shell fragments, trace clay, greenish gray, medium dense, moist Match to Sheet		

DRILLING CO.: HARDIN HUBER INCORPORATED BAKER REP.: JAMES CULP
DRILLER: BRIAN VAN DOREN BORING NO.: 35GWD-1 SHEET 3 OF 4

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SITE 35- CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62ATD-232 BORING NO.: 356WD-1

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description	Well Installation Detail	Elevation
51	S-25	100%	6 9			Continued from Sheet 3		
52	S-26	1.4/2.0 70%	5 5 6 13					
53						53.0 53.0		-35.0
54	S-27	2.0/2.0 100%	5 9 26 48			END OF BORING FOR 4-25-94 SAND, fine grained, some SILT, trace shell fragments, trace clay, greenish gray. dense, moist	#2	#2
55						55.0 55.0 SAND, fine to medium grained, little shell fragments, trace SILT, Gray, very dense, wet.	#7	-36.9 -37.0
56								
57								-39.0
58							#5	#8 #5
59								
60								
61	S-28	1.6/2.0 80%	25 30 48 50/3			61.3 61.3		-43.0
62						CLAYEY SILT, some shell fragments, trace sand, greenish gray, very stiff, wet 61.8 61.8	#7	-43.3 -43.8 -44.0
63								
64						SAND AND SILT, trace clay, greenish gray, very stiff, wet, partially cemented.	#5	
65								
66	S-29	2.0/2.0 100%	10 13 8 50/3				#5	#5
67						67.0 67.0		-49.0
68						END OF BORING AT 67.0, SET WELL AT 62.0'		
69								
70						Match to Sheet		

DRILLING CO.: HARDIN HUBER Incorporated BAKER REP.: James Culp
DRILLER: BRIAN Van Doren BORING NO.: 356WD-1 SHEET 4 OF 4

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35GWD-2
COORDINATES: EAST: 2465479.1200 NORTH: 363479.0820
ELEVATION: SURFACE: 17.5 TOP OF STEEL CASING: 20.10

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	4-16-94	46.0	OVERCAST, MUGGY WET		
LENGTH	2'				4-20-94	17.0	Cool, Sunny		
TYPE	STD.			ROLLER					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.6	-57.1
Screen	2"	.10 Slot, Schedule 40 PVC	-57.1	-61.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Visual Description	Well Installation Detail	Elevation
1	S-1	1.5/2.0 75%	4 5 6 9		SAND, fine grained, trace Roots, trace SILT, brown to light brown, medium dense, damp	#0	
2							
3	S-2	1.1/2.0 55%	4 5 6 9			#0	
4							
5	35-GWDS-03 S-3	1.1/2.0 55%	7 7 7 7		NOTE: Moist	#7 6" steel Outer Casing	
6					NOTE: Wet, groundwater encountered at 6.0 feet.	#0	11.5
7	S-4	1.3/2.0 65%	6 6 5 7				
8							
9	S-5	1.5/2.0 75%	5 5 6 8			#0	
10					Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35GWD-2 SHEET 1 OF 4

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 356WD-2

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Visual Description	Well Installation Detail	Elevation
11	S-6	0.9/2.0 45%	5 4 5 5		Continued from Sheet 1 11.0 SAND, fine grained, trace silt, gray, Loose, wet		6.5
12							
13	S-7	1.8/2.0 90%	1 1 2 3		12.6 SAND AND SILT, fine grained, brown (with grey streaks), Loose, wet		4.4
14					14.0 SAND, fine grained, little silt, trace gravel, reddish brown, Loose, wet.		3.5
15	S-8	1.8/2.0 90%	3 2 2 3				
16							
17							
18							
19						6" steel outer casing	
20							
21	S-9	1.4/2.0 70%	3 4 5 5		21.0 SAND, fine grained, trace silt, greenish brown, Loose, wet, hydrocarbon odors.		-3.5
22							
23					23.5		-6.0
24							
25					SAND, fine grained, little silt, some shell fragments, gray to grayish brown, Loose, wet, partially cemented, wet, hydrocarbon odors		
26	S-10	.85/2.0 42.5%	2 3 3 5				
27							
28							
29							
30							

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 356WD-2 SHEET 2 OF 4

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: SITE 35 - CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62470-232 BORING NO.: 356WD-2

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description	Well Installation Detail	Elevation
31	S-11	1.6/2.0 80%	18 27 36 20			Continued from Sheet 3 SAND, fine grained, well graded, some shell fragments, trace silt, gray, very dense, wet, partially cemented.		
32								
33	AN							
34								
35								
36	S-12	1.4/2.0 70%	4 17 22 25					
37								
38	AN							
39								
40								
41	S-13	2.0/2.0 100%	9 15 15 17					
42								
43	S-14	2.0/2.0 100%	21 25 27 29			NOTE: Little silt, trace clay		
44						43.9 43.9 SAND, fine grained, some silt, trace shell fragments, trace clay, greenish gray, medium dense, wet.		-26.4 -26.5
45	S-15	1.8/2.0 90%	17 15 14 16					
46						46.0 46.0 END OF BORING FOR 4-16-94. - SET 6" CASING		-28.5
47	S-16	1.9/2.0 95%	6 7 9 16					
48								
49	S-17	2.0/2.0 100%	3 5 6 9					
J						Match to Sheet 4		

6" Steel Outer Casing

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian VanDoren BORING NO.: 356WD-2 SHEET 3 OF 4

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: SITE 35 - CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62070-232 BORING NO.: 356WD-2

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description	Well Installation Detail	Elevation
51	S-18	2.0/2.0 100%	3 5 7 7			Continued from Sheet 3		
52							#2	
53	S-19	2.0/2.0 100%	6 9 27 45				#2	
54						53.5 SAND, COARSE TO medium grained, some shell fragments, trace SILT, Gray, Very dense, wet.		-36.0 -36.5
55								
56							#7	#5
57	AN							-39.5
58								
59							#5	#8
60						NOTE: PARTIAL CEMENTATION.		
61	S-20	2.0/2.0 100%	41 31 47 45					-43.5
62							#7	-44.5
63	AN						#5	-45.5
64						END OF BORING AT 63.0', SET WELL AT 62'		
65								
66								
67								
68								
69								
70						Match to Sheet		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Dercn BORING NO.: 356WD-2 SHEET 4 OF 4

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35GWD-3
COORDINATES: EAST: 2464783.4800 NORTH: 363189.8380
ELEVATION: SURFACE: 16.7 TOP OF STEEL CASING: 19.03

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	4-17-94	17.0	Cloudy, Hot		-
LENGTH	2'				4-18-94	28.0	Sunny, Cool		
TYPE	STD.			ROTARY	4-27-94	22.0	Sunny, Hot breezy		-
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.33	-62.0
Screen	2"	.10 Slot, Schedule 40 PVC	-62.0	-66.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description
1	S-1	1.6/2.0 80%	5 10 7 8			SAND, fine grained, trace silt, trace roots, dark brown, medium dense, damp
2						
3	35-GWDS-03 S-2	1.6/2.0 80%	3 4 6 6			NOTE: trace clay
4						
5	35-GWDS-03 S-3	1.8/2.0 90%	2 4 6 8			NOTE: No clay. NOTE: Groundwater Encountered at 5.5 feet.
6						
7	35-GWDS-03 S-4	1.5/2.0 75%	5 11 10 10			
8						
9	S-5	1.8/2.0 90%	4 6 6 7			NOTE: trace gravel, gray
10						Match to Sheet 2

Well Installation Detail: #10, #7, #10, #10; 6" steel outer casing

Elevation

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35GWD-3 SHEET 1 OF 4

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35GWD-3

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Visual Description	Well Installation Detail	Elevation
11	S-6	1.7/2.0 85%	4 5 6 7		Continued from Sheet 1		
12							
13	AN						
14							
15							
16	S-7	0.85/2.0 42.5	4 6 5 6		NOTE: Dark red/brown staining at 16.8'	6" Steel Outer Casing	
17							
18	AN						
19							
20							
21	S-8	2.0/2.0 100%	1 1 1 WOH		NOTE: DARK GREY, LOOSE		
22							
23	AN				23.5 (est)		
24							-6.8
25					SAND, fine grained, trace shell fragments, trace silt, light grey, dense to very dense, wet, partially cemented		
26	S-9	1.5/2.0 75%	27 17 32 35				
27							
28	AN						
29							
30							

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35GWD-3 SHEET 2 OF ..

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

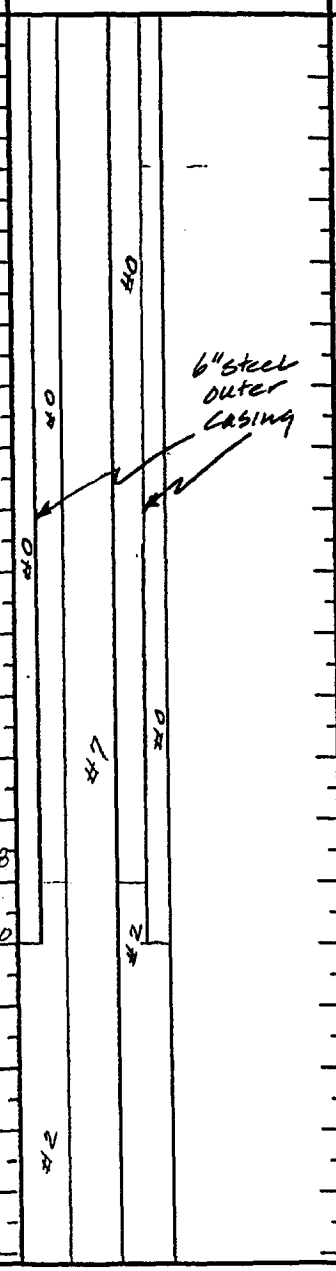
PROJECT: SITE 35 - CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62470-232 BORING NO.: 35GWD-3

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description
31	S-10	1.6/2.0 80%	31 32 27 30			Continued from Sheet 3 NOTE: Cementation increasing.
32						
33	A.N.					
34						
35						
36	S-11	1.8/2.0 90%	14 15 13 11			NOTE: Cementation decreasing, increasing silt
37						
38	A.N.					
39						
40						
41	S-12	1.9/2.0 95%	15 18 20 31			
42						
43	S-13	1.9/2.0 95%	20 20 15 20			43.8
44						SAND, fine grained, some SILT, trace shell fragments, greenish gray; dense, moist
45	AN					45.0 END OF BORING FOR 4-18-94 - SET CASING (6")
46						SAND, fine grained, Some Silt, trace shells, greenish grey, medium dense, wet
47	S-14	1.9/2.0 95%	4 5 7 8			
48						
49	S-15	2.0/2.0 100%	4 6 9 10			
0						Match to Sheet

Well Installation Detail



Elevation: -27.1, -27.3, -28.3

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35GWD-3 SHEET 3 OF 4

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SITE 35 - CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62470-232 BORING NO.: 35GWD-3

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description	Well Installation Detail	Elevation
51	S-16	1.7/2.0 85%	4 4 10 12			Continued from Sheet 3 NOTE: WET		
53	S-17	1.8/2.0 90%	4 5 10 15			NOTE: MOIST	#2	
55	S-18	1.8/2.0 90%	4 5 10 18			NOTE: MOIST	#2	
56						56.3 56.3		-39.6
57	S-19	2.0/2.0 100%	9 13 27 50/.1			SAND, fine grained, little shell fragments, trace silt, trace clay, gray, dense, wet, partially cemented		-40.3
59	A.N					59.0 59.0 SAND, fine grained, trace shell fragments, trace silt, greenish gray, medium dense, wet, partially cemented	#5	-42.3
61	S-20	2.0/2.0 100%	12 13 14 25				#7	
63	A.N.					63.5 63.5	#5	-45.3
64						SAND, fine grained, poorly graded, some shell fragments, trace silt, gray, very dense, wet		-46.8
65							#8	
66	S-21	1.3/2.0 65%	32 35 25 50/.2					-49.3
67						66.8 66.8 SILT, some shell fragments, trace sand, trace clay, green, very dense, MOIST	#7	-50.3
68	A.N.					68.0 END OF BORING AT 68.0', SET WELL AT 67.0'	#5	-51.3
69								
70						Match to Sheet		

DRILLING CO.: HARDIN HUBER INCORPORATED BAKER REP.: JAMES CULP
DRILLER: BRIAN VAN DOREN BORING NO.: 35GWD-3 SHEET 4 OF 4

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35GWD-4
COORDINATES: EAST: 2465316.7200 NORTH: 363820.2500
ELEVATION: SURFACE: 11.9 TOP OF STEEL CASING: 13.58

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	4-19-94	42.0	Clear, cool		
LENGTH	2'				4-29-94	13.0	overcast, humid		
TYPE	STD.			ROTARY					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.68	-47.0
Screen	2"	.10 Slot, Schedule 40 PVC	-47.0	-51.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	S-1	1.25/2.0 62.5	4 4 4 5			SAND, fine grained, trace silt, trace organic matter, brown, loose, damp		
2						NOTE: peat-like organic material		
3	S-2	1.3/2.0 65%	3 3 3 2			NOTE: trace well rounded gravel		
4								
5	S-3	N.R./2.0 0%	1 1 1 1			NOTE: NO RECOVERY		
6						6.0' 6.0'		5.9
7	35-GWDS-04 S-4	1.9/2.0 95%	2 4 4 4			SAND, fine grained, trace silt, light grey, loose, wet, strong hydrocarbon odors.		
8						NOTE: @7.8' - Encountered ground-water		4.1
9	S-5	1.7/2.0 85%	1 3 3 3					
10						Match to Sheet 2		

#0 #0 #0 #0 6" steel outer casing

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35GWD-4 SHEET 1 OF 4

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35GWD-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12	A.N.							
13								
14								
15						NOTE: STRONG hydrocarbon odors		
16	S-6	1.9/2.0 85%	1 8 24 16					
17						16.7 SAND, fine grained, trace shell fragments, trace silt, gray, dense, wet, partially cemented. 16.7	6" steel outer casing	-4.8
18								
19	A.N.							
20								
21	S-7	1.5/2.0 75%	30 20 32 34			NOTE: Light gray		
22								
23								
24	A.N.							
25								
26	S-8	1.4/2.0 70%	35 36 36 20					
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35GWD-4 SHEET 2 OF 4

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: SITE 35 - CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62470-232 BORING NO.: 35GWD-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description	Well Installation Detail	Elevation
31	S-9	1.4/2.0 70%	26 29 24 29			**Continued from Sheet 2** SAND, fine grained, trace silt, trace shell fragments, light gray very dense, wet		
32								
33	A.N.							
34								
35							6" steel outer casing	
36	S-10	1.8/2.0 90%	21 20 24 21					
37								
38	A.N.							
39						38.5 38.5		-26.6
40								-28.1
41	S-11	1.7/2.0 85%	4 6 6 9			SAND, fine grained, little silt, trace clay, greenish gray, medium dense, moist		
42						42.0 42.0 END OF BORING FOR 4-19-94 - SET 6" CASING.		-30.1
43	A.N.							
44						SAND, fine grained, some silt, trace shell fragments, greenish gray, very dense, moist 44.8		
45	S-12	2.0/2.0 100%	15 21 31 37			SAND, fine grained, some shell fragments, trace silt, gray, very dense, wet, partially cemented with calcium carbonate.		-32.9 -33.1
46								
47	A.N.					47.0 47.0 LIMESTONE FRAGMENTS (GRAVEL SIZE) GRAY, VERY DENSE, WET.		-35.1
48								
49	S-13	2.0/2.0 100%	24 28 30 31			Match to Sheet		
0								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: Janice Culp
DRILLER: Brian Van Doren BORING NO.: 35GWD-4 SHEET 3 OF 4

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SITE 35 - CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62470-232 BORING NO.: 35GWD-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description	Well Installation Detail	Elevation
51						Continued from Sheet	#8	39.1
52							#7 #6	40.1
53						53.0 53.0	#6	41.1
54	S-14	2.0 2.0 100%	15 16 20 21			SAND, fine grained, some silt, trace shell fragments, greenish gray, dense, moist	#5	
55						55.0 55.0		43.1
56						END OF BORING AT 55.0', SET WELL AT 52.0'		
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70						Match to Sheet		

DRILLING CO.: HARDIN HUGER INCORPORATED BAKER REP.: JAMES CULP
DRILLER: BRIAN VAN DOREN BORING NO.: 35GWD-4 SHEET 4 OF 4

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35GWD-5
COORDINATES: EAST: 2465810.3100 NORTH: 363296.4980
ELEVATION: SURFACE: 7.7 TOP OF STEEL CASING: 10.23

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	4-28-94	27.0	Warm, Humid		
LENGTH	2'								
TYPE	STD.			ROTARY					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.53	-49.0
Screen	2"	.10 Slot, Schedule 40 PVC	-49.0	-53.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Visual Description	Well Installation Detail	Elevation
1	S-1	1.7/2.0 85%	5 6 7 10		SAND, fine grained, some silt, trace roots, dark brown, medium dense, damp		
2					NOTE: @1.0' - Light brown		
3	S-2	1.4/2.0 70%	5 5 5 6		NOTE: Light gray	#0 8" steel outer CASING	
4							
5	35-GWDS-03 S-3	1.5/2.0 75%	5 10 5 6		5.5 5.5 CLAY, little silt, brown and gray mottled, medium dense, WET	#1 6" steel outer casing	2.2
6							
7	35-GWDS-03 MS/MSD S-4	1.8/2.0 90%	4 6 8 8		NOTE: Groundwater @ 7.0'		
8							
9	S-5	1.5/2.0 75%	2 2 3 4		9.8 9.8 SILTY SAND, fine grained Match to Sheet 2	#0	-2.1
10							

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35GWD-5 SHEET 1 OF 4

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 356WD-5

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Visual Description	Well Installation Detail	Elevation
11					Continued from Sheet 1		
11					trace clay, brown and gray mottled, loose, wet		
12	A.N.				12.5 (est) 12.5	8" steel outer casing	-4.8
13							
14							
15							
16	S-6	2.0 / 2.0 100%	2 2 3 3		CLAY, trace SILT, gray, medium stiff, wet. NOTE: gray sand stringer ± 2". Set 8" casing because drilling fluids were not recirculating.	6" steel outer casing	-8.3
17							
18	AN				18.0 (est) 18.0	#1	-10.3
19							
20							
21	S-7	2.0 / 2.0 100%	2 2 3 5		SILT, some clay, trace wood fragments, dark brown, medium stiff, wet	#0	
22							
23	AN						
24					24.0 (est) 24.0		-16.3
25					SAND, fine to medium grained, trace silt, REDDISH brown, loose, wet	#0	
26	S-8	1.0 / 2.0 50%	2 2 3 4				
27					27.0 27.0		-19.3
28					END OF BORING FOR 4-28-94	#0	
29					NOTE: TRACE SHELL FRAGMENTS, PARTIALLY CEMENTED WITH CALCIUM CARBONATE.		
30							

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 356WD-5 SHEET 2 OF 4

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: SITE 35 - CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62470-232 BORING NO.: 356WD-5

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description	Well Installation Detail	Elevation
31	S-9	1.8/2.0 90%	15 12 12 13			Continued from Sheet 2		
32						30.8 SAND, fine grained, poorly graded, little shell fragments, trace silt, gray, medium dense, wet, partially cemented with calcium carbonate.	#0 #0 #0 #0 6" STEEL OUTER CASING	-23.1
33	A.N.							
34								
35						35.0	35.0	-27.3
36	S-10	1.9/2.0 95%	5 5 9 7			SAND, fine grained, some silt, trace shell fragments, greenish gray, medium dense, wet		
37						37.0	37.0	-29.3
38	A.N.					END OF BORING FOR 4-29-94 - SET 6" CASING		-30.3
39								
40								
41	S-11	2.0/2.0 100%	4 7 10 12			SAND, fine grained, trace shell fragments, trace silt, greenish gray, medium dense, moist.	#N #1 #2	
42								
43	S-12	2.0/2.0 100%	4 7 7 8			NOTE: little silt, wet		
44								
45	S-13	2.0/2.0 100%	8 12 29 36			45.0 SAND, fine grained, some shell fragments, trace silt, gray Dense, wet.	45.0 #3 #6	-37.3
46								
47								
48						48.0 (est) 48.0 LIMESTONE FRAGMENTS, SOME SHELL FRAGMENTS, TRACE SAND, GRAY, DENSE, WET		-40.3
49							#8	-41.3
0						Match to Sheet		

DRILLING CO.: HARDIN HUBER INCORPORATED BAKER REP.: JAMES CULP
DRILLER: Brian Van Doren BORING NO.: 356WD-5 SHEET 3 OF 4

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: SITE 35 - CAMP GEIGER AREA FUEL FARM
S.O. NO.: 62470-232 BORING NO.: 35GWD-5

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis
PID = Photoionization Detector

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	PID (ppm)	Visual Description	Well Installation Detail	Elevation
51	S-14	2.0/2.0 100%	24 45 44 30			Continued from Sheet 3 50.5 SAND, fine grained, little shell fragments, gray, very dense, wet, partially cemented with calcium carbonate..	#5 #8 #7 #5	-42.8
52								
53	A.N.							-45.3
54								-46.3
55								
56	S-15	1.6/2.0 80%	35 50 50/.4			56.5 56.5 SAND, fine grained, some silt, little shell fragments, greenish gray, very dense, wet 57.0		-48.8
57								-48.5
58						END OF BORING AT 57.0', SET WELL AT 54.0'		
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70						Match to Sheet		

DRILLING CO.: HARDIN-HUBER INCORPORATED BAKER REP.: JAMES CULP
DRILLER: Brian Van Doren BORING NO.: 35GWD-5 SHEET 4 OF 4

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-26B
COORDINATES: EAST: 2465390.3200 NORTH: 363200.1290
ELEVATION: SURFACE: 15.4 TOP OF STEEL CASING: 15.05

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	5-13-94	42.0	SUNNY, COOL		-
LENGTH	2'								
TYPE	STD.			ROTARY					-
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	-0.35	-37.3
Screen	2"	.10 Slot, Schedule 40 PVC	-37.3	-41.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	S-1	2.0/2.0 100%	5 10 10 8			0.3 ASPHALT 0.3 SAND, fine grained, trace silt, brown, medium dense, dry	#0	15.1
2								
3	S-2	1.2/2.0 60%	5 11 12 14			NOTE: GRAY		
4								
5	S-3	1.1/2.0 55%	2 4 6 10				#7	
6								
7	35-MW26B-04 S-4	1.1/2.0 55%	6 10 12 14			NOTE: Medium grained at 7.3 FEET NOTE: GROUNDWATER AT 7.7 FEET		
8								
9	S-5	1.0/2.0 50%	4 5 4 4			9.0 9.0 SILT, some sand, trace clay, orange, loose, moist to wet.	#0	6.4
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-26B SHEET 1 OF 3

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-26B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12	A.N.					12.5(est) 12.5		2.9
13							#0	
14								
15						SAND, fine grained, trace silt, brown, loose, wet		
16	S-6	1.6/2.0 80%	2 2 3 2			NOTE: @ 16.7' - orange in color with gray clay balls.		
17								
18	A.N.							
19						19.5(est) 19.5	#1	-4.1
20						SAND, fine grained, little shell fragments, little silt, trace gravel, grdy, dense, wet, partially cemented with calcium carbonate. 21.3		
21	S-7	1.9/2.0 95%	15 25 10 15					-5.9
22						SILT, little shell fragments, trace sand, light brown, dense, moist		
23	A.N.						#0	
24								
25						NOTE: Some shell fragments, partially cemented with calcium carbonate, becoming gray.		
26	S-8	2.0/2.0 100%	15 30 20 35					
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-26B SHEET 2 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-26B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31	S-9	2.0/2.0 100%	20 32 22 28			Continued from Sheet 2 SAND, fine grained, some shell fragments, trace silt, gray and brown, partially cemented with calcium carbonate.	#2	-15.6
32								
33	A.N.					NOTE: gray	#7	
34								
35								
36	S-10	2.0/2.0 100%	10 12 14 12			NOTE: gray		-20.6
37								-21.6
38	A.N.						#5	
39						39.5 (est) 39.5	#8	-24.1
40								
41	S-11	2.0/2.0 100%	12 13 18 16			SILT, some sand, little shell fragments, trace clay, greenish gray, dense, moist to wet		-25.6
42						42.6 42.6 END OF BORING AT 42.0 FEET; WELL SET AT 42.0 FEET.	#7	-26.6
43								
44								
45								
46								
47								
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-26B SHEET 3 OF 3

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-29B
COORDINATES: EAST: 2464566.1200 NORTH: 363109.0400
ELEVATION: SURFACE: 18.5 TOP OF STEEL CASING: 20.28

RIG: R35-Mobile Drill									
	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	4-26-94	46.0	Hot, breezy		-
LENGTH	2'								
TYPE	STD.			Rotary					-
HAMMER WT.	140#								
FALL	30"						- —		
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.78	-40.0
Screen	2"	.10 Slot, Schedule 40 PVC	-40.0	-44.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Visual Description	Well Installation Detail	Elevation
1	AN						
2					SILT, little sand, trace gravel, dark brown, medium dense, damp	#0	
3	S-1	1.3/2.0 65%	5 5 7 8		3.0 3.0 SILT, trace clay, trace sand, light brown and gray, medium dense, moist.		15.5
4							
5	S-2	2.0/2.0 100%	3 3 5 9		5.3 5.3 SAND, medium to fine grained, trace silt, light gray, medium dense, wet	#1	13.2
6							
7	35-MW298-03 S-3	2.0/2.0 100%	5 6 9 15		NOTE: Groundwater encountered at 8.0'		10.5
8							
9	S-4	2.0/2.0 100%	5 6 7 9		NOTE: SAND is fine grained.	#0	
10					Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-29B SHEET 1 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-29B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12						12.5 (est) 12.5		6.0
13								
14								
15						SILT, trace sand, black, loose, wet, UNIDENTIFYABLE ODOR TO THE SOILS.		
16	S-5	2.0/2.0 100%	4 4 5 6			16.1		2.4
17						Sand, fine grained, trace silt, black, medium dense, wet, same odor as above.		
18	AN						#0	
19								
20								
21	S-6	1.5/2.0 75%	1 1 1 1				#7	
22								
23	AN							
24							#0	
25						25.1 25.1		-6.6
26	S-7	2.0/2.0 100%	11 13 24 38			SAND, fine grained, well graded, trace SILT, gray, dense, wet, partially cemented with Calcium carbonate. 25.9		-7.4
27								
28						SILT, trace sand, gray, dense, moist		
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-29B SHEET 2 OF 2

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-29B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31	S-8	1.5/2.0 75%	18 22 27 25			Continued from Sheet 2 SAND, fine grained, trace shell fragments, trace silt, gray, very dense, wet, partially cemented with calcium carbonate.	#0	-
32								
33	A.N.						#0	
34								
35								-16.5
36	S-9	1.3/2.0 65%	8 13 11 15			NOTE: CAVING @ 36.6'	#2	
37								-18.5
38	A.N.							
39							#7	
40							#5	-21.5
41	S-10	2.0/2.0 100%	8 10 15 16					
42								
43	S-11	2.0/2.0 100%	12 20 25 26				#5 #8	
44								-25.5
45	S-12	2.0/2.0 100%	10 11 12 11			44.6 44.6 SAND, fine grained, some silt, trace shell fragments, greenish gray, medium dense, moist 46.6 END OF BORING @ 46.0 FEET.	#7 #5	-26.5
46								-27.5
47								
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-29B SHEET 3 OF 3

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-29A
COORDINATES: EAST: 2464566.0500 NORTH: 363103.4520
ELEVATION: SURFACE: 18.6 TOP OF STEEL CASING: 20.62

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25" ID		4-27-94	17	Hot, Breezy		
LENGTH	2'		5'						
TYPE	STD.		H.S.A.						
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.02	-7.05
Screen	2"	.10 Slot, Schedule 40 PVC	-7.05	-16.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1						SEE BORING LOG FOR 35MW-29B FOR SOIL INFORMATION	#0 #10	
2							2.5	16.1
3							#2 #2	
4							4.5	14.1
5							#7 #5	
6							6.05	12.55
7							#5	
8							#8	
9								
10								

Match to Sheet 2

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-29A SHEET 1 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-29A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet	#5	
12								
13							#8 #6	
14						SEE BORING LOG FOR 35MW-29B FOR SOIL INFORMATION.		
15							#7	3.6
15.0								
16								2.6
16.0							#5	
17								1.6
17.0								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-29A SHEET 2 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-30B
COORDINATES: EAST: 2464810.9200 NORTH: 362825.6830
ELEVATION: SURFACE: 16.2 TOP OF STEEL CASING: 18.38

RIG: R35-Mobile Drill									
	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	5-11-94	44.0	Cool, Sunny		
LENGTH	2'								
TYPE	STD.			ROTARY					-
HAMMER WT.	140#								
FALL	30"						- -		
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.18	-37.25
Screen	2"	.10 Slot, Schedule 40 PVC	-37.25	-41.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Elevation
1	S-1	1.8/2.0 90%	2 3 3 4			SILT, some roots, trace sand, dark brown, loose, damp. NOTE: Root content decreasing	
2						2.0 2.0	14.2
3	S-2	1.7/2.0 85%	2 3 4 4			SILT, little sand, trace clay, brown, loose, damp	
4						3.9 3.9	12.3
5	S-3	2.0/2.0 100%	2 2 3 3			SILTY CLAY, trace sand, brown, medium stiff, damp	
6						4.9 4.9	11.3
7	35-MW30B-04 S-4	1.5/2.0 75%	5 8 12 10			SAND, fine grained, little silt, dark gray, loose, wet. NOTE: Trace silt, light brown, medium dense	
8						7.8 7.8	8.4
9	S-5	0.6/2.0 30%	3 4 10 13			SAND, medium grained, trace silt, light brown, medium dense, moist. NOTE: Groundwater at 9.8 feet.	
10						Match to Sheet 2	

Well Installation Detail: #0, #1, #0

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-30B SHEET 1 OF 3

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-30B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						**Continued from Sheet 1**		
12						12.5 (est) 12.5		3.7
13								
14								
15						SAND, fine grained, trace silt, gray, loose, wet		
16	S-6	1.7 / 2.0	2 3				40	
17		85%	3 5					
18								
19								
20								
21	S-7	1.4 / 2.0	1 WOH			NOTE: Olive color	47	
22		70%	WOH WOH					
23								
24						23.5 (est) 23.6		-7.3
25							10	
26	S-8	2.0 / 2.0	8 10			SILT, Little Clay, trace sand, grayish white, dense, wet 26.2 26.2		-10.0
27		100%	22 26			SAND, fine to medium grained, some shell fragments, trace silt, light gray, dense, wet, Partially cemented with Calcium carbonate.		
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-30B SHEET 2 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-30B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31	S-9	1.2/2.0 60%	22 24 24 23			Continued from Sheet 2	#2 #2	-
32								
33	AN							-16.8
34						33.5 (est) 33.5	#1	-17.3
35						GRAVEL, (cemented Sand, QUARTZ PEBBLES and limestone fragments) some shell fragments, gray, very dense, wet	#5	
36	S-10	1.2/2.0 60%	18 22 26 17					
37								-21.05
38	AN						#5	
39							#8	
40								
41	S-11	1.9/2.0 95%	20 22 24 22					-25.05
42						41.9 41.9	#1	-25.7 -25.8
43	S-12	2.0/2.0 100%	5 8 10 12			SAND, fine grained, some silt, greenish gray, medium dense, moist	#5	-26.8
44						44.0 44.0	#3 #3 #3	-27.8
45						END OF BORING AT 44.0 FEET; SET WELL AT 42.0 FEET.		
46								
47								
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-30B
SHEET 3 OF 3

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECOR

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-30A
COORDINATES: EAST: 2464806.3000 NORTH: 362825.7500
ELEVATION: SURFACE: 16.3 TOP OF STEEL CASING: 18.38

RIG: R35-Mobile Drill									
	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25" ID		5-11-94	17.0	Cool, Sunny		
LENGTH	2'		5'						
TYPE	STD.		H.S.A.						
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.08'	-6.25
Screen	2"	.10 Slot, Schedule 40 PVC	-6.25	-15.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1						SEE BORING LOG FOR 35MW-30B FOR SOIL INFORMATION.	#0 #0	
2								
3						3.0	#1	13.3
4							#2 #2	
5						4.5		11.8
6							#1.5 #1.5	
7						6.25	#3	10.05
8							#8	
9								
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-30A SHEET 1 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-30A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12						SEE BORING LOG FOR 35MW-30B FOR SOIL INFORMATION.	#5 #8 #5	
13								
14								
15								
15.25							#7	1.05
16								
16.0							#5	0.3
17								-0.7
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-30A
SHEET 2 OF 2

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-31B
COORDINATES: EAST: 2465209.7100 NORTH: 363319.6060
ELEVATION: SURFACE: 16.4 TOP OF STEEL CASING: 18.46

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	4-30-94	47.0	Hot, Humid		
LENGTH	2'								
TYPE	STD.			ROTARY					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.06	-37
Screen	2"	.10 Slot, Schedule 40 PVC	-37.0	-41.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	S-1	1.3/2.0 65%	10 10 9 6			SAND, fine grained, little silt, trace roots, light brown, medium dense, dry	#0	
2						1.7 SILTY SAND, trace roots, dark brown, loose, dry		14.7
3	S-2	1.5/2.0 75%	2 2 3 2			3.0 SILT, trace sand, trace clay, trace roots, light brown, loose, moist to damp		13.4
4						4.0		12.4
5	S-3 (35-MW29, 03/35-MW40-03D)	1.4/2.0 70%	5 5 3 2			SILT, some clay, light brown, medium stiff to stiff, moist. NOTE: Groundwater encountered at 5.9 FEET	#7	
6						6.0		10.4
7	S-4	1.7/2.0 85%	4 5 6 9			SAND, fine grained, trace silt, light brown, medium dense, wet		
8								8.4
9	S-5	0.8/2.0 40%	5 5 4 6			NOTE: MEDIUM grained @ 8.0 FEET.	#0	
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-31B SHEET 1 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-31B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12	A.N.					12.5		3.9
13							0	
14								
15						SAND, fine grained, trace silt, trace clay, gray, medium dense, wet		
16	S-6	1.9/2.0 95%	13 12 9 7					
17								
18						18.0 (est)		-1.6
19	A.N.						7	
20						Sand, fine grained, trace silt, reddish gray, loose, wet, iron staining.		
21	S-7	0.3/2.0 15%	1 1 1 1					
22								
23								
24	A.N.					24.0 (est)		-7.6
25						Sand, fine grained, trace silt, gray, medium dense becoming loose, wet, partially cemented with calcium carbonate		
26	S-8	1.1/2.0 55%	12/20 2 1				0	
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-31B
SHEET 2 OF 3

Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-31B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31	S-9	1.6/2.0 80%	11 25 15 18			Continued from Sheet SAND, fine grained, little shell fragments, gray, dense, wet, partially cemented with calcium carbonate.	#0 #0	-
32								
33	A.N.						#2 #7 #2	-16.1
34								
35								-18.6
36	S-10	1.4/2.0 70%	15 22 16 18				#5	
37								-20.6
38							#8	
39								
40							#5	
41	S-11	2.0/2.0 100%	18 23 24 30				#7	-24.6
42								-25.6
43							#5	-26.6
44						48.5 (est) 48.5	#3	-27.1
45							#3 #3	
46	S-12	2.0/2.0 100%	5 5 10 12			SAND, fine grained, some silt, greenish gray, medium dense, moist		
47						47.0 47.6 END OF BORING AT 47.0 FEET		-30.6
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-31B SHEET 3 OF 3

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-31A
COORDINATES: EAST: 2465203.3700 NORTH: 363319.0100
ELEVATION: SURFACE: 16.4 TOP OF STEEL CASING: 18.32

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25" ID		1-30-94	14.0	Hot, Humid		
LENGTH	2'		5'						
TYPE	STD.		H.S.A.						
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.92	-3.05
Screen	2"	.10 Slot, Schedule 40 PVC	-3.05	-12.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1							#0	15.4
2							#2	
3						SEE BORING LOG FOR 35MW-31B FOR SOIL INFORMATION	#7	13.9
4								13.35
5							#1	
6								
7								
8							#8	
9							#5	
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-31A
SHEET 1 OF 2

Baker

Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-31A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12						12.0	#5 #8 #5	4.4
13						13.0	#7 - —	3.4
14						14.0	#5	2.4
15								
16								
17						SEE BORING LOG FOR		
18						35MW-31B FOR SOIL INFORMATION		
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-31A
SHEET 2 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-32B
COORDINATES: EAST: 2465339.4700 NORTH: 362926.5520
ELEVATION: SURFACE: 16.1 TOP OF STEEL CASING: 18.75

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	5-14-94	44.0	Sunny, Cool		
LENGTH	2'								
TYPE	STD.			ROTARY					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.65	-37.3
Screen	2"	.10 Slot, Schedule 40 PVC	-37.3	-41.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	S-1	2.0/2.0 100%	20 30 34 15			SILTY SAND, little gravel, light brown, very dense, dry (FILL MATERIAL)	#0	
2						1.8		14.3
3	S-2	1.8/2.0 90%	7 9 9 10			SILT, some sand, trace gravel, light brown, medium dense, moist		
4						3.7		12.4
5	S-3	1.4/2.0 70%	2 2 3 4			SAND, fine grained, little silt, trace gravel, light brown, loose, moist to wet	#7	
6						NOTE: GROUNDWATER ENCOUNTERED AT 5.7 FEET.		
7	S-4	1.2/2.0 60%	1 2 3 3			6.4 SAND, fine grained, trace silt, trace clay, gray, loose, wet	#0	9.7
8						NOTE: CLAY CONTENT DECREASES AT 7.0 FEET		
9	S-5	1.5/2.0 75%	1 2 3 3			NOTE: CLAY CONTENT INCREASES @ 9.3 FEET		
10						Match to Sheet 2		

35-MW-32BS-03

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-32B SHEET 1 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-32B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12						12.5 (lost) 12.5		3.6
13	A.N.							
14							#7	
15						SAND, fine grained, trace silt, olive, medium dense, wet		
16	S-6	1.5/2.0 75%	6 9 11 14			NOTE: dark gray @ 16.0 feet		
17							#0	
18								
19	A.N.							
20								
21	S-7	2.0/2.0 100%	1 1 2 2					
22							#0	
23	A.N.							
24								
25								
26						NOTE: We skipped the 25 to 27 foot interval because of a 26 deep loss of drilling fluids 26.0		-9.9
27						SAND, fine grained, some shell fragments, trace silt, gray, dense, wet, partially cemented with calcium carbonate.		
28								
29								-12.9
30							#2	#2

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-32B
SHEET 2 OF 3

Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-32B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31	S-8	1.9/2.0 95%	20 22 22 24			Continued from Sheet 2	#2	-
32								
33	A.N.						#7	
34								-17.9
35								
36	S-9	2.0/2.0 100%	25 27 27 28					
37								-21.2
38	A.N.						#5	
39							#8	
40								
41	S-10	2.0/2.0 100%	18 20 22 22			NOTE: Trace clay from 41.3 feet to 41.6 feet, silt content increasing		-25.15
42						42.0 42.0 SAND, fine grained, some shell fragments	#7	-25.9
43	S-11	2.0/2.0 100%	8 10 10 11				#5	-26.9
44						END OF BORING AT 44.0 FEET; SET WELL AT 42.0	#3 #3 #3	-27.9
45								
46								
47								
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-32B
SHEET 3 OF 3

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECOR

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-32A
COORDINATES: EAST: 2465339.5300 NORTH: 362921.8600
ELEVATION: SURFACE: 16.1 TOP OF STEEL CASING: 18.23

RIG: R35-Mobile Drill									
	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25" ID		5-14-94	15.0	Sunny, cool		
LENGTH	2'		5'						
TYPE	STD.		U.S.A.						
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.13	-4.25
Screen	2"	.10 Slot, Schedule 40 PVC	-4.25	-13.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1							#0 #0	
2						2.0	#7	14.1
3						3.0	#2 #2	13.1
4						SEE BORING LOG FOR 35MW-32B FOR SOIL INFORMATION 4.25	#5	11.85
5								
6								
7							#5	
8							#8	
9								
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-32A SHEET 1 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-32A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12							#5 #8 #5	
13							13.25	2.85
14							#7 14.0	2.1
15							#5 15.0	1.1
16						SEE BORING LOG FOR 35MW-32B FOR SOIL INFORMATION		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-32A SHEET 2 OF 2

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-33B
COORDINATES: EAST: 2465634.3100 NORTH: 363097.4320
ELEVATION: SURFACE: 16.8 TOP OF STEEL CASING: 16.62

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	5-11-94	27.0	Cool, Sunny		
LENGTH	2'								
TYPE	STD.			ROTARY					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	-0.18	-39.0
Screen	2"	.10 Slot, Schedule 40 PVC	-39.0	-43.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	A.N.					0.5 ASPHALT 0.5		16.3
2						SAND, fine grained, trace gravel, trace silt, brown, medium dense, dry	#0	
3	S-2	1.3/2.0 65%	4 5 7 7			3.5 SAND, very fine grained, trace silt, gray, medium dense, dry 3.5		13.3
4								
5	S-3	1.3/2.0 65%	5 6 8 8					
6						NOTE: damp	#7	
7	S-4	1.3/2.0 65%	7 7 7 5					
8								
9	35-MW33B-05 S-5	1.3/2.0 65%	4 4 5 5			8.7 8.7 CLAY, some silt, trace sand, gray and brown, medium stiff, moist 9.2	#0	8.1 7.6
10						SAND, fine grained, Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-33B SHEET 1 OF 3

Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-33B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1 trace silt, brown, medium dense, moist.		-
12								
13								
14								
15							#0	
16	S-7	1.6/2.0 80%	5 5 7 2			NOTE: Orange at 16.4 FEET.		
17								
18								
19							#7	
20						NOTE: Light Brown at 20.0 FEET.		
21	S-8	1.0/2.0 50%	1 WOH WOH WOH			NOTE: Olive color at 21.0 FEET.		
22								
23						23.0 (est) 23.0		-6.2
24								
25						SAND, fine grained, some shell fragments, trace silt, gray, medium dense, wet, partially cemented with calcium carbonate.	#0	
26	S-9	1.8/2.0 90%	5 9 16 20					
27						27.0		-10.2
28						END OF BORING FOR 5-11-94.		
29								
30								-13.2

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-33B SHEET 2 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-33B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31	S-10	1.25/2.0 62.5	18 25 32 22			Continued from Sheet 2 SAND, fine grained, little shell fragments, trace silt, gray, very dense, wet, partially cemented with calcium carbonate	#2	-
32								
33	A.N.						#2	
34								
35							#7	
36	S-11	0.9/2.0 45%	22 25 35 50/.5			NOTE: Mudstone fragments observed in spoils		-19.2
37								
38	A.N.						#5	
39								-22.2
40							#5	
41	S-12	1.7/2.0 85%	15 22 24 22			NOTE: Some shell fragments, little silt 41.3 GRAVEL, (cemented sand), some shell fragments, gray, very dense, 42.5 WET 42.5	#8	
42								
43	S-13	2.0/2.0 100%	15 22 24 24			SILTY SAND, fine grained, trace shell fragments, gray, very dense, moist 43.7	#7	-26.2
44						SILT, some sand, trace shell fragments, greenish gray, dense, moist 44.0		-27.2
45						END OF BORING AT 44.0 FEET; SET WELL AT 44.0 FEET.		
46								
47								
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-33B SHEET 3 OF 3

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-33A
COORDINATES: EAST: 2465638.5600 NORTH: 363097.6030
ELEVATION: SURFACE: 16.9 TOP OF STEEL CASING: 16.68

RIG: R35-Mobile Drill									
	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25" ID		5-12-94	15.0	Sunny, Cool, breezy		
LENGTH	2'		5'						
TYPE	STD.		H.S.A.						
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	-0.22	-4.25
Screen	2"	.10 Slot, Schedule 40 PVC	-4.25	-13.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1							#0	15.4
1.5								
2							#2	
3						SEE BORING LOGS FOR 35MW-33B FOR SOIL INFORMATION.	#7	13.9
4								12.65
4.25								
5								
6							#5	
7							#8	
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-33A SHEET 1 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-33A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12							#5 #8 #5	
13							13.2	3.65
14						SEE BORING LOG FOR 35MW-33B FOR SOIL INFORMATION.	#7 14.0	2.9
15							#6 15.0	1.9
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-33A
SHEET 2 OF 2

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-34B
COORDINATES: EAST: 2465706.6900 NORTH: 362733.6920
ELEVATION: SURFACE: 14.8 TOP OF STEEL CASING: 16.76

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	5-10-94	42.0	Cool, overcast		
LENGTH	2'								
TYPE	STD.			ROTARY					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.96	-36.2
Screen	2"	.10 Slot, Schedule 40 PVC	-36.25	-40.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	S-1	2.0/2.0 100%	4 6 6 5			0.3 TOPSOIL 0.3 SILTY SAND, trace roots, brown, medium dense, damp 1.2 1.2 SILT, little sand, trace clay, brown, medium dense, damp 1.5 1.5 SAND, fine grained, little silt, trace gravel, brown, medium dense, damp	#0	14.5
2								13.6
3	S-2	0.4/2.0 20%	4 5 5 3					13.3
4						4.0 4.0 SILTY SAND, brown, loose, moist		10.8
5	35-MW34B-03 S-3	1.7/2.0 85%	1 1 2 2			5.3 5.3 Clay, some silt, trace sand, brown and gray, soft, moist	#7	9.5
6								
7	S-4	2.0/2.0 100%	1 2 9 14			7.2 7.2 SAND, medium grained, poorly graded, trace silt, dark gray turning brown, medium dense, wet NOTE: Groundwater encountered at 7.5 feet.	#0	7.6
8								
9	S-5	0.8/2.0 40%	3 3 2 1					
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-34B SHEET 1 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-34B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12	A.N.					12.5 (est) 12.5		2.3
13								
14								
15		2.0/2.0	1 2 3			CLAYEY SILT, trace sand, trace root material, gray, medium stiff, wet		
16								
17		100%	3					
18	A.N.					18.5 (est) 18.5		-3.7
19						PEAT, some wood fragments, dark brown, medium dense, wet		
20		2.0/2.0	4 5					
21			7					
22		100%	9					
23	A.N.							
24								
25						25.4 25.4		-10.6
26		2.0/2.0	2 2 3			Sand, fine grained, trace silt, gray, loose, wet.		
27		100%	3			26.7 26.7 SILT, trace sand, dark gray, loose, wet		-11.9
28								
29						29.0 (est) 29.0		-14.2
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-34B SHEET 2 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-34B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31	S-9	1.9/2.0 95%	28 25 26 30			Continued from Sheet 2 SAND, fine grained, some shell fragments, trace silt, grayish white, very dense, wet, partially cemented with calcium carbonate.	#2 #2	-
32								-17.2
33	A.N.						#5	
34							#7	
35								
36	S-10	1.6/2.0 80%	15 17 16 15				#5	-21.45
37								
38	A.N.						#8	
39								
40								
41	S-11	1.9/2.0 95%	16 18 18 19			40.5 40.5 SAND, fine grained, some silt, trace shell fragments, greenish gray, dense, moist 42.0 42.0	#7 #5	-25.45 -26.2 -27.2
42								
43						END OF BORING AT 42.0 FEET; SET WELL AT 41.0 FEET		
44								
45								
46								
47								
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-34B
SHEET 3 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-34A
COORDINATES: EAST: 2465711.2800 NORTH: 362735.0940
ELEVATION: SURFACE: 14.7 TOP OF STEEL CASING: 16.77

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25" I.D.		5-10-94	15.0	Cool, Overcast		
LENGTH	2'		5'						
TYPE	STD.		H.S.A.						
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.07	-3.75
Screen	2"	.10 Slot, Schedule 40 PVC	-3.75	-12.75

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1						SEE BORING LOG FOR 35MW-34B FOR SOIL INFORMATION	#0 #7 #0	
2							2.5	12.2
3							#2 #2	
4							3.5 3.75	11.2 10.95
5							#5	
6								
7							#8	
8								
9							#5	
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-34A SHEET 1 OF 2

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-34A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1	#5 #8	-
12							#5	
13						SEE BORING LOG FOR 35MW-34B FOR SOIL INFORMATION	#7	1.96
14						14.0	#5	0.7
15						15.0		-0.3
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-34A SHEET 2 OF 2

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-35B
COORDINATES: EAST: 2465840.3700 NORTH: 362997.6940
ELEVATION: SURFACE: 13.7 TOP OF STEEL CASING: 15.67

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	5-3-94	42.0	HOT, BREEZY, SUNNY		
LENGTH	2'								
TYPE	STD.			ROTARY					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.97	-34.10
Screen	2"	.10 Slot, Schedule 40 PVC	-34.10	-39.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	S-1	1.3/2.0 65%	5 9 13 15			0.25 TOPSOIL 0.25 SAND, fine grained, trace silt, gray, medium dense, damp 0.7 0.7		13.45 13.0
2						SILT, little sand, light brown, medium dense, damp 2.2 2.2		
3	35-MW35BS-02 S-2	1.6/2.0 80%	5 6 6 7			Sand, fine grained, trace silt, light brown, medium dense to loose, damp	0	11.5
4								
5	S-3	1.2/2.0 60%	4 5 4 4			NOTE: AT 5.0' - gray in color. 5.7 . . . . . 5.7 SILTY SAND, fine grained, light brown, loose, moist 6.0		8.0 7.7
6								
7	S-4	2.0/2.0 100%	5 5 10 12			CLAY, trace silt, brown and gray, stiff, wet NOTE: GROUNDWATER AT 5.8 FEET NOTE: SAND STRINGER AT 7.8 FEET. (±0.2 FEET THICK)		
8								
9	S-5	2.0/2.0 100%	10 12 11 12			NOTE: SAND STRINGER AT 8.6 FEET (± 1.3 FEET THICK) AND AT 9.4 FEET (±0.2 FEET THICK). NOTE: CLAY IS becoming more gray.	0	
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-35B SHEET 1 OF 3

Baker

Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm

S.O. NO.: 62470-232 BORING NO.: 35MW-35B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12	A.N.							
13						13.0 (est) 13.0	#D	0.7
14								
15						SILT, trace clay, trace wood		
16	S-6	2.0 / 2.0	WOH / 1 / 1			And root fragments, dark gray, SOFT, damp		
17		100%						
18	A.N.						#T	
19								
20						20.3 20.5		-6.6
21	S-7	2.0 / 2.0	9 / 8 / 10			SAND, fine to medium grained, little shell fragments, trace silt, gray, medium dense, wet, partially cemented with calcium carbonate		
22		100%	15				#D	
23	A.N.							
24								
25						NOTE: Shell fragments increasing		
26	S-8	2.0 / 2.0	9 / 15 / 21				#N	-12.3
27		100%	23					
28								
29							#V	
30						30.0 (est) 30.0		-16.3

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp

DRILLER: Brian Van Doren BORING NO.: 35MW-35B SHEET 2 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-35B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31	N					Continued from Sheet 3 DID NOT SAMPLE - LOST RECIRCULATION OF DRILLING FLUIDS	#2 #2	-17.3
32						LIMESTONE FRAGMENTS, Some shell fragments, trace sand, gray, dense, wet		
33	A.N.						#7	
34						34.0 (est) 34.0		-20.3
35		2.0	11			SAND, fine grained, little shell fragments, gray, dense, wet, Partially cemented with calcium Carbonate.	#5 #6	-20.4
36	S-9	2.0	19					
37		100%	21 22				#8	
38	A.N.							
39								-25.55
40						40.0 40.0	#7	-26.3
41	S-10	2.0	4			Sand, fine grained, little silt, trace shell fragments, greenish gray, loose, moist	#5	-27.3
42		2.0	4 5			42.0 42.0	#3 #3 #3	-28.3
43		100%	6			END OF BORING AT 42.0 FEET, SET WELL AT 40.0 FEET		
44								
45								
46								
47								
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-35B
SHEET 3 OF 3

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-35A
COORDINATES: EAST: 2465844.6700 NORTH: 362994.5130
ELEVATION: SURFACE: 13.6 TOP OF STEEL CASING: 15.45

RIG: R35-Mobile Drill									
	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25" ID		5-3-94	15.0	HOT, BREEZY SUNNY		
LENGTH	2'		5'						
TYPE	STD.		H.S.A.						-
HAMMER WT.	140#								
FALL	30"						- —		
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.85	-4.2
Screen	2"	.10 Slot, Schedule 40 PVC	-4.25	-13.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1						1.0	#D	12.6
2						SEE BORING LOG FOR 35MW-35B FOR SOIL INFORMATION	#N	
3						3.0	#1	10.6
4						4.25	#S	9.35
5								
6								
7								
8							#B	
9							#S	
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-35A SHEET 1 OF 2

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-35A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1	#5 #8	
12								
13							#5	
						13.25		0.35
14						14.0	#7	-0.4
15						SEE BORING LOG FOR 35MW-35B FOR SOIL INFORMATION. 15.0	#5	-1.4
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-35A SHEET 2 OF 2

Baker
Baker Environmental, Inc

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-36B
COORDINATES: EAST: 2466049.6000 NORTH: 363075.1260
ELEVATION: SURFACE: 11.3 TOP OF STEEL CASING: 13.22

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	5-4-94	42.0	WET, COOL, 70's		-
LENGTH	2'								
TYPE	STD.			ROTARY					-
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.92	-34.2
Screen	2"	.10 Slot, Schedule 40 PVC	-34.20	-38.26

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	S-1	2.0/2.0 100%	9 11 12 10			0.75 TOPSOIL 0.75 SILT, little sand, trace clay, 1.25 light brown, medium dense, dry 1.25	#0	10.55 10.05
2						SAND, fine grained, trace silt, light brown, medium dense, dry 2.0 2.0		9.03
3	S-2	1.0/2.0 50%	3 3 3 4			SILT, trace sand, dark gray, loose, 3.0 moist to damp 3.9		8.3
4						SAND, fine grained, trace silt, light brown, loose, damp, gray streaking		
5	35-MW36B-03 S-3	0.75/2.0 37.5%	3 4 3 3				#7	
6								
7	S-4	1.0/2.0 50%	1 1 1 1			NOTE: Groundwater at 7.5 FEET.		
8								
9	S-5	1.8/2.0 90%	1 2 2 2			8.8 8.8 SILT, trace sand, trace clay, dark gray, loose, wet 9.2	#0	2.5 2.1
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-36B SHEET 1 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-36B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12						CLAY, little silt, Gray and brown, soft, wet, stained soils at 8.9 Feet, hydrocarbon odors observed		
13	A.N.							
14								
15						15.3 15.3		
16	S-6	2.0/2.0 100%	4 5 5 8			SAND, fine grained, trace silt, gray, medium dense, wet		-4.0
17								
18								
19	A.N.							
20								
21	S-7	1.7/2.0 85%	5 7 7 9					
22								
23						23.5 23.5		
24	A.N.					SAND, fine grained, trace Shell fragments, trace Silt, reddish brown, medium dense, wet, iron Staining		-12.2
25								
26	S-8	2.0/2.0 100%	1 3 8 20					
27						26.7 26.7		-15.4
28						SAND, fine grained, some Shell fragments, gray, dense, wet partially cemented calcium carbonate.		-16.7
29								
30								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-36B
SHEET 2 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-36B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31–32	S-9	2.0 / 2.0 100%	18 22 26 28			Continued from Sheet 2 SAND, fine grained, some shell fragments, gray, dense, wet, partially cemented with calcium carbonate.	#2 #7 #5	-19.7
33–34	A.N.							-22.9
35–36	S-10	2.0 / 2.0 100%	19 22 22 20				#5 #8	
37–38	A.N.							-26.96
39						39.0 (est) 39.0	#7 #5	-27.7
40–41	S-11	2.0 / 2.0 100%	9 18 18 20			SAND, fine grained, some silt, trace shell fragments, greenish gray, dense, moist	#3 #3 #3	-28.7
42						42.0 42.0 END OF BORING AT 42.0 FEET; SET WELL AT 39.0 FEET.		-30.7
43–50								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-36B SHEET 3 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-36A
COORDINATES: EAST: 2466050.9700 NORTH: 363068.7520
ELEVATION: SURFACE: 11.3 TOP OF STEEL CASING: 13.30

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25"		5-9-94	16.0	BRIGHT, SUNNY BREEZY, HOT		
LENGTH	2'		5'						
TYPE	STD.		H.S.A.						
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.0	-3.25
Screen	2"	.10 Slot, Schedule 40 PVC	-3.25	-12.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1							#0	9.8
1.5							#2	
2						SEE BORING LOG FOR 35MW-36B FOR SOIL INFORMATION	#7	8.8
3								
3.25								8.05
4							#5	
5								
6							#5	
7							#8	
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-36A SHEET 1 OF 2

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-36A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1	#8	-
12							#5 #5	-0.95
						12.25	#7	
13						13.0		-1.7
14							#5	
15						SEE BORING LOG FOR 35MW-36B FOR SOIL INFORMATION		
16						16.0		-4.7
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-36A SHEET 2 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-37B
COORDINATES: EAST: 2461336.8600 NORTH: 343160.2700
ELEVATION: SURFACE: 18.3 TOP OF STEEL CASING: 20.33

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	5-15-94	45.0	WARM, SUNNY		
LENGTH	2'								
TYPE	STD.			ROTARY					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.03	-39.0
Screen	2"	.10 Slot, Schedule 40 PVC	-39.0	-43.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	S-1	1.0/2.0 50%	6 9 11 7			SILT, Some root material, little sand, dark brown, medium dense, dry		
2						2.3 2.3	#0	16.0
3	S-2	1.5/2.0 75%	2 3 3 3			SILT, trace sand, trace clay, light brown, loose, moist. NOTE: SAND APPEARS CONCENTRATED IN LOCALIZED ZONES.		
4								
5	35-MW37B-03 S-3	2.0/2.0 100%	2 3 6 9			5.5 5.5	#7	12.8
6						SAND, medium grained, trace silt, brown, medium dense, moist NOTE: GROUNDWATER ENCOUNTERED AT 7.5 feet.		
7	S-4	1.5/2.0 100%	4 9 10 12					
8							#0	
9	S-5	1.7/2.0 85%	4 6 9 12			9.6 9.6		8.7
10						SAND, fine grained, Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-37B SHEET 1 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-37B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11	S-6	1.3/2.0 65%	5 4 2 2			Continued from Sheet 1 well graded, trace silt, brown, loose, wet	#0	-
12								
13	A.N.					13.0 - - - - - - - - - 13.0	-	5.3
14								
15	S-7	1.8/2.0 90%	2 2 3 3			SAND, coarse grained, trace silt, light brown, loose, wet 15.3 15.3		3.0
16								2.1
17						SAND, fine to medium grained, well graded, trace silt, dark gray, loose, wet. 16.2 16.2		
18	A.N.							
19						SAND, fine grained, little silt, dark gray, loose, wet 18.5(est) - - - - - 18.5	#1	-0.2
20								
21	S-8	1.8/2.0 90%	1 WOH 1 WOH			SAND, fine grained, trace silt, Olive, Very Loose, wet		
22								
23								
24								
25						NOTE: Skipped the 25'-27' interval because we feared losing drilling fluid recirculation.	#0	
26						26.0(est) - - - - - - 26.0		-7.7
27						SAND, fine grained, some shell fragments, trace silt, gray, dense, wet, partially cemented with calcium carbonate.		
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-37B SHEET 2 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-37B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31	S-9	1.7/2.0 85%	18 22 23 20			Continued from Sheet 2 NOTE: Little Shell fragments	#0 #0	-
32								-13.7
33	AN						#2 #2	
34							#7	
35								
36	S-10	1.9/2.0 95%	15 18 22 21					-17.7
37								
38	AN							
39							#5	-20.7
40								
41	S-11	2.0/2.0 100%	9 11 15 22			41.7 41.7	#8 #5	
42						SILTY SAND, fine grained, trace Shell fragments, greenish Gray; dense, Moist		
43	S-12	2.0/2.0 100%	12 18 20 18				#7	-24.7
44							#5	-25.7
45						45.0 45.0 END OF BORING AT 45.0 FEET; SET WELL AT 44.0 FEET.		-26.7
46								
47								
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-37B
SHEET 3 OF 3

TEST BORING AND WELL CONSTRUCTION RECOR

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-37A
COORDINATES: EAST: 2464340.4100 NORTH: 363160.1660
ELEVATION: SURFACE: 18.3 TOP OF STEEL CASING: 20.30

RIG: R35-Mobile Drill									
	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25" ID		5-15-94	16.0	Warm, Sunny		
LENGTH	2'		5'						
TYPE	STD.		H.S.A.						-
HAMMER WT.	140#								
FALL	30"						- —		
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+2.0	-5.2
Screen	2"	.10 Slot, Schedule 40 PVC	-5.2	-14.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1						SEE BORING LOG FOR 35MW-37B FOR SOIL INFORMATION.	#0	
2							#0	
3						2.5	#2 #1 #2	15.8
4						4.0		14.3
5						5.2		13.1
6							#5	
7							#8	
8							#5	
9								
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-37A SHEET 1 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-37A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12								
13							#5 #8 #5	
14							14.0	4.3
15						SEE BORING LOG FOR 35 MW-37B FOR SOIL INFORMATION	#7 15.0	3.3
16							#5 16.0	2.3
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-37A SHEET 2 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-38B
COORDINATES: EAST: 2464508.4900 NORTH: 362813.1980
ELEVATION: SURFACE: 18.2 TOP OF STEEL CASING: 20.00

RIG: R35-Mobile Drill	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"			8"	5-16-94	45.0	Hot, Sunny, Muggy		
LENGTH	2'								
TYPE	STD.			ROTARY					
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.8	-39.0
Screen	2"	.10 Slot, Schedule 40 PVC	-39.0	-43.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1	S-1	1.9/2.0 95%	4 7 9 7			SILTY SAND, trace roots, dark brown, medium dense, dry 1.0		17.2
2						SILT, trace sand, dark brown, medium dense, damp. 2.7		
3	S-2	1.7/2.0 85%	4 7 6 6			SAND, medium grained, little silt, brown, medium dense, damp.	#0	15.5
4								
5	35-MW38BS-03 S-3	1.6/2.0 80%	5 7 10 12			NOTE: Trace silt at 4.0 FEET. NOTE: Gray at 5.7 feet.	#1	
6								
7	S-4	1.8/2.0 90%	4 6 6 7			NOTE: Groundwater encountered at 7.0 FEET.		
8							#0	
9	S-5	1.9/2.0 95%	1 3 3 4			NOTE: Fine grained at 9.8 FEET.		
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-38B SHEET 1 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-38B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12	A.N.					12.5(est) 12.5		5.7
13								
14								
15								
16	S-6	1.4/2.0 70%	1 1 2 3			SAND, fine grained, trace Silt, light green, loose, wet		
17								
18	A.N.							
19								
20								
21	S-7	1.6/2.0 80%	3 4 4 6					
22								
23	A.N.							
24								
25								
26	S-8	2.0/2.0 100%	4 6 12 18			25.9 25.9 SILTY Clay, Some Shell fragments, gray, very stiff, moist, Calcium Carbonate (marl). 27.8		-7.7
27								
28	S-9	2.0/2.0 100%	12 12 14 18			GRAVEL, (Limestone fragments), Little clay, trace silt, gray, dense, wet		-9.6
29								
30	A.N.							

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-38B SHEET 2 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-38B

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
31						Continued from Sheet	#0 #0	-
31.5								-13.3
32								-13.8
33	A.N.						#2 #2	
34								
35						SAND, fine grained, trace silt, gray, medium dense, wet partially cemented with calcium carbonate.		
36	S-16	2.0 / 2.0 100%	10 12 12 14					-17.8
37							#7 #5	
38	A.N.							
39								-20.8
40							#5	
41	S-11	2.0 / 2.0 100%	8 12 10 16				#8	
42								
43	S-12	2.0 / 2.0 100%	9 17 8 6			43.3 SAND, fine grained, some silt, greenish gray, medium dense, moist. 43.3	#7	-24.8 -25.1
44								-25.8
45	A.N.					45.0 45.0 END OF BORING AT 45.0 FEET	#5	-26.8
46								
47								
48								
49								
50								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-38B SHEET 3 OF 3

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental, Inc.

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232
COORDINATES: EAST: 2464504.3600 NORTH: 362812.6300
ELEVATION: SURFACE: 18.1 TOP OF STEEL CASING: 19.74
BORING NO.: 35MW-38A

RIG: R35-Mobile Drill									
	SPLIT SPOON	CASING	AUGERS	BIT SIZE	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		6.25" ID		5-16-94	16.0	Hot, Sunny Muggy		
LENGTH	2'		5'						
TYPE	STD.		H.S.A.						
HAMMER WT.	140#								
FALL	30"								
STICK UP									

REMARKS: ALL WELL CONSTRUCTION DETAILS ARE BASED ON FIELD MEASUREMENTS.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Riser Pipe	2"	Schedule 40, PVC	+1.64	-5.25
Screen	2"	.10 Slot, Schedule 40 PVC	-5.25	-14.25

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
1						SEE BORING LOG FOR 35MW-38B FOR SOIL INFORMATION	#0	
2							2.0 #2	16.1
3							#7	
4							3.5	14.5
5							5.25 #5	12.85
6								
7							#5	
8							#8	
9								
10						Match to Sheet 2		

DRILLING CO.: Hardin Huber Incorporated
DRILLER: Brian Van Doren
BAKER REP.: James Culp
BORING NO.: 35MW-38A

Baker
Baker Environmental, Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 35 - Camp Geiger Area Fuel Farm
S.O. NO.: 62470-232 BORING NO.: 35MW-38A

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab. Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab. Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	Lab. Moist %	Visual Description	Well Installation Detail	Elevation
11						Continued from Sheet 1		
12								
13							#5 #8 #5	
14								3.85
15						SEE BORING LOG FOR 35MW-38B FOR SOIL INFORMATION. 15.0	#7	3.1
16						16.0	#5	2.1
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Hardin Huber Incorporated BAKER REP.: James Culp
DRILLER: Brian Van Doren BORING NO.: 35MW-38A. SHEET 2 OF 2

APPENDIX I
RI/FS SAMPLING SUMMARY

SAMPLING SUMMARY
SITE 35, CAMP GEIGER AREA FUEL FARM
REMEDIAL INVESTIGATION
CONTRACT TASK ORDER 0232
MARINE CORP BASE, CAMP LEJEUNE, NORTH CAROLINA

SURFACE WATER

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	TCL PEST/ PCB	TAL TOTAL METALS	HARDNESS
35-SWO1	4/12	X	X	X	X	X
35-SWO2	4/12	X	X	X	X	X
35-SWO3	4/12	X	X	X	X	X
35-SWO4	4/12	X	X	X	X	X
35-SWO5	4/12	X	X	X	X	X
35-SWO6	4/12	X	X	X	X	X
35-SWO7	4/20	X	X	X	X	
35-SWPD01	7/28	X	X	X	X	
35-SWPD02	7/28	X	X	X	X	

SURFACE SOIL

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	TCL PEST/ PCB	TAL METALS
35-SSO1-00	5/17	X	X	X	X
35-SSO2-00	5/17	X	X	X	X
35-SSO3-00	5/18	X	X	X	X
35-SSO4-00	5/18	X	X	X	X
35-SSO5-00	4/29	X	X		X
35-SSO6-00	4/29	X	X		X
35-SSO7-00	5/18	X	X	X	X
35-SSO8-00	4/29	X	X		X
35-SSO9-00	5/18	X	X	X	X
35-SS10-00	5/17	X	X	X	X
35-SS11-00	4/13	X	X	X	X
35-SS12-00	4/13	X	X	X	X
35-SS13-00	5/18	X	X	X	X
35-SS14-00	5/18	X	X	X	X

SEDIMENT

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	TCL PEST/ PCB	TAL METALS	TOC	GRAIN SIZE/ SIEVE
35-SDO1-06	4/16						X
35-SDO1-06	4/20	X	X	X	X	X	
35-SDO1-612	4/20	X	X	X	X		
35-SDO2-06	4/16						X
35-SDO2-06	5/17	X	X	X	X		
35-SDO2-612	5/17	X	X	X	X		
35-SDO3-06	4/14						X
35-SDO3-06	5/17	X	X	X	X		
35-SDO3-612	5/17	X	X	X	X		
35-SDO4-06	4/14						X
35-SDO4-06	4/20	X	X	X	X	X	
35-SDO4-612	4/20	X	X	X	X	X	
35-SDO5-06	5/17	X	X	X	X		
35-SDO5-612	5/17	X	X	X	X		
35-SDO5-06	4/15						X
35-SDO6-06	5/17	X	X	X	X		
35-SDO6-612	5/17	X	X	X	X		
35-SDO6-06	4/15						X
35-SDO7-06	4/14						X
35-SDO7-06	4/20	X	X	X	X	X	
35-SDO7-612	4/20	X	X	X	X	X	
35-BN02-06	4/16						X
35-BN03-06	4/16						X
35-BN04-06	4/16						X

SAMPLING SUMMARY (Continued)
SITE 35, CAMP GEIGER AREA FUEL FARM
REMEDIAL INVESTIGATION
CONTRACT TASK ORDER 0232
MARINE CORP BASE, CAMP LEJEUNE, NORTH CAROLINA

SUBSURFACE SOIL

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	TAL METALS	ADDITIONAL PARAMETERS
35-GWD01-03	4/26	X	X	X	
35-GWD02-03	5/16	X	X	X	
35-GWD03-03	5/16	X	X	X	
35-GWD03-04	5/16				X
35-GWD04-02	5/16	X	X	X	
35-GWD05-03	4/28	X	X	X	
35-MW26B-04	5/13	X			
35-MW29B-03	5/10	X	X	X	
35-MW30B-04	5/11	X			
35-MW31B-03	4/30	X			
35-MW32B-03	5/14	X			
35-MW33B-05	5/11	X			
35-MW34B-03	5/10	X			
35-MW35B-01	5/10	X	X	X	
35-MW36B-03	5/4	X			
35-MW37B-03	5/15	X			

19 actual samples ... this list doesn't match actual samples taken?

35MW29B-01

35-MW35-02

ADDITIONAL PARAMETERS, SUBSURFACE SOIL

SAMPLE LOCATION	DATE COLLECTED	TCLP VOLS	TCLP SVOLS	TCLP PEST	TCLP HERB	TCLP METALS	REACTIVITY CORROSIVITY IGNITABILITY	TOC	TOTAL KJELDAHL NITROGEN	TOTAL PHOSPOROUS EPA 365.3	REACTIVE CYANIDE	REACTIVE SULFIDE	TOTAL PLATE COUNT
35-GWD03-04	4/16	X	X	X	X	X	X	X	X	X	X	X	X

SAMPLE LOCATION	DATE COLLECTED	ATTER-BURG LIMITS	GRAIN SIZE	CONSTANT HEAD	PERMEABLITY
35-ST01	4/1	X	X	X	X

Replaced

SAMPLING SUMMARY (Continued)
SITE 35, CAMP GEIGER AREA FUEL FARM
REMEDIAL INVESTIGATION
CONTRACT TASK ORDER 0232
MARINE CORP BASE, CAMP LEJEUNE, NORTH CAROLINA

SUBSURFACE SOIL

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	TAL METALS	ADDITIONAL PARAMETERS
35-GWD01-03	4/26	X	X	X	
35-GWD02-03	5/16	X	X	X	
35-GWD03-03	5/16	X	X	X	
35-GWD03-04	5/16				X
35-GWD04-02	5/16	X	X	X	
35-GWD05-03	4/28	X	X	X	
35-MW26B-04	5/13	X			
35-MW29B-01	5/10	X	X	X	
35-MW29B-03	5/10	X	X	X	
35-MW30B-01	5/10	X	X	X	
35-MW30B-04	5/11	X			
35-MW31B-03	4/30	X			
35-MW32B-03	5/14	X			
35-MW33B-05	5/11	X			
35-MW34B-03	5/10	X			
35-MW35B-01	5/10	X	X	X	
35-MW35B-02	5/3	X			
35-MW36B-03	5/4	X			
35-MW37B-03	5/15	X			
35-MW38B-03	5/16	X			

ADDITIONAL PARAMETERS, SUBSURFACE SOIL

SAMPLE LOCATION	DATE COLLECTED	TCLP VOLS	TCLP SVOLS	TCLP PEST	TCLP HERB	TCLP METALS	REACTIVITY CORROSIVITY IGNITABILITY	TOC	TOTAL KJELDAHL NITROGEN	TOTAL PHOSPOROUS EPA 365.3	REACTIVE CYANIDE	REACTIVE SULFIDE	TOTAL PLATE COUNT
35-GWD03-04	4/16	X	X	X	X	X	X	X	X	X	X	X	X

SAMPLE LOCATION	DATE COLLECTED	ATTER-BURG LIMITS	GRAIN SIZE	CONSTANT HEAD	PERMEABILITY
35-ST01	4/1	X	X	X	X

SAMPLING SUMMARY
SITE 35, CAMP GEIGER AREA FUEL FARM
REMEDIAL INVESTIGATION
CONTRACT TASK ORDER 0232
MARINE CORP BASE, CAMP LEJEUNE, NORTH CAROLINA

SURFACE WATER

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	TCL PEST/ PCB	TAL TOTAL METALS	HARDNESS
35-SW01	4/12	X	X	X	X	X
35-SW02	4/12	X	X	X	X	X
35-SW03	4/12	X	X	X	X	X
35-SW04	4/12	X	X	X	X	X
35-SW05	4/12	X	X	X	X	X
35-SW06	4/12	X	X	X	X	X
35-SW07	4/20	X	X	X	X	
35-SWPD01	7/28	X	X	X	X	
35-SWPD02	7/28	X	X	X	X	

(Repeated 1st page)

SURFACE SOIL

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	TCL PEST/ PCB	TAL METALS
35-SS01-00	5/17	X	X	X	X
35-SS02-00	5/17	X	X	X	X
35-SS03-00	5/18	X	X	X	X
35-SS04-00	5/18	X	X	X	X
35-SS05-00	4/29	X	X		X
35-SS06-00	4/29	X	X		X
35-SS07-00	5/18	X	X	X	X
35-SS08-00	4/29	X	X		X
35-SS09-00	5/18	X	X	X	X
35-SS10-00	5/17	X	X	X	X
35-SS11-00	4/13	X	X	X	X
35-SS12-00	4/13	X	X	X	X
35-SS13-00	5/18	X	X	X	X
35-SS14-00	5/18	X	X	X	X

SEDIMENT

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	TCL PEST/ PCB	TAL METALS	TOC	GRAIN SIZE/ SIEVE
35-SD01-06	4/16						X
35-SD01-06	4/20	X	X	X	X	X	
35-SD01-612	4/20	X	X	X	X		
35-SD02-06	4/16						X
35-SD02-06	5/17	X	X	X	X		
35-SD02-612	5/17	X	X	X	X		
35-SD03-06	4/14						X
35-SD03-06	5/17	X	X	X	X		
35-SD03-612	5/17	X	X	X	X		
35-SD04-06	4/14						X
35-SD04-06	4/20	X	X	X	X	X	
35-SD04-612	4/20	X	X	X	X	X	
35-SD05-06	5/17	X	X	X	X		
35-SD05-612	5/17	X	X	X	X		
35-SD05-06	4/15						X
35-SD06-06	5/17	X	X	X	X		
35-SD06-612	5/17	X	X	X	X		
35-SD06-06	4/15						X
35-SD07-06	4/14						X
35-SD07-06	4/20	X	X	X	X	X	
35-SD07-612	4/20	X	X	X	X	X	
35-BN02-06	4/16						X
35-BN03-06	4/16						X
35-BN04-06	4/16						X

SAMPLING SUMMARY (Continued)
SITE 35, CAMP GEIGER AREA FUEL FARM
REMEDIAL INVESTIGATION
CONTRACT TASK ORDER 0232
MARINE CORP BASE, CAMP LEJEUNE, NORTH CAROLINA

GROUNDWATER

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	PEST/ PCB	TAL METALS (TOTAL)	TAL METALS (DISSOLVED	EPA 601	EPA 602	ADDITIONAL PARAMTERS
35-GWD1-01	5/14						X	X	
35-GWD2-01	5/14						X	X	
35-GWD3-01	5/15						X	X	
35-GWD4-01	5/15						X	X	
35-GWD5-01	5/15		X	X	X	X	X	X	
35-MW02S-02	4/26						X	X	
35-MW06S-02	4/26						X	X	
35-MW09S-02	5/10		X		X	X	X	X	
35-MW09D-02	5/11		X		X	X	X	X	
35-MW04S-02	4/26						X	X	
35-MW10S-02	5/12		X		X	X	X	X	
35-MW10D-02	5/11		X		X	X	X	X	
35-MW14S-02	5/12		X		X	X	X	X	
35-MW14D-02	5/12		X		X	X	X	X	
35-MW16S-02	5/12		X		X	X	X	X	
35-MW16D-02	5/12		X		X	x	X	X	
35-MW19S-02	5/12		X		X	X	X	X	
35-MW19D-02	5/12		X		X	X	X	X	
35-MW21S-02	5/13		X	X	X	X	X	X	
35-MW21S-02	5/20								X
35-MW21D-02	5/13	X	X	X	X	X	X	X	
35-MW22S-02	5/13		X	X	X	X	X	X	
35-MW22D-02	5/13	X	X		X	X	X	X	
35-MW25S-02	5/13	X	X		X	X	X	X	
35-MW25D-02	5/13		X		X	X	X	X	
35-MW26A-02	5/17						X	X	
35-MW26B-01	5/20						X	X	
35-MW29A-01	5/10		X		X	X	X	X	
35-MW29B-01	5/10		X	X	X	X	X	X	
35-MW30B-01	5/15						X	X	
35-MW31A-01	5/19						X	X	
35-MW31B-01	5/14						X	X	
35-MW32A-01	5/19						X	X	
35-MW32B-01	5/19						X	X	
35-MW33A-01	5/19		X	X	X	X	X	X	
35-MW33B-01	5/17		X	X	X	X	X	X	
35-MW34A-01	5/16						X	X	
35-MW34B-01	5/16						X	X	
35-MW35A-01	5/14						X	X	
35-MW35B-01	5/15						X	X	
35-MW36A-01	5/16						X	X	
35-MW36B-01	5/15						X	X	
35-MW37A-01	5/19						X	X	
35-MW37B-01	5/19						X	X	
35-MW38A-01	5/20						X	X	
35-MW38B-01	5/20						X	X	
35-EMW03-03	5/14	X	X		X	X	X	X	
35-EMW05-03	5/14	X	X		X	X	X	X	
35-EMW07-03	5/14	X	X		X	X	X	X	

ADDITIONAL PARAMETERS, GROUNDWATER

SAMPLE LOCATION	DATE COLLECTED	BOD	COD	TSS	TDS	TOTAL ALKALINITY	TOC	TOTAL KJELDAHL NITROGEN	TOTAL PHOSPOROUS EPA 365.3	TOTAL PLATE COUNT
35-MWD21S-0	4-16	X	X	X	X	X	X	X	X	X

SAMPLING SUMMARY (Continued)
SITE 35, CAMP GEIGER AREA FUEL FARM
REMEDIAL INVESTIGATION
CONTRACT TASK ORDER 0232
MARINE CORP BASE, CAMP LEJEUNE, NORTH CAROLINA

Fish Samples

SAMPLE LOCATION	DATE COLLECTED	TCL VOLS	TCL SVOLS	PEST/ PCB	TAL METALS
35-FS03-MC09	4-17	X	X	X	X
35-FS03-MC10	4-17	X	X	X	X
35-FS03-AEE01	4-14	X	X	X	X
35-FS03-PS01	4-14	X	X	X	X
35-FS03-PS02	4-14	X	X	X	X
35-FS03-PSO3	4-15	X	X	X	X
35-FS03-PS04	4-15	X	X	X	X
35-FS03-PS05	4-15	X	X	X	X
35-FS03-PS06	4-15	X	X	X	X
35-FS03-PS07	4-17	X	X	X	X
35-FS03-WM02	4-15	X	X	X	X
35-FS03-BG01	4-15	X	X	X	X
35-FS03-BG02	4-15	X	X	X	X
35-FS03-BG03	4-15	X	X	X	X
35-FS03-BG04	4-15	X	X	X	X
35-FS03-BG05	4-15	X	X	X	X
35-FS03-BG06	4-15	X	X	X	X
35-FS03-BG07	4-15	X	X	X	X
35-FS03-SM03	4-17	X	X	X	X
35-FS03-SM04	4-17	X	X	X	X
35-FS03-MC01	4-14	X	X	X	X
35-FS03-MC02	4-17	X	X	X	X
35-FS03-MC03	4-17	X	X	X	X
35-FS03-MC04	4-17	X	X	X	X
35-FS03-MC05	4-17	X	X	X	X
35-FS03-MC06	4-17	X	X	X	X
35-FS03-MC07	4-17	X	X	X	X
35-FS03-MC08	4-17	X	X	X	X
35-FS03-LG03	4-17	X	X	X	X
35-FS03-LG04	4-17	X	X	X	X
35-FS03-LG05	4-17	X	X	X	X
35-FS03-LG06	4-17	X	X	X	X
35-FS03-LG07	4-17	X	X	X	X
35-FS03-LG08	4-17	X	X	X	X
35-FS03-LG09	4-17	X	X	X	X
35-FS03-LG01	4-15	X	X	X	X
35-FS03-SM01	4-14	X	X	X	X
35-FS03-SM02	4-14	X	X	X	X
35-FS02-AE01	4-14	X	X	X	X
35-FS02-PS01	4-14	X	X	X	X
35-FS02-MC01	4-17	X	X	X	X
35-FS02-MC02	4-17	X	X	X	X
35-FS02-CF01	4-14	X	X	X	X
35-FS01-GS01	4-15	X	X	X	X
35-FS01-AE01	4-15	X	X	X	X
35-FS01-PS01	4-15	X	X	X	X
35-FS03-WM01	4-15	X	X	X	X
35-FS02-LG01	4-14	X	X	X	X
35-FS03-LG02	4-17	X	X	X	X

APPENDIX J
SUMMARY OF PID MEASUREMENTS FROM RI/FS SOIL BORINGS

SUMMARY OF PID MEASUREMENTS FROM SOIL BORINGS
SITE 35, CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA
CONTRACT TASK ORDER 0232

Soil Boring Number	Sample Interval (feet, bgs)	Background Readings (ppm)	Point Source Readings (ppm)	Headspace Readings (ppm)	Comments
35GWD-1	0.0 - 2.0	0.7	0.7	0.7	
	4.0 - 6.0	0.7	0.7	0.7	Sample collected for analysis
	6.0 - 8.0	0.7	0.7	0.7	
	8.0 - 10.0	0.7	0.7	0.7	
	10.0 - 12.0	0.7	0.7	0.7	
	12.0 - 14.0	0.7	0.7	0.7	
	14.0 - 16.0	0.7	0.7	0.7	
	16.0 - 18.0	0.7	0.7	0.7	
	18.0 - 20.0	0.7	0.7	0.7	
	20.0 - 22.0	0.7	0.7	0.7	
	22.0 - 24.0	0.7	0.7	0.7	
	24.0 - 26.0	0.7	0.7	0.7	
	26.0 - 28.0	0.7	0.7	0.7	
	28.0 - 30.0	0.7	0.7	0.7	
	30.0 - 32.0	0.7	0.7	0.7	
	32.0 - 34.0	0.7	0.7	0.7	
	34.0 - 36.0	0.7	0.7	0.7	
	36.0 - 38.0	0.7	0.7	0.7	
	38.0 - 40.0	0.7	0.7	0.7	
	40.0 - 42.0	0.7	0.7	0.7	
	42.0 - 44.0	0.7	0.7	0.7	
	44.0 - 46.0	0.7	0.7	0.7	
	47.0 - 49.0	0.0	0.0	0.0	
	49.0 - 51.0	0.0	0.0	0.0	
	51.0 - 53.0	0.0	0.0	0.0	
	53.0 - 55.0	0.0	0.0	0.0	
	60.0 - 62.0	0.0	0.0	0.0	
	65.0 - 67.0	0.0	0.0	0.0	
35GWD-2	0.0 - 2.0	0.4	0.3	0.5	
	2.0 - 4.0	0.3	1.3	0.6	
	4.0 - 6.0	1.1	0.3	0.3	Sample collected for analysis
	6.0 - 8.0	0.1	0.1	0.1	
	8.0 - 10.0	0.1	0.1	1.4	
	10.0 - 12.0	0.1	0.1	0.9	
	12.0 - 14.0	0.1	0.3	0.6	
	14.0 - 16.0	0.1	0.1	0.6	

SUMMARY OF PID MEASUREMENTS FROM SOIL BORINGS
SITE 35, CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA
CONTRACT TASK ORDER 0232

Soil Boring Number	Sample Interval (feet, bgs)	Background Readings (ppm)	Point Source Readings (ppm)	Headspace Readings (ppm)	Comments
35GWD-2 (continued)	20.0 - 22.0	0.2	0.2	1.1	
	25.0 - 27.0	0.1	0.1	0.6	
	30.0 - 32.0	0.1	0.1	0.1	
	35.0 - 37.0	0.1	0.1	0.1	
	40.0 - 42.0	0.1	0.1	0.1	
	42.0 - 44.0	0.1	0.1	0.1	
	44.0 - 46.0	0.1	0.1	0.1	
	46.0 - 48.0	0.1	0.1	0.1	
	48.0 - 50.0	0.1	0.1	0.1	
	50.0 - 52.0	0.1	0.1	0.1	
	52.0 - 54.0	0.1	0.1	0.1	
	60.0 - 62.0	0.1	0.1	0.1	
35GWD-3	0.0 - 2.0	0.2	0.2	0.3	
	2.0 - 4.0	0.2	0.2	0.2	Sample composited and analyzed
	4.0 - 6.0	0.2	0.3	0.2	Sample composited and analyzed
	6.0 - 8.0	0.2	0.2	0.2	Sample composited and analyzed
	8.0 - 10.0	0.2	0.2	0.2	
	10.0 - 12.0	0.2	0.2	0.2	
	15.0 - 17.0	0.2	0.2	0.2	
	20.0 - 22.0	0.1	0.1	1.8	
	25.0 - 27.0	0.1	0.1	2.2	
	30.0 - 32.0	0.1	0.1	1.6	
	35.0 - 37.0	0.1	0.1	1.4	
	40.0 - 42.0	0.1	0.1	1.5	
	42.0 - 44.0	0.1	0.1	0.6	
	46.0 - 48.0	0.0	0.0	0.0	
	48.0 - 50.0	0.0	0.0	0.0	
	50.0 - 52.0	0.0	0.0	0.0	
	52.0 - 54.0	0.0	0.0	0.0	
	54.0 - 56.0	0.0	0.0	0.0	
	56.0 - 58.0	0.0	0.0	0.0	
	60.0 - 62.0	0.0	0.0	0.0	
	65.0 - 67.0	0.0	0.0	0.0	

SUMMARY OF PID MEASUREMENTS FROM SOIL BORINGS
SITE 35, CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA
CONTRACT TASK ORDER 0232

Soil Boring Number	Sample Interval (feet, bgs)	Background Readings (ppm)	Point Source Readings (ppm)	Headspace Readings (ppm)	Comments
35GWD-4	0.0 - 2.0	0.9	0.9	0.8	
	2.0 - 4.0	0.4	1.9	1.9	Sample composited and analyzed
	4.0 - 6.0	0.4	N.R.	N.R.	No recovery from this interval
	6.0 - 8.0	0.3	65.3	42.8	Sample composited and analyzed
	8.0 - 10.0	0.5	49.5	49.8	
	15.0 - 17.0	0.4	1.7	1.7	
	20.0 - 22.0	0.4	3.8	1.6	
	25.0 - 27.0	0.3	1.0	1.3	
	30.0 - 32.0	0.3	0.3	1.9	
	35.0 - 37.0	0.0	0.2	1.0	
	40.0 - 42.0	0.0	0.0	0.6	
	44.0 - 46.0	0.3	0.3	0.3	
	46.0 - 48.0	0.3	0.3	0.3	
	53.0 - 55.0	0.3	0.3	0.3	
35GWD-5	0.0 - 2.0	0.3	0.3	0.3	
	2.0 - 4.0	0.3	0.4	0.3	
	4.0 - 6.0	0.3	0.3	0.3	Sample collected for analysis
	6.0 - 8.0	0.3	0.4	0.3	Sample collected for MS/MSD
	8.0 - 10.0	0.3	0.6	0.3	
	15.0 - 17.0	0.3	0.3	0.3	
	20.0 - 22.0	0.3	0.3	0.3	
	25.0 - 27.0	0.3	0.3	0.3	
	30.0 - 32.0	0.0	0.0	0.0	
	35.0 - 37.0	0.0	0.0	0.0	
	40.0 - 42.0	0.3	0.3	0.3	
	42.0 - 44.0	0.3	0.3	0.3	
	44.0 - 46.0	0.3	0.3	0.3	
	50.0 - 52.0	0.3	0.3	0.3	
	55.0 - 57.0	0.3	0.3	0.3	
35MW-26B	0.0 - 2.0	0.2	0.3	0.2	
	2.0 - 4.0	0.3	0.3	0.2	
	4.0 - 6.0	0.3	0.3	0.2	
	6.0 - 8.0	0.3	0.6	0.3	Sample collected for analysis
	8.0 - 10.0	0.3	0.6	0.4	
	15.0 - 17.0	0.3	0.4	0.3	
	20.0 - 22.0	0.3	0.3	0.5	

SUMMARY OF PID MEASUREMENTS FROM SOIL BORINGS
SITE 35, CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA
CONTRACT TASK ORDER 0232

Soil Boring Number	Sample Interval (feet, bgs)	Background Readings (ppm)	Point Source Readings (ppm)	Headspace Readings (ppm)	Comments
34MW-26B (continued)	25.0 - 27.0	0.2	0.3	0.3	
	30.0 - 32.0	0.2	0.2	0.3	
	35.0 - 37.0	0.2	0.2	0.2	
	40.0 - 42.0	0.2	0.2	0.2	
35MW-29B	2.0 - 4.0	0.2	0.2	0.3	
	4.0 - 6.0	0.2	0.2	0.3	
	6.0 - 8.0	0.2	0.2	0.8	Sample collected for analysis
	8.0 - 10.0	0.2	0.2	0.4	
	15.0 - 17.0	0.2	0.2	0.5	
	20.0 - 22.0	0.2	0.2	0.5	
	25.0 - 27.0	0.2	0.2	0.2	
	30.0 - 32.0	0.2	0.2	0.3	
	35.0 - 37.0	0.2	0.2	0.3	
	40.0 - 42.0	0.2	0.2	0.3	
	42.0 - 44.0	0.2	0.2	0.2	
	44.0 - 46.0	0.2	0.2	0.2	
35MW-30B	0.0 - 2.0	4.5	5.5	2.0	
	2.0 - 4.0	4.5	5.9	2.0	
	4.0 - 6.0	4.5	7.0	1.6	
	6.0 - 8.0	4.5	6.0	2.0	Sample collected for analysis
	8.0 - 10.0	4.5	5.2	3.0	
	15.0 - 17.0	2.0	6.0	2.0	
	20.0 - 22.0	2.0	6.0	2.0	
	25.0 - 27.0	1.0	2.2	2.0	
	30.0 - 32.0	1.0	2.0	2.0	
	35.0 - 37.0	0.2	0.2	1.8	
	40.0 - 42.0	0.2	0.2	1.6	
	42.0 - 44.0	0.2	0.2	1.6	
35MW-31B	0.0 - 2.0	0.3	0.3	0.3	
	2.0 - 4.0	0.3	0.3	0.3	
	4.0 - 6.0	0.3	0.3	0.3	Sample collected for analysis
	6.0 - 8.0	0.3	0.3	0.3	
	8.0 - 10.0	0.3	0.3	0.3	
	15.0 - 17.0	0.3	0.3	0.3	
	20.0 - 22.0	0.3	0.3	0.3	
	25.0 - 27.0	0.3	0.3	0.3	

SUMMARY OF PID MEASUREMENTS FROM SOIL BORINGS
SITE 35, CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA
CONTRACT TASK ORDER 0232

Soil Boring Number	Sample Interval (feet, bgs)	Background Readings (ppm)	Point Source Readings (ppm)	Headspace Readings (ppm)	Comments
35MW-31B (continued)	30.0 - 32.0	0.3	0.3	0.3	
	35.0 - 37.0	0.3	0.3	0.3	
	40.0 - 42.0	0.3	0.3	0.3	
	45.0 - 47.0	0.3	0.3	0.3	
35MW-32B	0.0 - 2.0	1.2	1.2	1.2	
	2.0 - 4.0	1.2	1.6	1.6	
	4.0 - 6.0	1.2	2.0	2.0	Sample collected for analysis
	6.0 - 8.0	1.2	1.8	1.8	
	8.0 - 10.0	1.2	1.8	1.8	
	15.0 - 17.0	1.2	1.2	1.2	
	20.0 - 22.0	0.7	1.5	1.5	
	25.0 - 27.0	---	--	---	Did not sample this interval
	30.0 - 32.0	0.7	1.5	1.3	
	35.0 - 37.0	0.3	1.0	1.0	
	40.0 - 42.0	0.2	0.3	0.3	
	42.0 - 44.0	0.2	0.2	0.2	
35MW-33B	2.0 - 4.0	0.2	0.2	0.2	
	4.0 - 6.0	0.2	0.2	0.2	
	6.0 - 8.0	0.2	0.2	0.2	
	8.0 - 10.0	0.2	1.0	1.0	Sample collected for analysis
	10.0 - 12.0	0.2	1.4	1.4	
	15.0 - 17.0	0.2	0.3	0.2	
	20.0 - 22.0	0.2	0.3	0.2	
	25.0 - 27.0	0.2	0.2	0.2	
	30.0 - 32.0	1.0	1.0	1.5	
	35.0 - 37.0	2.0	2.0	2.6	
	40.0 - 42.0	1.7	1.9	2.3	
	42.0 - 44.0	1.3	1.5	1.8	
35MW-34B	0.0 - 2.0	2.0	6.0	2.0	
	2.0 - 4.0	4.0	7.0	4.0	
	4.0 - 6.0	4.0	7.0	4.0	Sample collected for analysis
	6.0 - 8.0	4.0	7.0	4.0	
	8.0 - 10.0	4.0	6.0	4.0	
	15.0 - 17.0	4.5	5.2	4.5	
	20.0 - 22.0	0.0	2.0	2.0	
	25.0 - 27.0	0.0	3.0	5.0	

SUMMARY OF PID MEASUREMENTS FROM SOIL BORINGS
SITE 35, CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA
CONTRACT TASK ORDER 0232

Soil Boring Number	Sample Interval (feet, bgs)	Background Readings (ppm)	Point Source Readings (ppm)	Headspace Readings (ppm)	Comments
35MW-34B (continued)	30.0 - 32.0	0.0	0.4	2.0	
	35.0 - 37.0	0.0	0.2	2.0	
	40.0 - 42.0	0.0	0.2	2.0	
35MW-35B	0.0 - 2.0	0.4	0.2	0.2	
	2.0 - 4.0	0.2	0.1	0.3	Sample collected for analysis
	4.0 - 6.0	0.2	0.1	0.4	
	6.0 - 8.0	0.2	0.1	0.3	
	8.0 - 10.0	0.1	0.1	0.2	
	15.0 - 17.0	0.1	0.1	0.2	
	20.0 - 22.0	0.1	0.1	0.2	
	25.0 - 27.0	0.0	0.1	0.2	
	30.0 - 32.0	---	--	---	Did not sample this interval
	35.0 - 37.0	0.1	0.1	1.8	
	40.0 - 42.0	0.1	0.1	2.0	
35MW-36B	0.0 - 2.0	0.6	0.6	2.0	
	2.0 - 4.0	N/A	N/A	2.0	Background readings were not obtained due to heavy rains
	4.0 - 6.0	N/A	N/A	2.0	Background readings were not obtained due to heavy rains. Sample collected for analysis
	6.0 - 8.0	N/A	N/A	2.0	Background readings were not obtained due to heavy rains
	8.0 - 10.0	0.1	2.5	2.4	
	15.0 - 17.0	N/A	N/A	2.0	Background readings were not obtained due to heavy rains
	20.0 - 22.0	N/A	N/A	2.0	Background readings were not obtained due to heavy rains
	25.0 - 27.0	N/A	N/A	2.2	Background readings were not obtained due to heavy rains
	30.0 - 32.0	N/A	N/A	1.8	Background readings were not obtained due to heavy rains
	35.0 - 37.0	N/A	N/A	1.6	Background readings were not obtained due to heavy rains
	40.0 - 42.0	N/A	N/A	1.8	Background readings were not obtained due to heavy rains

SUMMARY OF PID MEASUREMENTS FROM SOIL BORINGS
SITE 35, CAMP GEIGER AREA FUEL FARM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA
CONTRACT TASK ORDER 0232

Soil Boring Number	Sample Interval (feet, bgs)	Background Readings (ppm)	Point Source Readings (ppm)	Headspace Readings (ppm)	Comments
35MW-37B	0.0 - 2.0	0.2	0.2	0.2	
	2.0 - 4.0	0.2	0.2	0.2	
	4.0 - 6.0	0.2	0.2	0.2	Collected sample for analysis
	6.0 - 8.0	0.2	0.2	0.2	
	8.0 - 10.0	0.2	0.2	0.2	
	10.0 - 12.0	0.2	0.2	0.2	
	15.0 - 17.0	0.2	0.2	0.2	
	20.0 - 22.0	0.2	0.2	0.2	
	25.0 - 27.0	---	--	---	Did not sample this interval
	30.0 - 32.0	0.2	0.2	0.2	
	35.0 - 37.0	0.2	0.2	0.2	
	40.0 - 42.0	0.2	0.2	0.2	
	42.0 - 44.0	0.2	0.2	0.2	
35MW-38B	0.0 - 2.0	0.3	0.3	0.3	
	2.0 - 4.0	0.3	0.3	0.3	
	4.0 - 6.0	0.3	0.3	0.3	Sample collected for analysis
	6.0 - 8.0	0.3	0.3	0.3	
	8.0 - 10.0	0.3	0.3	0.3	
	15.0 - 17.0	0.3	0.3	0.4	
	20.0 - 22.0	0.3	0.3	0.3	
	25.0 - 27.0	0.3	0.3	0.3	
	27.0 - 29.0	0.3	0.3	0.3	
	35.0 - 37.0	0.2	0.3	0.2	
	40.0 - 42.0	0.2	0.3	0.2	
	42.0 - 44.0	0.2	0.3	0.2	

Note: Split-spoon samples were collected from only intermediate and deep soil borings. Shallow borings were advanced for well installation only.

LAW ENGINEERING

GEOTECHNICAL, ENVIRONMENTAL
& CONSTRUCTION MATERIALS
CONSULTANTS

February 19, 1993

Commander
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia 23511-6287

Attention: Mr. Trueman Seamans
Engineer-In-Charge

Subject: **ADDENDUM TO REPORT OF UNDERGROUND FUEL INVESTIGATION AND COMPREHENSIVE SITE ASSESSMENT**
CAMP GEIGER FUEL FARM, MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-08135-01

Dear Mr. Seamans:

In accordance with Naval Facilities Engineering Command Order for Supplies and Services Contract No. N62470-90-D-7625/0002 dated September 29, 1990, Law Engineering is pleased to present this addendum to the report of our environmental services for the above-referenced project site. The scope of our services, as described in the attached report, included drilling of three soil-test borings and collecting soil samples for chemical testing; installing three ground-water monitoring wells and collecting ground-water samples for chemical testing; performing an eight-hour aquifer test using the three newly-installed wells; and interpreting the data from the pump test to estimate the hydraulic characteristics of the aquifer.

This report is intended for the exclusive use of Naval Facilities Engineering Command, Atlantic Division. The contents should not be relied upon by any other parties without the express, written consent of Law Engineering. The findings are relevant to the dates of our site work and should not be relied upon to represent site conditions on other dates.

3301 ATLANTIC AVE.
P.O. BOX 18288
RALEIGH, NC 27619
919-876-0416

We appreciate the opportunity to continue to work with you and the Navy on your environmental projects. If any questions arise, please contact us at (919) 876-0416.

Sincerely,

LAW ENGINEERING, INC.

Richard A. Kolb, P.G.
Senior Geologist

Thomas A. Proctor, P.G.
Senior Geologist

C. Jeffrey Adkins, P.E.
Project Engineer

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Principal Engineer

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cc: Code 09A2122, Ms. Nicola Gonzalez
Ms. Debra Pickett

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1.0 INTRODUCTION

1.1 Purpose of the Investigation

On September 29, 1990, the Commander of the Atlantic Division Naval Facilities Engineering Command (LANTDIV) in Norfolk, Virginia, contracted with Law Companies Group, Inc. to perform a Comprehensive Site Assessment (CSA) at the Camp Geiger Fuel Farm, Marine Corps Base (MCB), Camp Lejeune, North Carolina (Drawing 1.1). The purpose of the investigation was 1) to identify the presence, magnitude and extent of possible free-product accumulation and ground-water contamination and 2) to assess potential exposure to subsurface contaminants resulting from the release(s) of petroleum fuels. As stated in Law Engineering's CSA Workplan dated July 25, 1991, the objective of the investigation was to provide sufficient data to meet the requirements of Sections 280.63 and 280.65 of 40 CFR Part 280, Federal Technical Standards for Underground Storage Tanks and Sections .0704 and .0706 of Title 15A, Chapter 2, Subchapter 2N, North Carolina Criteria and Standards Applicable to Underground Storage Tanks.

The assessment activities presented in the CSA Workplan were completed and a report, entitled "Final Report, Underground Fuel Investigation, Comprehensive Site Assessment", was issued to the Commander of the Atlantic Division, Naval Engineering Facilities Command on February 8, 1992. Based upon the results of the

initial assessment, it was determined that additional assessment was necessary to fully characterize the southern extent of petroleum contamination resulting from the underground fuel release and that performing an aquifer pumping test was necessary to estimate the hydraulic characteristics of the surficial aquifer.

1.2 Scope of Work

Authorization to proceed with the investigation was granted by the Commander of LANTDIV of Norfolk, Virginia, via Addendum to Contract/Purchase Order No. N62470-90-D-7625/0002. As outlined in the contract, the scope of work included preparing a health and safety plan, advancing three soil borings, installing three monitoring wells, collecting and analyzing soil and ground-water samples, performing an eight-hour pumping test of the surficial aquifer, preparing an addendum to our report of investigation, and presenting our data and conclusions. Specific methods employed while performing the project activities are described in this report, which presents a summary of the additional assessment activities performed during October and November 1992.

2.0 SUBSURFACE CONTAMINATION ASSESSMENT

2.1 Installation of the Monitoring Wells

Law Engineering performed field activities on October 28 and 29, 1992, which consisted of advancing three soil borings. One of these borings was subsequently used to install pumping well 28 (PW-28). The remaining two borings were used to install monitoring wells 26 (MW-26) and MW-27, used as observation wells during the pumping test. The locations of these wells are shown on Drawing 3.1. The numbers of the drawings included in this addendum report correspond with those in our February 1992 report.

Law Engineering accomplished all drilling using hollow-stem augers and techniques described in ASTM D-1452. We steam-cleaned our down-hole drilling equipment prior to work at each drilling location. We used augers with an inside diameter of 6.25 inches for drilling each boring. The site geologist collected soil samples from each of the soil borings for field classification, headspace testing and chemical testing. We generally obtained soil samples for field classification at depths of 0 to 1.5 feet, 1.5 to 3 feet, 3 to 4.5 feet and on 5-foot centers thereafter to boring termination. We collected these soil samples with a split-spoon sampler 24 inches long and with an inside diameter of 1.375 inches (outside diameter of 2 inches). We obtained each soil

sample by continually dropping a 140-pound hammer for 30 inches, until the sampler was driven 18 inches into the substrate. We performed split-spoon sampling in general accordance with ASTM D-1586 and recorded on the field boring log the number of blows required to drive the sampler each 6-inch increment. After donning laboratory-grade gloves, we placed representative portions of each sample in two, pre-labeled plastic bags and sealed each bag for subsequent headspace testing.

The site geologist examined in the field the soil sample collected at each interval using visual/manual techniques described in ASTM D-2487 and ASTM D-2488. We classified the soil in general accordance with the United Soil Classification System. We have included a record of each test boring in Appendix A.

We collected one soil sample from the boring for the pumping well to test for grain-size distribution. We used the data from this test in calculations to estimate the hydraulic conductivity of the surficial aquifer. The results of this grain-size test are included in Appendix B.

The specifications for each soil boring included decontaminating the drilling equipment with a pressurized steam-cleaning unit, emplacing a silica-sand filter pack and a bentonite seal above the filter pack and grouting the well above the bentonite seal with a cement/bentonite slurry, and developing the well through low-yield pumping.

Development water was discharged to the oil/water separator which is located east of the fuel farm, as directed by activity personnel.

The screened intervals of the two observation wells are constructed of Schedule 40 PVC with an inside diameter of two inches. The screened interval of the pumping well is constructed of Schedule 40 PVC with an inside diameter of four inches. The risers for each of the three wells are constructed of Schedule 80 PVC. Each of the wells constructed by Law Engineering has a lockable cap and is protected by a flush-mount cover constructed of steel. Details for installing the monitoring wells are included in Appendix C. Upon installation, each well was developed through low-yield pumping. In Table 3.1, we have summarized the approximate volumes of water removed during well development and our observations of turbidity of the development water. The numbers of the tables included in this report correspond with those in our February 1992 report.

2.2 Assessment of Soil Contamination

2.2.1 Scanning Procedures

Law Engineering monitored all soil-investigation activities with an organic vapor analyzer (OVA) manufactured by Foxboro (Model 128) which had been calibrated

using methane. We used the OVA to qualitatively measure total volatile organics in the borehole, in ambient air, and in the individual soil samples. Values recorded with the OVA are qualitative and are not directly comparable to actual laboratory analytical results. However, the OVA is useful in providing a relative indication of the presence of volatile organics in soil samples.

2.2.2 Collection of Soil Samples

We collected soil samples from each boring for headspace testing and laboratory chemical analysis according to the following procedure:

- Drive the decontaminated split-spoon sampler to the desired depth interval.

- Retrieve and immediately open the split-spoon sampler. Quickly remove portions of sample aliquots from the split-spoon sampler and place the sample into two, pre-labeled, airtight plastic bags. Carefully execute sample handling in an effort to reduce the loss of the volatile organics. Seal and place the bags in a warm location.

- After approximately 10 minutes, test the headspace gas in one of the two bags with the OVA and record the peak value. This procedure was conducted for the soil sample collected at each sample-depth interval.

- From the soil samples collected from each boring, two samples were targeted for chemical testing. For those samples, the paired sample was transferred to a laboratory-supplied glass container, placed into a cooler, packed on ice and shipped to the laboratory for chemical analysis. Law Engineering maintained custody of the samples until shipment. Chain of custody forms are included in Appendix D.

2.2.3 Results of the Soil Sampling

A summary of headspace testing is presented in Table 4.1. Volatile organics were not detected in the boreholes for MW-26 and MW-27. Volatile organics were detected in excess of the equipment detection limit of 0.2 parts per million (ppm) in samples collected from the borehole for PW-28 at depths below the water table.

We have presented a summary of laboratory analyses of the soil samples collected from MW-26, MW-27 and PW-28 in Table 4.2. Copies of the laboratory test reports are included in Appendix E. The selected soil samples were tested for total petroleum

hydrocarbons (TPH) using EPA Methods 3550 (semi-volatiles) and 5030 (volatiles). The laboratory did not detect TPH in the soil samples collected from these three wells.

We have modified two of our isopleth maps (Drawings 4.3 and 4.3.1) to include the locations of MW-26, MW-27 and PW-28. TPH was not detected in the soil samples from these three wells; therefore, the contours on these isopleth maps did not change from those in our February 1992 report.

2.3 Assessment of Ground-Water Contamination

2.3.1 Procedures for Sampling the Monitoring Wells

Law Engineering installed three wells during the investigation to complement the 25 wells installed during previous investigations. Prior to sampling each of the three, newly-installed wells, Law Engineering measured and recorded the depth to ground water using an electronic, water-level probe. We recorded the data collected and observations made on the Monitoring Well and Sampling Field Data Worksheets (Appendix E). Ground-water elevations relative to sea level for the newly-installed wells are shown on the Monitoring Well Casing and Water Elevation Worksheet (Appendix F).

Law Engineering evacuated the newly-installed wells prior to collecting ground-water samples to remove stagnant water from the well casing and sand pack. We performed this task in an effort to collect samples representative of the water quality in the surficial aquifer. To evacuate the observation wells, we used decontaminated, Teflon bailers attached to new nylon cord; to evacuate the pumping well, we used an Arch Well Development Pump. We measured and recorded specific conductance, pH, and water temperature throughout the evacuation process. We generally evacuated the wells of at least three standing well volumes and until indicator parameters had stabilized.

Prior to sampling the wells, Law Engineering personnel donned laboratory-grade gloves. We collected the water samples and immediately decanted the samples from the bailer into pre-labeled sample containers. We sealed the containers, stored the containers in a chilled cooler, and maintained custody of the samples until shipment at the end of the day.

2.3.2 Results of the Ground-Water Sampling

We have presented a summary of laboratory analyses of the ground-water samples collected from all of the monitoring wells, including MW-26, MW-27 and PW-28, in Table 4.4. Copies of the laboratory test reports are included in Appendix H. We

tested the ground-water samples from MW-26, MW-27 and PW-28 for purgeable aromatic hydrocarbons by EPA Method 602, modified to include total xylenes and methyl tertiary butyl ether (MTBE). The laboratory did not detect constituents of petroleum hydrocarbons in the ground-water samples from MW-27 and PW-28. In the sample from MW-26, the laboratory detected total xylenes at a concentration of 1 µg/L and MTBE at a concentration of 12 µg/L. The North Carolina Ground-Water Quality Standard for total xylenes is 400 µg/L and for MTBE is 50 µg/L. Therefore, the concentrations of these constituents in MW-26 are below the state standards.

We have modified six isopleth maps from the February 1992 report (Drawings 4.7, 4.7.1 through 4.7.4 and 4.13) to include the locations of MW-26, MW-27 and PW-28. Benzene, toluene and ethylbenzene were not detected in the ground-water samples from these three wells; therefore, we did not change the contours for these constituents on the isopleth maps (Drawings 4.7.1, 4.7.2 and 4.7.3, respectively). We also did not change the contours of the isopleth maps of total xylenes concentrations (Drawing 4.7.4) and combined BTEX concentrations (Drawing 4.7). Since the concentration of 1 µg/L of total xylenes detected by the laboratory in the ground-water sample from MW-26 is the same as the laboratory detection limit, it is possible that this concentration is a result of laboratory-induced contamination or handling of the samples during shipment.

Law Engineering documented MTBE at concentrations below the State Standard of 50 µg/L in the ground-water sample from MW-26 and in the water collected during the pumping test performed on PW-28. MW-26 and PW-28 are hydraulically upgradient of the contaminant source at the Tank Farm; therefore, the MTBE documented in the ground water from these wells is possibly not related to activities at the Tank Farm. As we documented in our previous report, we also could not identify a likely source for the MTBE detected in the sample collected from MW-9, which is located west of the Tank Farm and of MW-26/PW-28. Because of the isolated occurrence of MTBE in several of the wells and no discernible pattern of contaminant migration, we are unable to offer an explanation as to other sources of MTBE.

3.0 SITE HYDROGEOLOGY

3.1 Eight-Hour Pumping Test

Law Engineering conducted an eight-hour pumping test during November 1992 at PW-28 to determine the performance characteristics of the well and to estimate the hydraulic parameters of the aquifer. Yield and drawdown were recorded so that the specific capacity of the well could be calculated. These data give a measure of the productive capacity of the well and provide information needed for the selection of

appropriately sized pumping equipment which may be necessary during the corrective action phase of the project. The pumping test also provided data from which to determine the transmissivity and storativity of the surrounding aquifer in order to predict the size and shape of capture zones produced during pumping of individual or multiple extraction wells.

3.1.1 Pumping-Test Procedures

Prior to the actual pumping test, PW-28 was pumped for approximately one hour to determine the approximate well yield. This "pre-test" data was necessary to select the proper size pump and to establish the pumping rate to be used during the test.

During the pumping test, the ground water pumped from PW-28 was stored in a tanker. The laboratory tested a water sample collected from this tanker for purgeable aromatics by EPA Method 602, modified to include total xylenes and MTBE. The discharged water was transported off the site by P&W Oil Company, which is storing the water for future disposal.

The eight-hour pumping test was conducted on November 4, 1992. During the test, a constant pumping rate of approximately 4.1 gallons per minute was maintained and the drawdown in each of the surrounding observation wells -- MW-22S, MW-26 and

MW-27 -- was measured and recorded at appropriate time intervals. These data are summarized in Appendix I. As summarized, after eight hours of pumping PW-28, approximately 2,360 gallons of ground water were extracted and drawdowns were as follows:

Observation Well	Distance from PW-28	Drawdown
MW-22S	113 feet	0.08 feet
MW-26	32 feet	0.22 feet
MW-27	88 feet	0.01 feet

3.1.2 Estimating Aquifer Parameters

The data collected during the pumping test were used to calculate the storativity and transmissivity of the surrounding aquifer. These determinations were made by using type curve matching, time-downdown method, and the In-Situ computer software, TS-Match Theis Curve Automated Matching Program. TS-Match uses relative least-squares and the Newton-Raphson iterative method to solve the Theis solution, where:

$$s = \frac{Q}{\pi T} \int_u^{\infty} \frac{e^{-u}}{u}\, du,$$

where: s = drawdown
Q = pumping rate, in gpm
T = Transmissivity, in gpd/ft
$u = (r^2S)/(4Tt)$, where
r = radial distance, in feet, from the pumped well to the observation well,
S = storage coefficient, and
t = time

The TS-Match program makes the following assumptions:

- the production rate is constant.
- the aquifer is homogeneous, non-leaky, and there is no recharge.
- the aquifer has very large areal extent. If this is not the case, a mechanism has been provided to ignore data which the user considers are strongly influenced by the limited extent of the aquifer.
- water removed from storage is discharged instantaneously with decline in head (i.e., no delayed-yield effects).
- for analyzing production well data, skin (well loss) = 0.

- for analyzing production well data, wellbore storage is not accounted for. However, a mechanism has been provided to ignore data that may be influenced by wellbore storage.

In addition, the data were also analyzed manually by the type-curve matching method and the manual time-drawdown method to confirm the solution presented by TS-Match. We also analyzed grain-size distribution data from well PW-28 to estimate hydraulic conductivity. The field data and calculations are presented in Appendix I. The Type-curve matching, TS-Match, time-drawdown and grain size distribution solutions are as follows:

SUMMARY OF AQUIFER PARAMETER ESTIMATIONS			
AQUIFER PARAMETER	WELL NUMBER		
	MW-22S	MW-26	PW-28
I. Transmissivity (ft^2/day) by:			
a) Type Curve Matching	3064	1570	
b) Time-Drawdown	3911	1026	
c) Theis Curve Matching (Computer Program)	4226	988	
II. Specific Storage by:			
a) Type Curve Matching	0.003	0.008	
b) Time-Drawdown	0.001	0.006	
c) Theis Curve Matching	0.0015	0.011	

SUMMARY OF AQUIFER PARAMETER ESTIMATIONS			
AQUIFER PARAMETER	WELL NUMBER		
	MW-22S	MW-26	PW-28
III. Hydraulic Conductivity (3) (ft/day) by:			
a) Type Curve Matching	139	71	
b) Time-Drawdown	177	47	
c) Theis Curve Matching	192	45	
d) Grain-Size Analysis	(4)	(4)	99

NOTES:

(1) MW-22 and MW-26 were used as observation wells for the pumping test.
(2) PW-28 was the well on which the pumping test was performed.
(3) Aquifer thickness is 22 feet, estimated from boring records in February 7, 1992, report.
(4) Grain-size distribution analysis not performed on soil samples from these wells.

From this data, average hydraulic conductivity values would be 169 ft/day for MW-22S, and 54 ft/day for MW-26. The hydraulic conductivity value from grain-size analysis for well PW-28, which is 99 ft/day, falls between these two other values. All three conductivity values fall within the same order of magnitude. The differences between the values may be explained by local heterogeneities in the soil matrix of the aquifer. A regional average of approximately 110 ft/day may be used for hydraulic conductivity in the surficial aquifer beneath the Fuel Farm area.

Similarly, average specific storage calculated from the pumping test ranges from 10^{-3} to 10^{-2}. Specific storage values associated with well MW-26 are higher than those

associated with MW-22. The differences may be explained by local heterogeneities in the soil matrix of the aquifer.

4.0 PROCEDURES FOR QUALITY CONTROL

4.1 Decontaminating Equipment

The CSA Workplan details the quality-control procedures followed for handling and decontaminating equipment in the field. Using the procedures described in the Workplan, we decontaminated our drilling equipment adjacent to the oil/water separator, which is located east of the Fuel Farm.

4.2 Collecting, Handling and Shipping Samples

The CSA Workplan details the quality-control procedures followed for collecting, handling and shipping samples. We utilized rinse blanks and trip blanks as quality-control measures to provide checks on the integrity and quality of our ground-water sampling program.

Law Engineering submitted an equipment rinse blank to the laboratory to evaluate the procedures we used for decontaminating the Teflon bailers. Law Engineering also

submitted a trip blank to the laboratory to check the integrity of the sample containers, to determine if contaminants may have entered the sample containers during shipment to and from the job site, and to check for laboratory-induced contamination. Each of the blanks was analyzed for purgeable aromatics. The two blank samples did not contain contaminant levels above the laboratory detection limit. Although, our procedures for bailer decontamination were generally successful in eliminating the introduction of contaminants through the sampling equipment, it is possible that the 1 μg/L of total xylenes documented in the ground-water sample from MW-26 may have resulted from incomplete decontamination of the bailer used to sample that well or from laboratory-induced contamination.

5.0 REFERENCES

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

North Carolina Administrative Code, Title 15, Subchapter 2L, Classification and Water Quality Standards Applicable to the Groundwaters of North Carolina, North Carolina Environmental Management Commission, Raleigh, North Carolina, August 4, 1989.

Walton, W.C., Practical Aspects of Ground Water Modeling, 2nd Edition, 1984.

Water-Vel, Hydrologic Modeling Division, In-Situ, Inc., Laramie, Wyoming, Version 2.2, July 1989.

TABLES

TABLE 3.1
SUMMARY OF DEVELOPMENT OF MONITORING WELLS

ADDENDUM TO REPORT OF UNDERGROUND FUEL INVESTIGATION AND COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER FUEL FARM
CAMP LEJEUNE,NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-08135-01

MONITORING WELL IDENTIFICATION NUMBER	FINAL TURBIDITY (SUBJECTIVE)*	APPROXIMATE VOLUME OF WATER REMOVED (GAL.)
MW-26	2	13.5
MW-27	2	20
PW-28	1	120

Note:

* (1) Clear; (2) Slight; (3) Moderate; (4) High

LAW ENGINEERING

TABLE 4.1
SUMMARY OF HEADSPACE TESTING

ADDENDUM TO REPORT OF UNDERGROUND FUEL INVESTIGATION AND COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-08135-01

SAMPLE LOCATION	SAMPLE DEPTH (ft.)	OVA READING	SAMPLE SELECTED FOR LABORATORY ANALYSIS
MW-26	0 - 1.5	Not Detected (ND)	
	1.5 - 3	ND	*
	3 - 4.5	ND	
	6 - 7.5	ND	*
	9.5 - 11	ND	
	14.5 - 16	ND	
MW-27	0 - 1.5	ND	
	1.5 - 3	ND	*
	3 - 4.5	ND	
	6 - 7.5	ND	*
	9.5 - 11	ND	
	14.5 - 16	ND	
PW-28	0 - 1.5	ND	
	1.5 - 3	ND	
	3 - 4.5	ND	*
	6 - 7.5	ND	
	9.5 - 11	ND	*
	14.5 - 16	20	
	19.5 - 21	28	

TABLE 4.2
SUMMARY OF LABORATORY ANALYSES OF SOIL SAMPLES

ADDENDUM TO REPORT OF UNDERGROUND FUEL INVESTIGATION AND COMPREHENSIVE SITE ASSESSMENT
CAMP GEIGER AREA FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-08135-01

SAMPLE LOCATION	SAMPLE DEPTH (ft)	TOTAL PETROLEUM HYDROCARBONS	
		VOLATILES (mg/kg)	SEMI-VOLATILES (mg/kg)
MW-26	1.5-3	N.D.	N.D.
MW-26	6-7.5	N.D.	N.D.
MW-27	1.5-3	N.D.	N.D.
MW-27	6-7.5	N.D.	N.D.
PW-28	3-4.5	N.D.	N.D.
PW-28	9.5-11	N.D.	N.D.

KEY TO SYMBOLS FOR TABLE 4.4

SUMMARY OF LABORATORY ANALYSES

* Numerical standard has not been established; substances not allowed in detectable concentrations.

N.D. = Not detected: see laboratory reports for applicable detection limits.

- = Sample not analyzed for this parameter.

TABLE 4.4 (Page 1 of 3)
SUMMARY OF LABORATORY ANALYSES
MONITORING WELL GROUND-WATER SAMPLES
SHALLOW SCREENED INTERVAL

ADDENDUM TO REPORT OF UNDERGROUND FUEL INVESTIGATION AND COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-08135-01

	WELL NUMBER	NC GROUND WATER STANDARD	EMW-1 (CGMW-1)	EMW-2 (CGMW-2)	EMW-3 (CGMW-3)	EMW-4 (CGMW-4)	EMW-5 (35GW-4)	EMW-6 (35GW-5)	EMW-7 (35GW-6)	MW-8S	MW-9S	MW-10S
	DATE SAMPLED		9/3/91	9/5/91	9/5/91	9/5/91	9/4/91	9/5/91	9/5/91	9/4/91	9/3/91	9/3/91
PARAMETER (ug/l)	SCREENED INTERVAL (Feet)		8.5-17.5	1.87-10.87	3.06-12.06	2.61-11.61	10.5-24.5	10.5-24.5	10.5-24.5	4.5-13.5	3.5-12.5	4.5-13.5'
BENZENE		1	ND	40	ND	13	0.4	0.3	ND	52	45	3
TOLUENE		1000	ND	12	ND	ND	ND	ND	ND	ND	ND	5
ETHYLBENZENE		29	ND	41	ND	0.7	ND	ND	ND	73	ND	7
XYLENES TOTAL		400	ND	76	ND	2	ND	ND	ND	420	4	ND
METHYL TERTIARY BUTYL ETHER (MTBE)		50	ND	ND	ND	ND	ND	3	ND	ND	46	ND
LEAD		50	14	ND	2	28	75	ND	12	5	ND	3
TRANS-1,2-DICHLOROETHENE		70	ND	ND	2	ND	0.7	ND	18	ND	ND	17
TRICHLOROETHENE		2.8	ND	ND	8	0.6	3	0.6	59	ND	ND	170
1-METHYLNAPTHALENE		*	-	-	-	-	-	-	-	450	-	-
2-METHYLNAPTHALENE		*	-	-	-	-	-	-	-	460	-	-

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TABLE 4.4 (Page 2 of 3)
SUMMARY OF LABORATORY ANALYSES
MONITORING WELL GROUND-WATER SAMPLES
SHALLOW SCREENED INTERVAL

ADDENDUM TO REPORT OF UNDERGROUND FUEL INVESTIGATION AND
COMPREHENSIVE SITE ASSESSMENT

CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-08135-01

	WELL NUMBER	NC GROUND WATER STANDARD	MW-11S	MW-12S	MW-13S	MW-14S	MW-15S	MW-16S	MW-17S	MW-18S	MW-19S	MW-20S
	DATE SAMPLED		9/4/91	9/4/91	9/4/91	9/4/91	9/4/91	9/5/91	9/5/91	9/5/91	9/4/91	9/4/91
PARAMETER (ug/l)	SCREENED INTERVAL (Feet)		4.5'-13.5'	5'-14'	5.5'-14.5'	3.5'-12.5'	4.5'-13.5'	5.0'-14.0'	7.5'-16.5'	3.0'12.0'	4.5'-13.5'	3.0'-12.0'
BENZENE		1	ND	ND	ND	0.6	4	40	0.5	52	ND	140
TOLUENE		1000	ND	ND	ND	ND	ND	230	ND	ND	ND	280
ETHYLBENZENE		29	80	ND	ND	ND	3	76	ND	ND	ND	320
XYLENES TOTAL		400	170	ND	ND	ND	29	800	ND	ND	ND	830
METHYL TERTIARY BUTYL ETHER (MTBE)		50	ND	ND	ND	ND	ND	ND	1	32	ND	ND
LEAD		50	ND	16	7	2	5	6	6	9	36	ND
CHLOROFORM		0.19	ND	ND	ND	3	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE		70	ND	ND	ND	44	ND	ND	ND	ND	5	ND
TRICHLOROETHENE		2.8	ND	ND	ND	110	ND	ND	0.6	ND	31	ND
1,2-DICHLOROETHANE		*	ND	ND	ND	ND	ND	ND	1	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE		*	ND	ND	ND	ND	ND	ND	ND	ND	12	ND
TETRACHLOROETHENE		*	ND	ND	ND	ND	ND	ND	ND	ND	1	ND

LAW ENGINEERING

TABLE 4.4 (Page 3 of 3)
SUMMARY OF LABORATORY ANALYSES
MONITORING WELL GROUND-WATER SAMPLES
SHALLOW SCREENED INTERVAL

ADDENDUM TO REPORT OF UNDERGROUND FUEL INVESTIGATION AND
7COMPREHENSIVE SITE ASSESSMENT

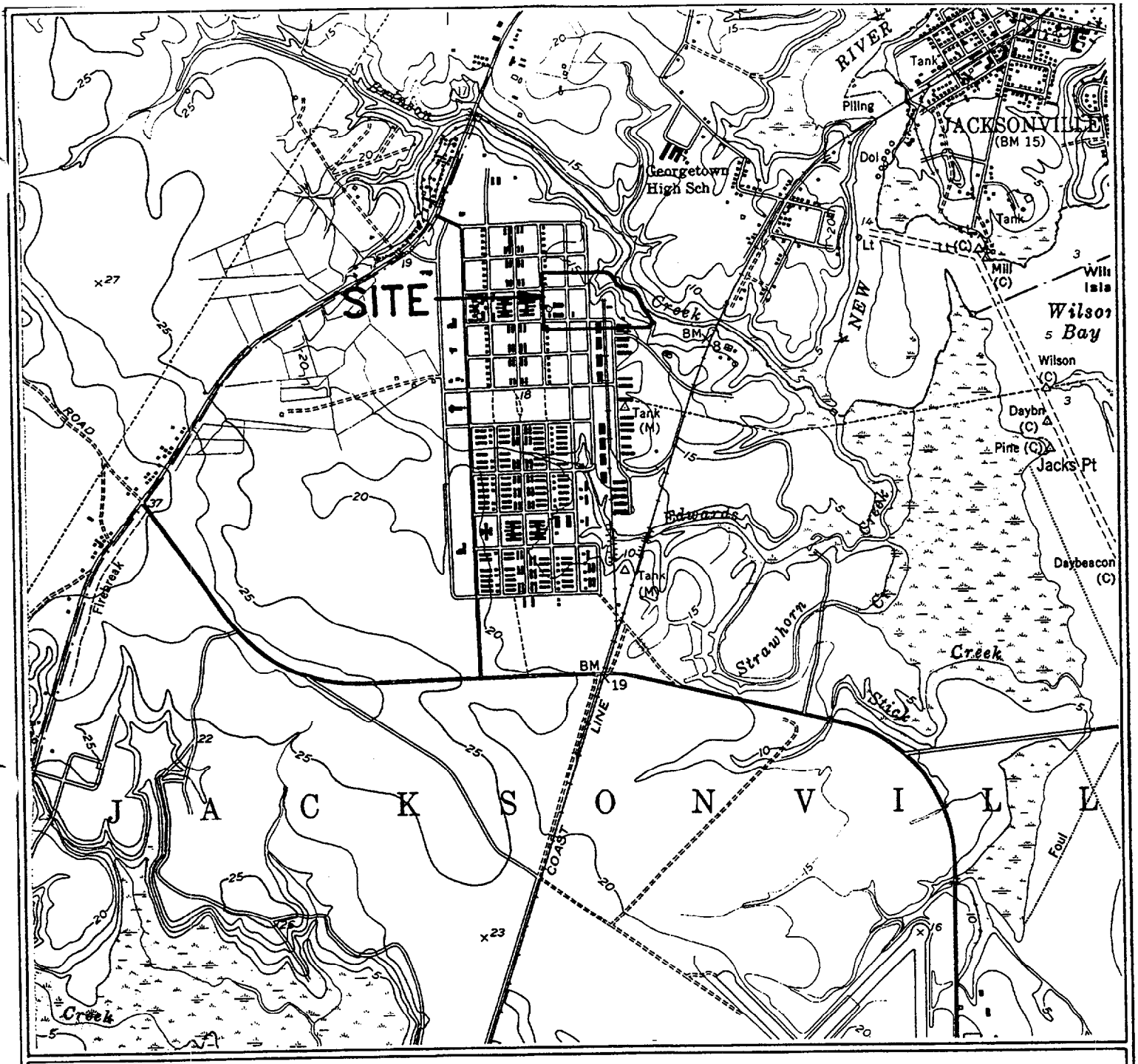
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA
LAW ENGINEERING JOB NO. 475-08135-01

	WELL NUMBER	NC GROUND WATER STANDARD	MW-21S	MW-22S	MW-23S	MW-24S	MW-25S	MW-26S (blind duplicate MW-14S)	MW-27S (blind duplicate MW-24S)	MW-26	MW-27	PW-28	POTABLE WATER
	DATE SAMPLED		9/4/91	9/4/91	9/5/91	9/5/91	9/4/91	9/4/91	9/5/91	11/04/92	11/04/92	11/04/92	10/29/92
PARAMETER (ug/l)	SCREENED INTERVAL (Feet)		4.5-13.5	5.5'-14.5'	2.5-9.5	8.5-17.5	4.5-13.5	3.5-12.5	8.5-17.5	4.5-13.5	55.5-14.5	55.5-24.5	-
BENZENE		1	220	2300	ND	11	26	0.6	12	ND	ND	ND	ND
TOLUENE		1000	ND	ND	ND	ND	160	ND	ND	ND	ND	ND	ND
ETHYLBENZENE		29	590	560	ND	10	190	ND	10	ND	ND	ND	ND
XYLENES TOTAL		400	1100	740	ND	43	500	ND	43	1.0	ND	ND	ND
METHYL TERTIARY BUTYL ETHER (MTBE)		50	ND	ND	ND	ND	ND	ND	ND	12.0	ND	ND	ND
LEAD		50	4	3	2	5	1	2	7	-	-	-	-
CHLOROFORM		0.19	ND	ND	ND	ND	ND	3	ND	-	-	-	-
TRANS-1,2-DICHLOROETHENE		70	ND	ND	ND	ND	ND	51	ND	-	-	-	-
TRICHLOROETHENE		2.8	ND	ND	0.6	ND	ND	120	ND	-	-	-	-
TRICHLOROFLUOROMETHANE		*	ND	ND	0.9	ND	ND	ND	ND	-	-	-	-
BROMODICHLOROMETHANE		*	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
BROMOFORM		0.19	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
DIBROMOCHLOROMETHANE		*	ND	ND	ND	ND	ND	ND	ND	-	-	-	-
ACENAPTHENE		*	-	-	-	ND	ND	ND	0.7	-	-	-	-
FLUORENE		*	-	-	-	1	ND	ND	ND	-	-	-	-
1-METHYLNAPTHALENE		*	-	-	-	84	190	ND	42	-	-	-	-
2-METHYLNAPTHALENE		*	-	-	-	63	270	ND	42	-	-	-	-
NAPTHALENE		*	-	-	-	41	220	ND	31	-	-	-	-

LAW ENGINEERING

DRAWINGS

LAW ENGINEERING



NORTH

JACKSONVILLE SOUTH, N.C.
NW/4 NEW RIVER 15' QUADRANGLE
N3437.5—W7722.5/7.5

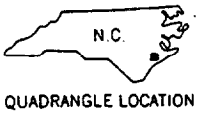
1952

PHOTOINSPECTED 1971
AMS 5563 III NW—SERIES V 842

CONTOUR INTERVAL 5 FEET

GRAPHIC SCALE FEET

2000 1000 0 2000 4000



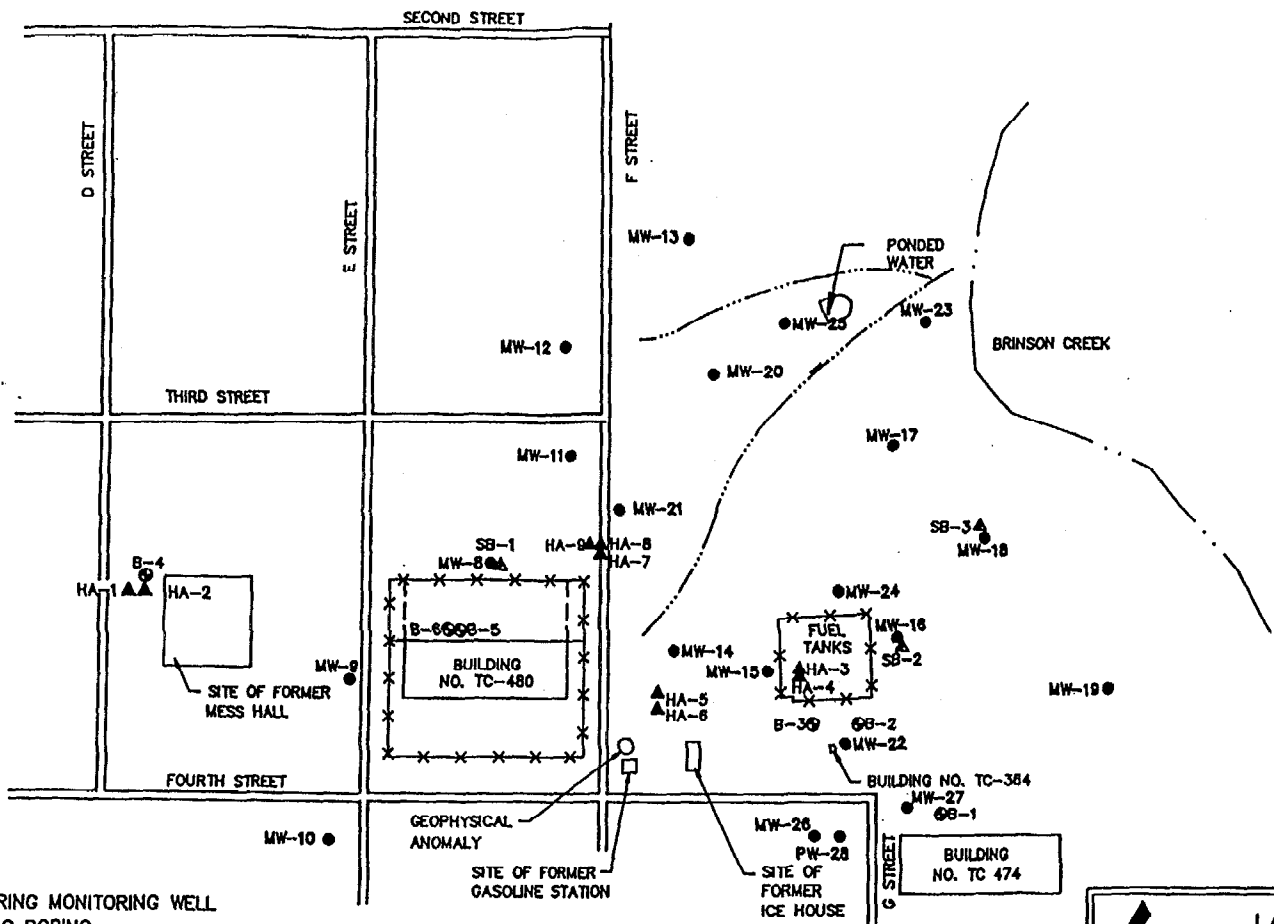
QUADRANGLE LOCATION

NOTE: SITE LOCATIONS ARE APPROXIMATE.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

TOPOGRAPHIC SITE MAP
UNDERGROUND FUEL INVESTIGATION
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: WBJ	DATE: DEC. 1992
DFT CHECK: WCP	SCALE: 1:24000
ENG CHECK: JAP	JOB: 475-08135-01
APPROVAL: RAL	DWG: 1.1



LEGEND

- FENCE
- ●MW-1 LOCATION OF LAW ENGINEERING MONITORING WELL
- ▲SB-1 LOCATION OF STRATIGRAPHIC BORING
- ⊕B-1 LOCATION OF SOIL BORING
- ▲HA-1 LOCATION OF HAND-AUGER BORING

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

LOCATION OF SOIL BORINGS
CAMP GEIGER FUEL FARM
CAMP LEJEUNE, NORTH CAROLINA

DRAWN: EAL	DATE: DEC. 1992
DFT CHECK: WBJ	SCALE: 1"=150'
ENG CHECK: TAP	JOB: 475-08135-01
APPROVAL: RAL	DWG: 3.1

REFERENCE: JAMES E. STEWART AND ASSOC.; SHT 1&2 OF 2; 9/13/91: USGS JACKSONVILLE SOUTH, N.C.

APPENDIX C

WELL-CONSTRUCTION RECORDS AND

GROUND-WATER MONITORING-WELL INSTALLATION DETAILS

LAW ENGINEERING

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ RO _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0277-WM-0297

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below) MW-26
   Nearest Town: Jacksonville County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER * See Address Below
   ADDRESS
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 10/29/92 USE OF WELL Monitoring
4. TOTAL DEPTH 14'
5. CUTTINGS COLLECTED YES [XX] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [XX]
7. STATIC WATER LEVEL Below Top of Casing: 7.47 FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 0' FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 4.5	Ft.	2"	SCH 80	PVC
From _____	To _____	Ft.	_____	_____	_____
From _____	To _____	Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From 1.5	To 3.0	Ft.	Bentonite	Pour
From _____	To _____	Ft.	_____	_____

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 4.5	To 13.5	Ft.	2	in.	0.010	in.	PVC
From _____	To _____	Ft.	_____	in.	_____	in.	_____
From _____	To _____	Ft.	_____	in.	_____	in.	_____

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 3.0	To 14.0	Ft.	Torpedo	Sand
From _____	To _____	Ft.	_____	_____

16. REMARKS: Concrete from 0' - 1.5'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See Attached Test Boring Records

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 Location Map

* Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287
Attention: Code 1821, Mr. Trueman Seamans

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

Richard A. Kohl — 12/14/92

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 9/91

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

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ RO _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

DRILLER REGISTRATION NUMBER: 332

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0277-WM-0297

1. WELL LOCATION: (Show sketch of the location below) MW-27
   Nearest Town: Jacksonville County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER * See Address Below
   ADDRESS
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 10/29/92 USE OF WELL Monitoring
4. TOTAL DEPTH 15'
5. CUTTINGS COLLECTED YES [XX] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [XX]
7. STATIC WATER LEVEL Below Top of Casing: 8.22 FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 0' FT. Above Land Surface*

*** Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118**

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth From	Depth To	Ft.	Diameter	Wall Thickness or Weight/Ft.	Material
	0	5.5		2"	SCH 80	PVC

13. GROUT:

	Depth From	Depth To	Ft.	Material	Method
	1.5	3		Bentonite	Pour

14. SCREEN:

	Depth From	Depth To	Ft.	Diameter	in.	Slot Size	in.	Material
	5.5	14.5		2		0.010		PVC

15. SAND/GRAVEL PACK:

	Depth From	Depth To	Ft.	Size	Material
	3	15		Torpedo	Sand

16. REMARKS: Concrete from 0' - 1.5'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See Attached Test Boring Records

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 Location Map

* Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287
Attention: Code 1821,
Mr. Trueman Seamans

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

Richard A. Hall 12/14/92

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 9/91

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

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ RO _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Law Engineering

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0277-WM-0297

DRILLER REGISTRATION NUMBER: 332

1. WELL LOCATION: (Show sketch of the location below) PW-28
   Nearest Town: Jacksonville County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER * See Address Below
   ADDRESS _____
   (Street or Route No.)
   City or Town State Zip Code
3. DATE DRILLED 10/28/92 USE OF WELL Pump Test
4. TOTAL DEPTH 25'
5. CUTTINGS COLLECTED YES [XX] NO [ ]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [XX]
7. STATIC WATER LEVEL Below Top of Casing: 8.11 FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 0' FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): N/A
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0	To 5.5	Ft.	4"	SCH 80	PVC
From _____	To _____	Ft.	_____	_____	_____
From _____	To _____	Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From 2	To 3	Ft.	Bentonite	Pour
From _____	To _____	Ft.	_____	_____

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 5.5	To 24.5	Ft	4	in.	0.010	in.	PVC
From _____	To _____	Ft.	_____	in.	_____	in.	_____
From _____	To _____	Ft.	_____	in.	_____	in.	_____

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 3	To 25	Ft.	Torpedo	Sand
From _____	To _____	Ft.	_____	_____

16. REMARKS: Concrete from 0' - 2'

DEPTH From	DEPTH To	DRILLING LOG Formation Description
		See Attached Test
		Boring Records

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 Location Map

* Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287
Attention: Code 1821,
Mr. Trueman Seamans

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

Richard A. Holt 12/14/92

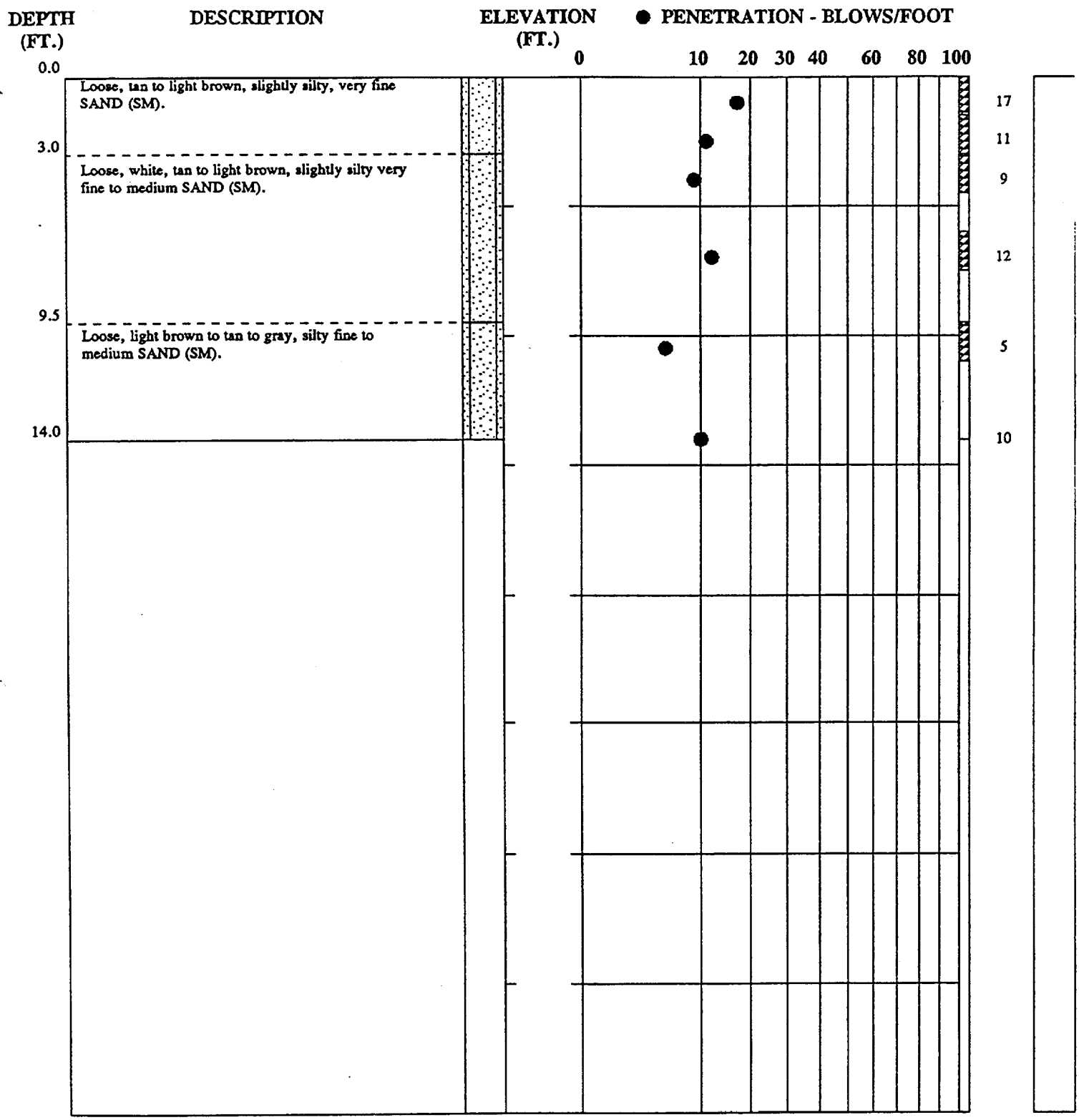
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 9/91

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

APPENDIX A

RECORDS OF SOIL-TEST BORINGS



REMARKS:

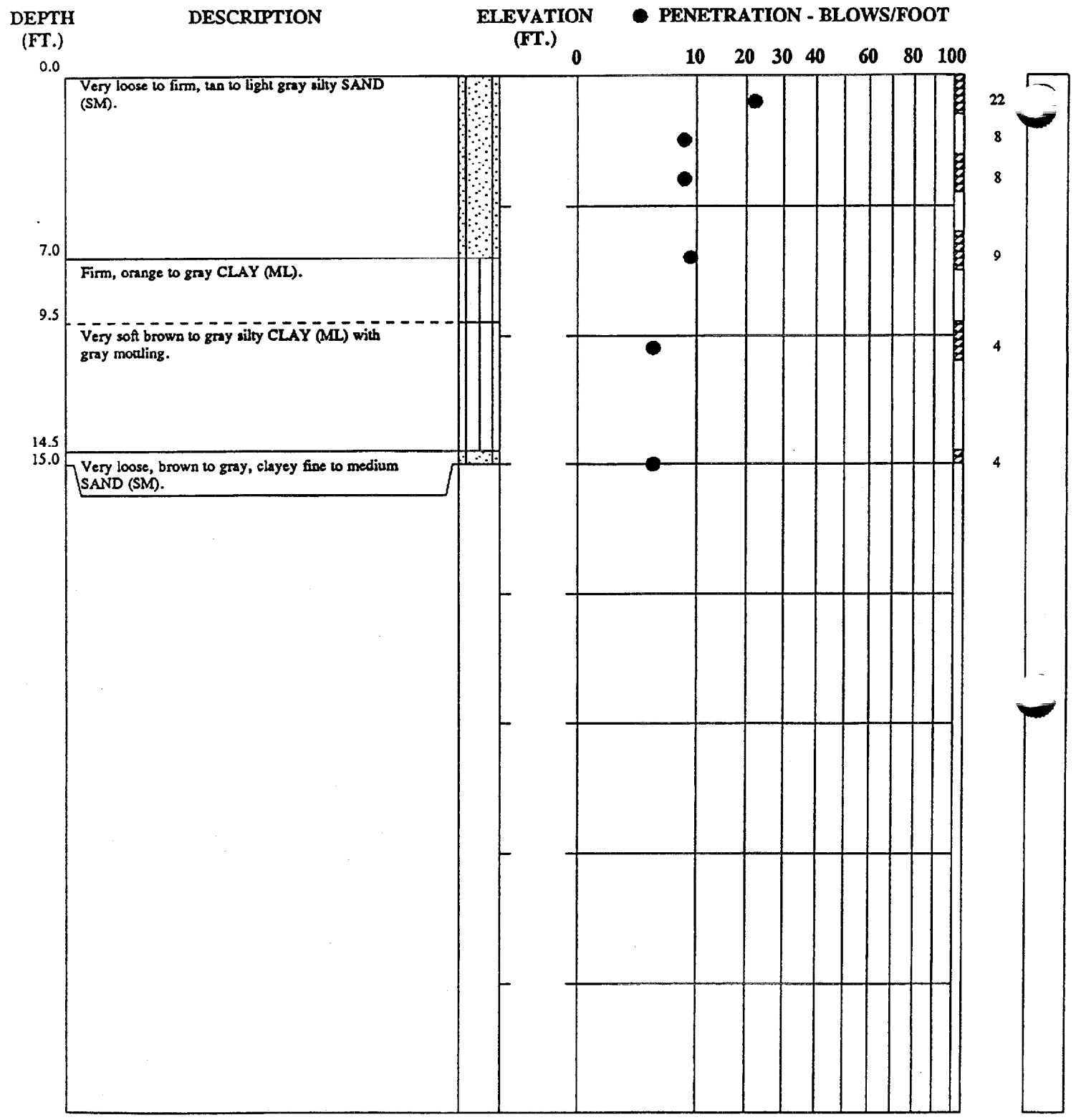
BORING TERMINATED AT 14.0'. UPON BORING COMPLETION, SINGLE-CASED MONITORING WELL INSTALLED. SEE WELL CONSTRUCTION RECORDS FOR DETAILS.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-26
DATE DRILLED	October 29, 1992
PROJECT NUMBER	475-08135-01
PROJECT	CAMP GEIGER FUEL FARM
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

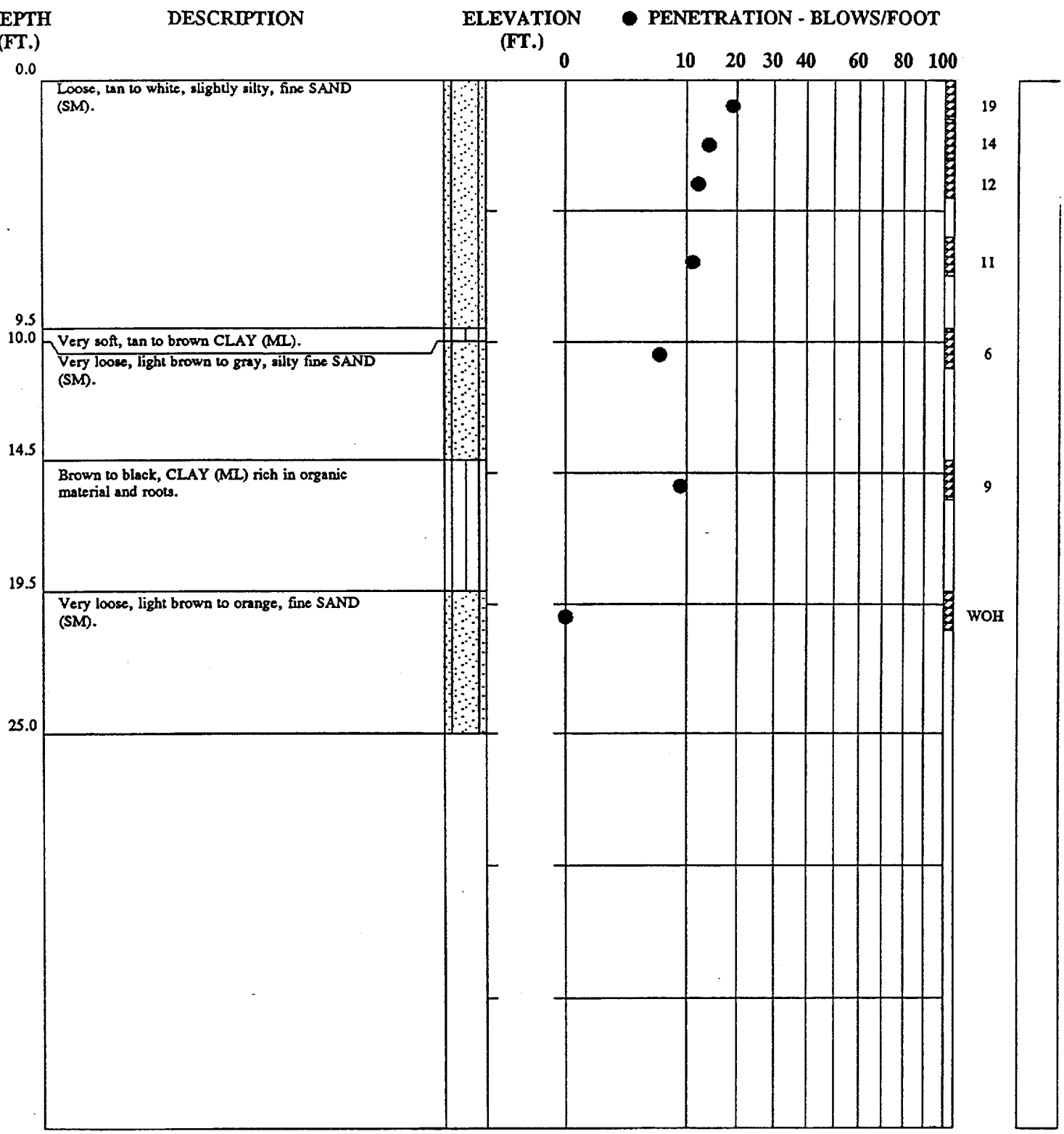
BORING TERMINATED AT 15.0'. UPON BORING COMPLETION, SINGLE-CASED MONITORING WELL INSTALLED. SEE WELL CONSTRUCTION RECORDS FOR DETAILS.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-27
DATE DRILLED	October 29, 1992
PROJECT NUMBER	475-08135-01
PROJECT	CAMP GEIGER FUEL FARM
PAGE 1 OF 1	

LAW ENGINEERING



REMARKS:

BORING TERMINATED AT 25.0'. UPON BORING COMPLETION, SINGLE-CASED MONITORING WELL INSTALLED. SEE WELL CONSTRUCTION RECORDS FOR DETAILS.

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	PW-28
DATE DRILLED	October 28, 1992
PROJECT NUMBER	475-08135-01
PROJECT	CAMP GEIGER FUEL FARM
PAGE 1 OF 1	

LAW ENGINEERING

APPENDIX D
INTERIM REMEDIAL ACTION
REMEDIAL INVESTIGATION (BAKER, 1994)

Final

Interim Remedial Action Remedial Investigation/ Feasibility Study

Operable Unit No. 10
Site 35 - Camp Geiger Area Fuel Farm

Marine Corps Base
Camp Lejeune, North Carolina

Prepared For:

Department of the Navy
Atlantic Division
Naval Facilities
Engineering Command
Norfolk, Virginia

Under the

LANTDIV CLEAN Program

Comprehensive Long-Term
Environmental Action Navy

EXECUTIVE SUMMARY

Introduction

An Interim Remedial Action Remedial Investigation (RI) was conducted at Operable Unit 10, Site 35 - Camp Geiger Area Fuel Farm to provide additional data regarding petroleum hydrocarbon contaminated soil to support the selection of an interim remedial action. Previous investigations had determined the presence of fuel-related contamination in subsurface soils and shallow groundwater in the vicinity of the Fuel Farm. Based on previously obtained data and reports of fuel-like odors along Brinson Creek by Camp Lejeune, LANTDIV, and Baker personnel, an Interim Remedial Action RI and Feasibility Study (FS) was deemed necessary because it was determined qualitatively that:

- The existing site conditions potentially expose nearby human populations, animals, or food chains to toxic substances, pollutants, or contaminants; and

- High levels of toxic substances or pollutants in soils are largely at or near the surface that may migrate.

Site Location and Description

Camp Geiger is located at the extreme northwest corner of MCB, Camp Lejeune, Onslow County. The main entrance to Camp Geiger is off U.S. Route 17, approximately 3.5 miles southeast of the City of Jacksonville, North Carolina. Site 35, the Camp Geiger Area Fuel Farm refers primarily to five, 15,000-gallon aboveground storage tanks (ASTs), a pump house, and a fuel unloading pad situated within Camp Geiger just north of the intersection of Fourth and "G" Streets.

Site History

Construction of Camp Geiger was completed in 1945, four years after construction of MCB, Camp Lejeune was initiated. Originally, the Fuel Farm ASTs were used for the storage of No. 6 fuel oil, but, were later converted for storage of other petroleum products including unleaded gasoline, diesel fuel, and kerosene. The date of their conversion is not known.

Routinely, the ASTs at Site 35 supply fuel to an adjacent dispensing pump. A leak in an underground line at the station was reportedly responsible for the loss of roughly 30 gallons per day of gasoline over an unspecified period (Law, 1992). The leaking line was subsequently sealed and replaced.

The ASTs at Site 35 are currently used to dispense gasoline, diesel and kerosene to government vehicles and to supply USTs in use at Camp Geiger and the nearby New River Marine Corps Air Station. The ASTs are supplied by commercial carrier trucks which deliver product to fill ports located on the fuel unloading pad at the southern end of the facility. Six, short-run (120 feet maximum), underground fuel lines are currently utilized to distribute the product from the unloading pad to the ASTs. Product is dispensed from the ASTs via trucks and underground piping.

Reports of a release from an underground distribution line near one of the ASTs date back to 1957-58 (ESE, 1990). Apparently, the leak occurred as the result of damage to a dispensing pump. At that time the Camp Lejeune Fire Department estimated that thousands of gallons of fuel were released although records of the incident have since been destroyed. The fuel reportedly migrated to the east and northeast toward Brinson Creek. Interceptor trenches were excavated and the captured fuel was ignited and burned.

Another abandoned underground distribution line extended from the ASTs to the former Mess Hall Heating Plant, located adjacent to "D" Street, between Third and Fourth Streets. The underground line dispensed No. 6 fuel oil to a UST which fueled the Mess Hall boiler. The Mess Hall, located across "D" Street to the west, is believed to have been demolished along with its Heating Plant in the 1960s.

In April 1990, an undetermined amount of fuel had been discovered by Camp Geiger personnel along the unnamed drainage channels north of the Fuel Farm. Apparently, the source of the fuel, believed to diesel or jet fuel, was an unauthorized discharge from a tanker truck that was never identified. The Activity reportedly initiated an emergency clean-up which included the removal of approximately 20 cubic yards of soil.

The Fuel Farm is scheduled to be decommissioned in 1994. Plans are currently being prepared to empty, clean, dismantle, and remove the ASTs along with all concrete foundations, slabs on grade, berms and associated underground piping. The Fuel Farm is being removed to make

way for a four lane divided highway proposed by the North Carolina Department of Transportation (NCDOT).

Previous Investigations and Findings

Previous investigations include an Initial Assessment Study (Water and Air Research [WAR], 1983), a Confirmation Study (Environmental Science and Engineering, Inc. [ESE], 1984 and 1987), a Focused Feasibility Study (NUS Corporation [NUS], 1990), and a Comprehensive Site Assessment (Law Engineering, Inc. [Law], 1991).

The Initial Assessment Study identified Site 35 as one of 23 sites warranting further investigation. Environmental media were not sampled as part of this study.

ESE performed the Confirmation Study at the Fuel Farm between 1984 and 1987. Soil, groundwater, surface water, and sediment samples were obtained and analyzed for lead and oil and grease. Groundwater was also analyzed for volatile organics. Oil and grease results indicated that soils northeast of the Fuel Farm were potentially impacted by site activities.

Additional wells were installed by NUS Corporation during the Focused Feasibility Study, which was conducted in 1990. Soil cuttings obtained from two of the four well boreholes contained hydrocarbon related contamination.

Law conducted the Comprehensive Site Assessment in 1991. A total of 18 soil borings were drilled, sampled and converted to nested wells that monitor the water table aquifer at two depths. An additional three soil borings were drilled to provide stratigraphic data. Five more soil borings were drilled to provide data regarding vadose zone contamination. Nine hand-auger samples were also obtained. A follow-up study was conducted subsequent to the Comprehensive Site Assessment. Three additional borings were drilled, sampled and converted to wells.

Law identified areas of impacted soil and groundwater directly beneath and apart from the Fuel Farm. The nature of the contamination included both chlorinated organic compounds (e.g., TCE, trans-1,2-DCE, and vinyl chloride) and petroleum hydrocarbons (e.g., TPH, MTBE, BTEX). The majority of the soil contamination encountered appeared to be associated with a fluctuating groundwater table. Two plumes of shallow groundwater contaminated with petroleum constituents and two plumes contaminated with chlorinated organics were

identified. All four plumes were located north of Fourth Street and east of E Street except for a portion of a TCE plume extending southwest of Fourth Street.

The Interim Remedial Action RI conducted by Baker in 1993 and 1994 consisted of drilling seven additional soil borings including five in those areas where groundwater contamination plumes were suspected. A single soil sample was obtained from each of these soil borings and analyzed for TCL organics, TAL inorganics, TPH and oil and grease. Samples obtained from two boring locations (SB-30 and SB-34) displayed relatively high concentrations of benzene, toluene, ethylbenzene, xylenes, naphthalene and 2-methylnaphthalene; constituents commonly associated with fuels. These two locations also displayed the highest detected concentrations of TPH encountered during the Interim Remedial Action RI. Highest detected concentrations of these contaminants were in samples taken at or below the shallow water table.

The non-fuel related contaminant trichloroethene (TCE) was detected at concentrations below its corresponding contract required quantitation limit in two samples. One of these samples was obtained from background soil boring location SB-29.

In addition to soil boring samples a total of ten shallow soil samples were obtained in the vicinity of Brinson Creek and the unnamed drainage channels located to the north of the Fuel Farm. No significant levels of fuel-related contaminants and TPH were detected in these samples. Oil and grease was, however, detected in these shallow soil samples. Therefore, two additional samples were obtained approximately 1/2-mile upstream of the site along Brinson Creek to establish background levels of oil and grease. Background oil and grease results obtained upstream of Site 35 indicate that naturally-occurring organics in soils or an upgradient contamination source could be responsible for the positive oil and grease results obtained at the site. An additional sample was also obtained downstream of the site to identify the potential extent of contamination.

In general, the Interim Remedial Action RI data confirm the findings of the CSA (Law, 1992) that indicated contaminated soil conditions at Site 35 are primarily associated with a fluctuating shallow groundwater plume. Contamination encountered in the vicinity of monitoring wells MW-21 and MW-25 was detected at approximately two or more feet above the measured groundwater surface and may be indicative of contamination not associated with a fluctuating groundwater plume. To date, however, recorded groundwater levels

provide insufficient data to afford an estimate of the range of groundwater elevation fluctuation at Site 35.

Nature and Extent of Contamination

Petroleum hydrocarbon contamination at Site 35 is primarily associated with shallow groundwater that is typically encountered across the site at six to eight feet below the ground surface (bgs). Law identified two distinct petroleum hydrocarbon shallow groundwater plumes including one directly beneath the Fuel Farm ASTs and another located immediately northwest of the Fuel Farm ASTs in the vicinity of the unnamed drainage channels that covey surface runoff to Brinson Creek.

In addition to contaminated groundwater samples, subsurface soil samples have been identified at the site as contaminated with petroleum hydrocarbons. The contaminated soil samples, for the most part, were obtained along a narrow zone that extends about one to two feet above the groundwater table (as measured on two separate occasions including once in August, 1991 by Law and again in March, 1994 by Baker). The soil contamination in this zone just above the top of shallow groundwater appears to have been transported there by a fluctuating groundwater table. In only two areas did the results of soil sampling indicate the presence of elevated petroleum hydrocarbon contamination at locations sufficiently above the top of groundwater such that the source of the contamination may not have been a fluctuating groundwater table. The two areas are both located north of the Fuel Farm where past unauthorized discharges of fuel products were reported to have occurred and are centered around samples obtained from monitoring well MW-25 and monitoring well MW-21, respectively.

Summary of Site Risks

A preliminary baseline risk assessment, limited to Site 35 soil contamination, was conducted using data from the previous investigations and the Interim Remedial Action RI. A more comprehensive baseline risk assessment involving groundwater, surface water, and sediment, in addition to soil, will be conducted as part of the comprehensive Site 35 Remedial Investigation being conducted concurrently.

Because soil contamination is associated with subsurface soils at or below the water table, a construction worker scenario was used to determine potential human health risks.

The construction worker was assumed to engage in excavation activities and could potentially contact contaminants in deep soil by dermal contact, through accidental ingestion and by inhaling contaminant-laden dust particles. A construction worker scenario is the most likely current potential human receptor as well as the most likely future receptor because of the new highway construction scheduled for Site 35. Benzene and arsenic were retained as chemicals of potential concern (COPCs) for quantitative evaluation in the preliminary baseline risk assessment. An incremental lifetime cancer risk (ICR) value of 3×10^{-6} was derived for the construction worker. This value falls within USEPA's target risk range of 10^{-6} to 10^{-4} which is generally considered to be acceptable by the Agency. Noncarcinogenic hazard index (HI) values fell below 1.0 suggesting that systemic adverse health effects would not occur subsequent to exposure.

An ecological risk assessment was not performed at this time because soil contaminants are encountered at depths 4 feet below the ground surface or more and occur primarily at or below the shallow water table. A comprehensive baseline ecological risk assessment, in addition to the baseline human health risk assessment, will, however, be conducted as part of the concurrent comprehensive Remedial Investigation at Site 35.

In addition to human health risks, North Carolina's Department of Environment, Health and Natural Resources Division of Environmental Management's Site Sensitivity Evaluation (SSE) was performed. SSE cleanup goals for gasoline, diesel and oil and grease were derived. Cleanup goals of 40 mg/kg, 160 mg/kg and 800 mg/kg, respectively, were calculated. The applicability of the SSE cleanup goals will be further addressed in the Interim Remedial Action Feasibility Study (FS).

APPENDIX K
RI/FS CHAIN OF CUSTODY RECORDS

Inchcape Testing Services NDRC Laboratories.

COC#: 35001

CHAIN OF CUSTODY RECORD

3 COOLERS SENT

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by		Bill to	
Name:	BAKER ENVIRONMENTAL	Name:	← SAME
Address:	CORAOPOLIS, PA.	Address:	
Contact:	Attn. R. HOFF	Contact:	← SAME
Phone:	412-269-2099	Phone:	
Fax:		PO #:	

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. CTO 232 | Project Name: MCB CAMP LEJEUNE, CAMP GEIGER | No. of Containers[2]

ANALYSIS REQUIRED: TCL VOLATILES; TCL SEMIVOLATILES; TCL PEST/PCB; TAL INORGANICS; HARDNESS

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	4/12				35-TB01					X
W	4/12				35-TB02					X
W	4/12				35-TB03					X
W	4/12	1215		X	35-SW03					X X X X X
W	4/12	1315		X	35-SW04					X X X X X
W	4/12	1315		X	35-SW04 MS/MSD					X X X X
W	4/12	1340		X	35-SW05					X X X X X
W	4/12	1110		X	35-SW06					X X X X X

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4/12/94	1540				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	PLEASE CONTACT R. HOFF OR C. CARUSO WITH ANY QUESTIONS. THANKS.

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

COC # 35002 p1of2

Inchcape Testing Services NDRC Laboratories. **CHAIN OF CUSTODY RECORD** 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: BAKER ENV.	Name: ← SAME
Address: Cockpolis, Fa	Address:
Contact: Mr. R Hoff	Contact: ← SAME
Phone: 112 269-2099	Phone:
Fax: 112 269 2002	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 010232 | Project Name MCB Camp Lejeune, Camp Geiger | No. of Containers[2]

ANALYSIS REQUIRED: TCL VOLATILES; TCL SEMIVOLATILES; TCL PEST/PCB; TAL & TOTAL INORGANICS; HARDNESS

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt	250 ml	P/O	Lab. Sample ID
W	4-12	1650		X	35-SW01					Collected @ 1650
W	4-12	1617		X	35-SW02					Collected @ 1617
W	4-12	1617		X	35-SW02D					Collected @ 1617
W	4-12				35-TB01					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Air J. Corp	4/12	1524			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: TIMES WERE NOT NOTED ON LABELS DUE TO LACK OF TIME PRIOR TO FED-X PICK UP. PLEASE USE TIMES & DATES ON C-O-C. ALSO 35-TB04 MAY NOT BE LABELED AS SUCH. CALL R. HOFF WITH QUESTIONS

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Ca 35002 p 20

4/18 1524

Submitted by	Bill to
Name: BAKER ENVIRONMENTAL	Name: ← SAME
Address: CORAOPOLIS, PA	Address:
Contact: Attn. R. HOFF	Contact: ← SAME
Phone: 412-269-2099	Phone:
Fax: 412-269-2002	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. CTO 232 | Project Name: MCB CAMP LEJEUNE, CAMP GEIGER | No. of Containers[2]

ANALYSIS REQUIRED: TCL VOLATILES; TCL SEMIVOLATILES; TCL PEST/PCBs; TAL INORGANICS

Lab use only Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
S	4-13	1327		X	35-SD05-06					X X X X
S	4-13	1325		X	35-SD05-612					X X X X
S	4-13	1242		X	35-SD06-06					X X X X
S	4-13	1240		X	35-SD06-612					X X X X
W	4-13				35-SDER01					X X X X
W	4-13				35-TB06					X

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
for JLuP	4/18	1524				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

SDG#: 35003 p1 of 2

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: BAKER ENVIRONMENTAL	Name: ← SAME
Address: CORAOPOLIS, PA	Address:
Contact: R. HOFF	Contact: ← SAME
Phone: 412-269-2095	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

Proj. No.	Project Name	No. of Containers[2]
GTO 232		

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL Volatiles	TCL Semivolatiles	TAL Inorganics	Lab. Sample ID
S	~~4-13-94 0850~~	0850		X	35-SS11-00					X	X	X	
S	4-13-94	0857		X	35-SS12-00					X	X	X	
S	4-13-94	0925		X	35-SS14-00					X	X	X	
S	4-13-94	1250		X	35-SS13-00					X	X	X	
S	4-13-94	1320		X	35-SS10-00					X	X	X	
S	4-13-94	1340		X	35-SS09-00					X	X	X	
S	4-13-94	1350		X	35-SS07-00					X	X	X	
S	4-13-94	1350		X	35-SS07-00 MS/MSD					X	X	X	
S	4-13-94	1352		X	35-SS07-00D					X	X	X	

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	4-14	15:37			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks

NOTE:

35-SS07-00 MS/MSD FOR VOLATILES CAN BE TAKEN FROM AVAILABLE SAMPLE VOLUME. R. HOFF

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other ____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

SDG #: 35003

p. 2 of 4

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: BAKER ENVIRONMENTAL	Name: ← SAME
Address: CORAOPOLIS, PA	Address:
Contact: R. HOFF	Contact: ← SAME
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Proj. No.	Project Name	No. of Containers[2]

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL VOLATILES	TCL SEMIVOLATILES	TAL INORGANICS	TCL PEST/PCB	Lab. Sample ID
S	4-13-94	1425		X	35-SS02-00					X	X	X		
S	4-13-94	1430		X	35-SS01-00					X	X	X		
W	4-13-94			X	35-TB07					X	X	X		
W	4-13-94			X	35-RB01					X	X	X		
~~W~~	~~4-13-94~~			~~X~~	~~35-FB01~~ R.H. 4/13									
S	4-14-94	1405		X	35-SD03-612					X	X	X	X	
S	4-14-94	1407		X	35-SD03-06					X	X	X	X	
S	4-14-94	1407		X	35-SD03-06MS/MSD					X	X	X	X	
W	4-14			X	35-TB08									

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	4-14	15:37			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks

NOTE:
35-TB08 second vial was broken.

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

COC#: [redacted]35004 p1 of —

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: BAKER ENVIRONMENTAL	Name: ← SAME
Address: CORAOPOLIS, PA	Address:
Contact: R. HOFF	Contact: ← SAME
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 | Project Name: MCB CAMP LEJEUNE CAMP GEIGER | No. of Containers[2]

ANALYSIS REQUIRED: TCL VOLATILES; TCL SEMIVOLATILES; TCL PEST/PCB; TAL INORGANICS

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL VOLATILES	TCL SEMIVOLATILES	TCL PEST/PCB	TAL INORGANICS	Lab. Sample ID
S	4/14	1732		X	35-SS05-00					X	X		X	
S	4/14	1720		X	35-SS06-00					X	X		X	
S	4/14	1800		X	35-SS08-00					X	X		X	
W	4/14			X	35-TB09					X				
S	4/14	1730		X	35-SD01-612					X	X	X	X	
S	4/14	1732		X	35-SD01-06					X	X	X	X	
S	4/14	1628		X	35-SD02-612					X	X	X	X	
S	4/14	1630		X	35-SD02-06					X	X	X	X	
S	4/14	1630		X	35-SD02-06D					X	X	X	X	

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4/15/14	1600				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY

COC# 35004 cont. Page of

Inchcape Testing Services NDRC Laboratories. **CHAIN OF CUSTODY RECORD** 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: BAKER ENVIRONMENTAL	Name: ← SAME
Address: CORAOPOLIS, PA	Address:
Contact: R. HOFF	Contact: ← SAME
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO232 Project Name: MCB CAMP LEJEUNE CAMP GEIGER No. of Containers[2]

ANALYSIS REQUIRED: TCL VOLATILES; TCL SEMIVOLATILES; TCL PEST/PCBs; TAL INORGANICS; HARDNESS

Lab use only — Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	4/14				35-TB10					X
W	4/15	1607		X	35-SW07					X X X X X
S	4/15	1642		X	35-SD04-612					X X X X X
S	4/15	1642		X	35-SD04-06					X X X X X
S	4/15	1642		X	35-SD04-06D					X X X X X
S	4/15	1615		X	35-SD07-612					X X X X X
S	4/15	1617		X	35-SD07-06					X X X X X
S	4/15	0822		X	35-GWD-01					X X X
W	4/15	1530		X	35-RB-02					X X X X

Turn around time ☒ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4/15/94	1600				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

CCC # 35005 2 of 2

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: James Culp	Name: Baker Env.
Address: 1723 Lejeune Blvd Jacksonville NC 28540	Address: 420 Rouser Rd. Coraopolis Pa
Contact:	Contact: D Hoff
Phone: 910-353-3336	Phone: (412) 269-2099
Fax:	PO #: 62476-232

Analysis Required: TCL Volatiles, TCL Semivolatiles, TAL Metals, Full TCLP, Corrosivity, Ignitability, Reactivity, Tot. Tot. Phosphorus, TKN, Microbial Enumeration, Pest/PCB, Hardness

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. CTO 232 Project Name MCB Camp Lejeune, Camp Geiger

No. of Containers [2]

Matrix [1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL Volatiles	TCL Semivolatiles	TAL Metals	Full TCLP	Corrosivity	Ignitability	Reactivity	Tot. Tot. Phosphorus	TKN	Microbial Enumeration	Pest/PCB	Hardness	Lab. Sample ID
S	4/16	1140		X	35-GWDS02-03					X	X	X										
S	4/17	1610		X	35-GWDS03-03					X	X	X										
S	4/17	1615	X		35-GWDS03-04								X	X	X	X	X	X				
W	4/16	1930		X	35-RB04					X	X	X										
W	4/17	1930		X	35-RB05					X	X	X							X			
W	4/16	—			35-TB11					X												
S	4/16	1802		X	36-SD01-06					X	X	X							X			
S	4/16	1800		X	36-SD01-612					X	X	X							X			
S	4/16	1715		X	36-SD02-06					X	X	X							X			
S	4/16	1715		X	36-SD02-612					X	X	X							X			

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS * * BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4/18/94	1520				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 35005 1CF2

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker	Name: Baker
Address: 1723 (W) Lejune Blvd	Address: 420 Rouser Rd.
JAY NC 28546	Coraopolis Pa 15108
Contact: J. Clup	Contact: R. HOFF
Phone: 910 353 3356	Phone: 412 269 2099
Fax:	PO #: 62470 232

ANALYSIS REQUIRED: TCL VOLATILES, TCL SEMIVOLATILES, PEST/PCB, TAL METALS, HARDNESS

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232
Project Name: MCB Camp Lejeune Camp Geiger

No. of Containers[2]

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL VOLATILES	TCL SEMIVOLATILES	PEST/PCB	TAL METALS	HARDNESS					Lab. Sample ID
S	4/16	1618		X	36-SD03-06					X	X	X	X						
S	4/16	1616		X	36-SD03-612					X	X	X	X						
S	4/16	1115		X	36 SD02-06D					X	X	X	X						

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	4/18/94	1530			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Please Contact R. Hoff w/any Questions

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other________

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. **CHAIN OF CUSTODY RECORD** 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Env.	Name: Baker
Address: 1723 Lejeune Blvd Jacksonville, NC 28540	Address: 420 Rouser Rd. Coraopolis, Pa 15108
Contact: J. Culp	Contact: R. Hoff
Phone: 910 353-3336	Phone: 412-269-2039
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: MCB CAmp Lejeune - Camp Geiger | No. of Containers[2]

ANALYSIS REQUIRED: TAL VOLATILES; TAL SEMIVOLATILES; PEST/PCB; TAL METALS; HARDNESS; TOC

Lab use only — Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	4-18	1254		X	36-SW05					
W	4-18	1254		X	36-SW05 MS/MSD					
W	4-18	1445		X	36-SW07					
W	4-18	1401		X	36-SW06					
W	4-18	1259		X	36-SW05D					
S	4-19	0835		X	35-GWDS04-02					
S	4-18	1306		X	36-SD05-06					
S	4-18	1304		X	36-SD05-612					
S	4-18	1306		X	36-SD05-06 MS/MSD					
S	4-18	1306		X	36-SD05-06D					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
James S. Culp	4/19/94	1630				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Env.	Name: Baker
Address: 1723 Le Jeune Blvd Jacksonville, NC 28540	Address: 420 Rouser Rd. Coraopolis, Pa 15108
Contact: J. Culp	Contact: R. Hoff
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 60470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

ANALYSIS REQUIRED: TCL VOLATILES; TCL SEMIVOLS; TCL PEST/PCB; TAL METALS; HARDNESS; TOC

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. ____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
S	4-18	1412		X	36-SD06-06					
S	4-18	1410		X	36-SD06-612					
S	4-18	1500		X	36-SD07-06					
S	4-18	1458		X	36-SD07-612					
W	4-18			X	35-TB12 ✓					
W	4-19	1440		X	36-SW01 ✓					
W	4-19	1420		X	36-SW02 ✓					
W	4-19	1350		X	36-SW03 ✓					
W	4-18	1600		X	36-RB06 ✓					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
James S. Culp	4/19/94	1630				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 435007

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, PA	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 | Project Name: MCB Camp Lejeune, Camp Geiger | No. of Containers[2]

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest/PCB; TAL Inorganics; Hardness; TOC

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL Volatiles	TCL Semivolatiles	TCL Pest/PCB	TAL Inorganics	Hardness	TOC	Lab. Sample ID
W	4/19	1730		X	35-RB07					X	X		X			
W	4/19	1940		X	36-SW04					X	X	X	X	X		
W	4/20				35-TB0414					X						
SD	4/19	1947			36-SD04-06					X	X	X	X		X	
SD	4/19	1945			36-SD04-612					X	X	X	X		X	

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	4-20-94	1500			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: If you have any questions please contact Rich Hoff at the above number

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 935008

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Atta R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 Project Name: MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest./PCB; TAL Inorganic

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-17	0825			35-FS03-MC09					X X X X
	4-17	0825			35-FS03-MC10					
	4-14	1900			35-FS03-AE01					
	4-14	1845			35-FS03-PS01					
	4-14	1845			35-FS03-PS02					
	4-15	0946			35-FS03-PS03					
	4-15	0946			35-FS03-PS04					
	4-15	0946			35-FS03-PS05					
	4-15	0940			35-FS03-PS06					
	4-17	0825			35-FS03-PS07					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 735008

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. CTO 232 | Project Name: MCB Camp Lejeune, Camp Geiger | No. of Containers[2]

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest./PCB; TAL Inorganic

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-15	0940			35-FS03-WM02					X X X X
	4-15	0940			35-FS03-BG01					
	4-15	0940			35-FS03-BG02					
	4-15	0940			35-FS03-BG03					
	4-15	0940			35-FS03-BG04					
	4-15	0940			35-FS03-BG05					
	4-15	0940			35-FS03-BG06					
	4-15	0940			35-FS03-BG07					
~~4-15~~	~~0940~~		mGr							mGm
~~4-15~~	~~0940~~		mGm							mGn

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC# 935008

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Atta R. Hoff	Contact: ← Same
Phone: 412 - 269 - 2099	Phone:
Fax:	PO #:

ANALYSIS REQUIRED: TCL Volatiles

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. ____ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL Volatiles	Lab. Sample ID
	4-21	1445			35-TB16	2				X	
	4-21	1445			35-TB17	2				X	
	4-21	1445			35-TB18	2				X	
	4-21	1445			35-TB19	2				X	
	4-21	1445			35-TB20	2				X	

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other ____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

COC # 935008

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 Project Name: MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest/PCB; TAL Inorganics

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-17	0825			35-FS03-SM03					X X X X
	4-17	0825			35-FS03-SM04					
	4-14	0930			35-FS03-MC01					
	4-17	0825			35-FS03-MC02					
	4-17	0825			35-FS03-MC03					
	4-17	0825			35-FS03-MC04					
	4-17	0825			35-FS03-MC05					
	4-17	0825			35-FS03-MC06					
	4-17	0825			35-FS03-MC07					
	4-17	0825			35-FS03-MC08					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other ____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 935008

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 Project Name: MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest. / PCB; TAL Inorganics

Lab use only — Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	No. of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-17	0825			35-FS03-LG03					X X X X
	4-17	0825			35-FS03-LG04					
	4-17	0825			35-FS03-LG05					
	4-17	0825			35-FS03-LG06					
	4-17	0825			35-FS03-LG07					
	4-17	0825			35-FS03-LG08					
	4-17	0825			35-FS03-LG09					
	4-15	0940			35-FS03-LG01					
	4-14	0930			35-FS03-SM01					
	4-14	0930			35-FS03-SM02					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 935008
1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, PA	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 Project Name: MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest./PCB; TAL Inorganics

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-14	1230			35-FS02-AE01					X X X X
	4-14	1230			35-FS02-PS01					
	4-14	1230			~~35-FS02-PS02~~ mcm					
	4-17	0715			35-FS02-14MC01-02 AE1					
	4-17	0715			35-FS02-MC02					
	4-14	0900			35-FS02-CF01					
	4-15	1530			35-FS01-GS01					
	4-15	1530			35-FS01-AE01					
	4-15	1530			35-FS01-PS01					
	4-15	0940			35-FS03-WM01					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 735008

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 Project Name: MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest/PCB; TAL Inorganics

Lab use only Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-18	0800			36-FS03-WC03					X X X X
	4-18	0800			36-FS03-WC04					
	4-18	0800			36-FS03-WC05					
	4-18	0800			36-FS03-WC06					
	4-18	0800			36-FS03-WC07					
	4-18	0800			36-FS03-WC08					
	4-18	0800			36-FS03-WC09					
	4-18	0800			36-FS03-WC10					
	4-14	0900			35-FS02-LG01					
	4-17	0825			35-FS03-LG02					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4-21-04	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

COC # 935008

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

ANALYSIS REQUIRED

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. ____ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. CTO 232 | Project Name MCB Camp Lejeune, Camp Geiger

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	TCL Volatiles	TCL Semivolatiles	TCL Pest./PCB	TAL Inorganics	Lab. Sample ID
	4-18	0800			36-FS03-SM02					X	X	X	X	
	4-18	0800			36-FS03-SM03									
	4-18	0800			36-FS03-SM04									
	4-18	1600			36-FS03-SM05									
	4-18	0800			36-FS03-PS01									
	4-18	0800			36-FS03-LMB01									
	4-20	0800			36-FS03-LMB02									
	4-20	0815			36-FS03-WM01									
	4-18	0800			36-FS03-WC01									
	4-18	0800			36-FS03-WC02									

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY 35-FS02-LC01

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 935008

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. CTO 231 Project Name MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest./PCBs; TAL Inorganics

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. ____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-18	1000			36-FS01-SM03					X X X X
	4-18	1000			36-FS01-SM04					
	4-18	1000			36-FS01-SM05					
	4-18	1000			36-FS01-SM06					
	4-18	1000			36-FS01-SM07					
	4-18	1000			36-FS01-SM08					
	4-18	1000		MS/MSD	~~36-FS01~~ 36-FS01-WC01					
	4-18	1000			36-FS01-WC02					
	4-18	1000			36-FS01-WC03					
	4-18	0800			36-FS03-SM01					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other ____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 935008

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 Project Name: MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest./PCB; TAL Inorganics

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-18	0800			36-FS02-WC04					X X X X
	4-20	0800			36-FS02-WC06					
	4-20	0800			36-FS02-WC07					
	4-20	0800			36-FS02-WC08					
	4-18	0800			36-FS02-WC05					
	4-20	1000			36-FS01-PS01					
	4-20	1000			36-FS01-PS02					
	4-20	1000			36-FS01-BG01					
	4-18	1000			36-FS01-SM01					
	4-18	1000			36-FS01-SM02					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 93500

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. CTO 232 Project Name MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semi volatiles; TCL Pest./PCB; TAL Inorganics

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-18	0800			36-FS02-SM01					X X X X
	4-18	0800			36-FS02-SM02					X X X X
	4-18	0800			36-FS02-SM03					X X X X
	4-18	0800			36-FS02-SM04					X X X X
	4-18	0800			36-FS02-LMB01					X X X X
	4-20	0800			36-FS02-BC01					X X X X
	4-20	0800			36-FS02-BC02					X X X X
	4-18	0800			36-FS02-WC01					X X X X
	4-18	0800			36-FS02-WC02					X X X X
	4-18	0800			36-FS02-WC03					X X X X

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	4-21-04	1500			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: If you have any questions, please call Rich Hoff at the above number. Hold for groupings

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 935009

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Corapolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 | Project Name: MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest./PCB; TAL Inorganics; TOC

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	No. of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-20	1652			35-SD04-06					X X X X X
	4-20	1652			35-SD04-06D					
	4-20	1650			35-SD04-612					
	4-20	1432			35-SD01-06					
	4-20	1430			35-SD01-612					
	4-20	1342			35-SD02-06					
	4-20	1342			35-SD02-06D					
	4-20	1340			35-SD02-612					
	4-20	1617			35-SD07-06					
	4-20	1615			35-SD07-612					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	4-21-94	1500			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: If you have any questions, please contact Rich Hoff at the above number.

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 935009 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by		Bill to	
Name:	Baker Environmental	Name:	← Same
Address:	Coraopolis, Pa	Address:	
Contact:	Attn. R. Hoff	Contact:	← Same
Phone:	412-269-2099	Phone:	
Fax:		PO #:	

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _______ °C

Proj. No.: CTO 232
Project Name: MCB Camp Lejeune, Camp Geiger
No. of Containers[2]: 2 per Sample

ANALYSIS REQUIRED: Grain Size; ~~TCL Volatiles~~; ~~TCL Semivolatiles~~; ~~TCL Pest/PCB~~; ~~TAL Inorganics~~; ~~TOC~~

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Grain Size	~~TCL Volatiles~~	~~TCL Semivolatiles~~	~~TCL Pest/PCB~~	~~TAL Inorganics~~	~~TOC~~	Lab. Sample ID
Sed	04-14-94	1617		X	35-SD07-06				2	X						
Sed	04-14-94	1649		X	35-SD04-06				2	X						
Sed	04-14-94	1714		X	35-SD03-06				2	X						
Sed	04-15-94	1000		X	35-SD06-06				2	X						
Sed	04-15-94	1055		X	35-BN03				2	X						
Sed	04-15-94	1145		X	35-SD05-06				2	X						
Sed	04-16-94	0905		X	35-BN04				2	X						
Sed	04-16-94	0945		X	35-BN02				2	X						
Sed	04-16-94	1110		X	35-SD02-06				2	X						
Sed	04-16-94	1133		X	35-SD01-06				2	X						

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS * * BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	4-21-94	1500			

Remarks

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other________

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 935009

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis PA	Address:
Contact: Attn. R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	P/O #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: CTO 232 Project Name: MCB Camp Lejeune, Camp Geiger

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TCL Pest/PCB; TAL Inorganics; Hardness mg/L

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	4-20	1550			35-SW07					X X X X X mc#
	4-20	2000			35-RB08					X X X X
	4-21	1500			35-TB015					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks.
[signature]	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 933009

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environmental	Name: ← Same
Address: Coraopolis, Pa.	Address:
Contact: Attn R. Hoff	Contact: ← Same
Phone: 412-269-2099	Phone:
Fax:	PO #:

ANALYSIS REQUIRED

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. CTO 232 | Project Name: MCB Camp Lejeune, Camp Geiger | No. of Containers[2]

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Grain Size	Lab. Sample ID
Sed	04-16-94	1612		X	36-SD03-06				2	X	
Sed	04-16-94	1715		X	36-SD02-06				2	X	
Sed	04-16-94	1802		X	36-SD01-06				2	X	
Sed	04-18-94	1308		X	36-SD05-06				2	X	
Sed	04-18-94	1412		X	36-SD06-06				2	X	
Sed	04-18-94	1500		X	36-SD07-06				2	X	
Sed	04-19-94	1717		X	36-BN03				2	X	
Sed	04-19-94	1757		X	36-BN02				2	X	
Sed	04-19-94	1900		X	36-BN01				2	X	
Sed	04-19-94	1947		X	36-SD04-06				2	X	

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	4-21-94	1500				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 35040 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker	Name: Baker Env.
Address: 1178 Lejeune BLVD Jax, NC 28540	Address: 420 Rouser Rd Coraopolis, Pa
Contact: Jim Culp	Contact: R. Hoff
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. CTO 232 | Project Name: Site 35 - Camp Geiger, MCB-CLEJ | No. of Containers[2]

ANALYSIS REQUIRED: TCL VOLATILES | TCL SEMIVOLATILES | TAL METALS | EPA 601 | EPA 602 + MTBE

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL VOLATILES	TCL SEMIVOLATILES	TAL METALS	EPA 601	EPA 602 + MTBE	Lab. Sample ID
W	4/26	1120		X	35-RB09					X	X	X			(HOLD)
S	4/26	1138		X	35-GWDS01-03					X	X	X			
S	4/26	1632		X	35-MW29B-03					X					
W	4/26	1350		X	35-MW06S-02					X	(54)		X	X	
W	4/26	1830		X	35-MW09D-02					X	(54)		X	X	
W	4/26	1710		X	35-MW02S-02								X	X	
W	4/26	1900		X	35-MW26S-02								X	X	
W	4/26	1805		X	35-MW04S-02								X	X	
W	4/26	1400		X	35-MW10S-02								X	X	
W	4/26			X	35-TB21					X					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	4-27-94	1440			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: FOR Samples analyzed for EPA 601 & 602 + MTBE - Please give STANDARD TURN WITH ONE Day Verbial Confirmation PER RICH HOFF

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Env.	Name:
Address: 420 Rouser Rd. Coraopolis, PA 15108	Address: Same as Submitted
Contact: Dan L. Bonk	Contact:
Phone: (412) 269-2063	Phone:
Fax: (412) 269-2002	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Proj. No.	Project Name	No. of Containers[2]

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL SVOA	TCL Pest & PCB			Routine Turnaround					Lab. Sample ID
W	7-28-94	0930		X	35-SWPD01		4			X	X			X					
W	7-28-94	0945		X	35-SWPD02		4			X	X			X					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	4-28-94	0930			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks
Airbill # 082241190

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Dan L. Bonk	Name:
Address: 420 Rouser Rd. Coraopolis, PA 15108	Address: * Same as Submitted
Contact: Baker Env.	Contact:
Phone: (412) 269-2063	Phone:
Fax: (412) 269-2002	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers [2]

ANALYSIS REQUIRED: TCL Volatiles; TAL Metals; Routine Turnaround

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Matrix [1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL Volatiles	TAL Metals	Routine Turnaround	Lab. Sample ID TFT 7-25-94
L	7-28 94	0930		X	35-SWPD01	3	1			X	X	X	~~35~~ 1
L	7-28 94	0945		X	35-SWPD02	3	1			X	X	X	
L	7-28 94	1130	X		A47/3-CWW		1				X	X	
L	7-28 94	1245		X	35-TB-100	2				X		X	

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
John T. Tubish	7-28 94	1400			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks
- Airbill # 082241190

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Jim Culp	Name: Baker Env.
Address: 1723 Lejeune Blvd Jax, NC	Address: 420 Rouser Rd Coraopolis, Pa 15108
Contact:	Contact: R. Hoff6
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: SITE 35 - Camp Geiger Fuel Farm | No. of Containers[2]

ANALYSIS REQUIRED — COC# 3501

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Matrix[1]	Date	Time	Comp.	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	VOLATILES	SEMIVOLATILES	TAL METALS	Lab. Sample ID
S	4/28	1530		X	35-GWDS05-03					X	X	X	
S	4/28	1530		X	35-GWDS05-03 MS/MSD					X	X	X	
W	4/29				35-TB22 mod 4/28					X			

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
James R. Culp	4/29/94	1440			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Call R. Hoff6 @ 412-269-2099 if you have Questions

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC# 35012 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker	Name: Baker
Address: 1723 Lejeune Blvd Jacksonville NC 28540	Address: 420 Rouser Rd. Coraopolis Pa 15108
Contact: Jim Culp	Contact: R. Hoff
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 Project Name SITE 35 - CAMP GEIGER

ANALYSIS REQUIRED: TCL VOLATILES; TCL SEMIVOLS; TAL METALS

Lab use only Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	No. of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	TCL VOLATILES	TCL SEMIVOLS	TAL METALS	Lab. Sample ID
S	4/29	1800		X	35-SS08-00					X	X	X	
S	4/29	1812		X	35-SS06-00					X	X	X	
S	4/29	1820		X	35-SS05-00					X	X	X	
S	4/29	1840		X	35-SS03-00					X	X	X	
W				X	35-TB23					X			
W	4/29	1515		X	35-RB10					X	X	X	(HOLD)
W	4/30	1315		X	35-RB11					X	X	X	Date on C-OC is correct not Date on Bottle
					~~35-GWD505-03~~								
S	4/30	~~1405~~ 1531		X	35-GWD MW40-03D					X			
S	4/30	1405		X	35-MW31-03					X			

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	4/29/94	1530			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Date on Bottle For 35-RB11 is wrong and should be 4-30-94

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

ERC 3513

Submitted by	Bill to
Name: BAKER ENVIRONMENTAL	Name: BAKER ENVIRONMENTAL
Address: CORAOPOLIS, PA 15108	Address: 420 ROUSER RD CORAOPOLIS, PA 15108
Contact: JIM CULP	Contact: RICH HOFF
Phone: DAYS INN CAMP LEJEUNE BLVD 910-353-3336	Phone: 412-269-2099
~~Fax:~~	PO #:

ANALYSIS REQUIRED

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.	Project Name	No. of Containers [2]

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL VOLATILES	TCL SEMIVOLATILES	PEST/PCB	TAL METALS	ATTERBERG LIMITS	GRAIN SIZE	CONSTANT HEAD PERMEABILITY	Lab. Sample ID
W	5/2/94	1600		X	35-FB01					X	X	X	X				
W	5/2/94	1600		X	35-FB02					X	X	X	X				
W	5/2/94	1500			35-TB24					X							
S	5/3/94	DRT		X	35-MW35-02					X							
S				X	35-ST01									X	X	X	X	

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Richard P Smith	5-3-94	1500			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: IF QUESTIONS CALL RICH HOFF AT 412-269 2099

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC 3514

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Mike Smith BAKER ENVIRONMENTAL	Name: RICH HOFF
Address: 420 ROUSER Rd CORAOPOLIS, PA	Address: 420 ROUSER Rd BLDG 3 CORAOPOLIS, PA 15108
Contact: RICH HOFF	Contact: RICH HOFF
Phone: 412-269-2099	Phone: 412-269-2099
Fax:	PO #: CAMP GEIGER FUELFARM 62470 - 232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name CAMP GEIGER FUEL FARM | No. of Containers[2]

ANALYSIS REQUIRED: TCL VOLITILES; TCL SEMI VOLITILES; PESTICIDES/PCBS; TAL METALS

Lab use only Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	5/3/94	1000		X	35-RB12					X X X X
W	5/4/94	1000		X	35-RB13					X X X X
W	5/4/94				35-TB25					X
S	5/4/94	0850		X	35-MW36B-03					X

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
Michael D Smith	5-4-94	1400				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchc **Testing Services** NDRC Laboratories. CHAIN OF C[illegible]TODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214)

Submitted by	Bill to
Name: Aaron Beanhardt	Name:
Address: Baker Environmental	Address:
Contact: Rich Hoff	Contact:
Phone: 412-269-6000	Phone:
Fax: 412-269-6097	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

ANALYSIS REQUIRED

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. ____ °C

Proj. No.	Project Name	No. of Containers[2]

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL-VOA	TAL-Metals	TCL-SVOA	TCL-Pest/PCB	Hardness	Grain Size	Total Organic Carbon	Lab. Sample ID
W	5-6-94	1023		X	HC-SW03	4	9			X	X	X	X	X			MS/MSD
W	5-6-94	1023		X	HC-SW03D	2	5			X	X	X	X	~~X~~ 4-B			
SD	5-6-94	1107		X	HC-SD02-06	1		3	2	X	X	X	X	5-6	X	X	
~~SD~~	5-6-94	1105		X	HC-SD02-612	1		3		X	X	X	X	4-B	~~X~~	X	
W	5-6-94	1055		X	HC-SW02	2	5			X	X	X	X	X			
W	5-6-94	0945		X	HM-SW02	2	5			X	X	X	X	X			
W	5-6-94	0920		X	HM-SW03	2	5			X	X	X	X	X			
W	5-6-94	1235		X	WC-SW02	2	5			X	X	X	X	X			
W	5-6-94	1205		X	WC-SW03	2	5			X	X	X	X	X			

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	5-6-94	1300			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Contact Rich Hoff if you have any questions

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes
Please Fax written changes to
214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Aaron Bernhardt	Name:
Address: Baker Environmental	Address:
Contact: Rich Huff	Contact:
Phone: 412-269-6000	Phone:
Fax: 412-269-6097	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

ANALYSIS REQUIRED: TCL-VOA; TAL-metals; TCL-SVOA; TCL-Pest/PCB; Hardness 1 and 3; Grain Size; Total Organic Carbon

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. ____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
SD	5-7-94	0847		X	HM-SD02-06	X		3/4	2	
SD	5-7-94	0845		X	HM-SD02-612 *			4		
SD	5-7-94	0812		X	HM-SD03-06 *			4	2	
SD	5-7-94	0810		X	HM-SD03-612			4		
SD	5-7-94	0927		X	HC-SD03-06			4	2	
SD	5-7-94	0927		X	HC-SD03-06D			4		
SD	5-7-94	0925		X	HC-SD03-612			4		
SD	5-7-94	1002		X	WC-SD03-06			4	2	
SD	5-7-94	1000		X	WC-SD03-612			4		
W	5-6-94	1445		X	35-RB12	2	4			

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	5-7-94	1300			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: FedEx # 0822411855

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber And/Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Aaron Bernhardt	Name:
Address: Baker Environmental	Address:
Contact: Rich Hoff	Contact:
Phone: 412-269-6000	Phone:
Fax: 412-269-6097	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL-VOAs	TAL-metals	TCL-SVOAs	TCL-Pest/PCBs	Total Organic Carbon	Grain Size	Lab. Sample ID
W	5-7-94	1105		X	35-RB13	2	4			X	X	X	X			
SD	5-6-94	1442		X	WC-SD02-06			4	2	X	X	X	X	X	X	
SD	5-6-94	1440		X	WC-SD02-612			4		X	X	X	X	X		
SP	5-5-94	1255		X	HM-BN03		1 1/2	2	2						X	
W	5-7-94	1300		X	~~TB~~ 35-TB26	2				X						
SD	5-5-94	1420		X	HC-BN02				2						X	
SD	5-5-94	1020		X	HM-BN02				2						X	
SD	5-6-94	1340		X	WC-BN02				2						X	
SD	5-5-94	1515		X	HC-BN03 J				2						X	

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	5-7-94	1300			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Fedex # 0822411855

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to	ANALYSIS REQUIRED	Lab use only
Name: *Aase Bernhardt*	Name:		Due Date:
Address: *Baker Environmental*	Address:		
Contact: *Rich Hoff*	Contact:		RCRA ☐
Phone: *412-269-6000*	Phone:		NPDES ☐
Fax: *412-269-6097*	PO #:		Screened For Radioactivity ☐
			Temp. ______ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL-VOA	TCL-SVOA	TCL-Pest/PCB	TAL-Metals	Hardness	Total Organic Carbon	Grain Size			Lab. Sample ID
W	5-8-94	1132		X	HC-SW04	2	5			X	X	X	X	X					
W	5-8-94	1200		X	HC-SW01	2	5			X	X	X	X						
W	5-8-94	1200		X	HC-SW01D	2	4			X	X	X	X						
W	5-8-94	1240		X	HM-SW01	2	5			X	X	X	X	X					
SD	5-8-94	1252		X	HM-SD01-06			8		X	X	X	X	~~X~~ A-D	X	X			ms/msD
SD	5-8-94	1252		X	HM-SD01-06D			4		X	X	X	X						
SD	5-8-94	1250		X	HM-SD01-612			4		X	X	X	X		X	~~X~~ A-D			
SD	5-8-94	1432		X	HC-SD04-06			4		X	X	X	X		X	X			
SD	5-8-94	1430		X	HC-SD04-612			4		X	X	X	X		X				
SD	5-8-94	1617		X	HC-SD01-06 √					X	X	X	X		X	X			ms/msD

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS * * BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
						Fed Ex # 0822411870
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other________

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchc Testing Services NDRC Laboratories. CHAIN OF C TODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214 5591

Submitted by	Bill to
Name: Aaron Bayhurst	Name:
Address: Baker Environmental	Address:
Contact: Rick Hoff	Contact:
Phone: 412-269-6000	Phone:
Fax: 412-269-6097	PO #:

ANALYSIS REQUIRED

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL-VOA	TCL-SVOA	TCL-Pest/PCB	TAL-metals	Total Organic Carbon	Grain Size	Lab. Sample ID
SD	5-8-94	1617		X	HC-SD01-060 ✓			4		X	X	X	X			
SD	5-8-94	1615		X	HC-SD01-612			4		X	X	X	X	X		
W	5-8-94	1940		X	35-AB14	2	4			X	X	X	X			
W	5-9-94	1420		X	35-TB27	2				X						

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks

Fed Ex # 0822411870

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Submitted by	Bill to
Name: Aaron Bernhardt	Name:
Address: Baker Environmental	Address:
Contact: Rick Huff	Contact:
Phone: 412-269-6000	Phone:
Fax: 412-269-6097	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

ANALYSIS REQUIRED: TCL - VOA; TCL - SVOA; TCL - Pest/PCB; TAL metals

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
F	5-9-94	1800		X	36-FS02-CB01				X	
F	5-9-94	1800		X	36-FS02-CB03				X	
F	5-9-94	1800		X	36-FS02-CB02				X	
F	5-10-94	1010		X	36-FS02-CB04				X	
F	5-10-94	1010		X	36-FS02-CB05				X	
F	5-9-94	1810		X	36-FS03-CB01				X	
F	5-9-94	1810		X	36-FS03-CB02				X	
F	5-9-94	1810		X	36-FS03-CB04				X	
F	5-9-94	1810		X	36-FS03-CB03				X	
F	5-9-94	1810		X	36-FS03-CB05				X	

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	5-10-94	1500			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Hold For Groupings

Fed Ex # 082241189 7

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

NDRC cannot accept verbal changes.
Please Fax written changes to
214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 35015

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: BAKER ENVIRONMENTAL	Name: BAKER
Address: 1713 LEJEUNE BLVD JACKSONVILLE, NC 28540	Address: 420 ROUSER RD AOF BLDG 3 COR AOPOLIS, PA 15108
Contact: J. CULP	Contact: RICH HOFF
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 Project Name SITE 35 - CAMP GEIGER

ANALYSIS REQUIRED: EPA 601 VOLATILES; EPA 602 VOLATILES; TCL 524M VOLATILES; TCL SEMIVOLATILES; TAL METALS (TOTAL); DISSOLVED METALS; TAL METALS

Lab use only — Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	No. of Containers [2] VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	5/10	1215		X	35-MW29A-01					STANDARD TURN-REQUEST 1 DAY VERBALS
W	5/10	1510		X	35-RB/B					
W	5/10			X	35-TB2B					
S	5/10	0840		X	35-MW34B-03					
S	5/10	1030		X	35-5504-00					
S	5/10	1030		X	35-5504-00D					
S	5/10	1130		X	35-MW30B-01					
S	5/10	1141		X	35-MW35B-01					
S	5/10	1004		X	35-MW29B-01					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

	Date:	Time:		Date:	Time:
Relinquished by: (Signature) Michael D Smith	5-10-94	1730	Received by: (Signature)		
Relinquished by: (Signature)			Received by: (Signature)		
Relinquished by: (Signature)			Received by: (Signature)		

Remarks: IF ANY QUESTIONS CALL RICH HOFF 412-269-2099 OK NOTE IN COLUMN

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other ____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 35016

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Jim Culp	Name: Rich Hoff
Address: 1723 Lejeune Blvd. Jax, NC 28540	Address: 420 Rouser Rd. Coraopolis, Pa
Contact:	Contact:
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: Site 35 - MCB Camp Geiger | No. of Containers²

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

Matrix¹	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	EPA 601	EPA 602 + MTBE	TAL SEMIVOLS	TAL METALS (TOTAL)	TCLP TESTS	TAL METALS (DISSOLVED)	TAL VOLS.	Lab. Sample ID
S	5/11	0806		X	35-MW30BS-04										X		
W	5/11	1400		X	35-RB19					X	X	X	X		X		(HOLD)
W	5/10	1940		X	35-MW09S-02					X	X	X	X		X		
W	5/10	1745		X	35-MW29BW-01					X	X	X	X	X	X		LABLE ON COC IS correct
W	5/11	0925		X	35-MW09D-02					X	X	X	✓		X		
W	5/11	1140		X	35-MW10D-02D					X	X	X	X		X		
W	5/11	1140		X	35-MW10D-02					X	X	X	X		X		
W	5/11			X	35-TB29					X							

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	5/14	1520			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks
1 DAY VERBALS FOR 35-MW29BW-01
THE LABLE ON BOTTLE DOES NOT HAVE THE "W" IN THE SAMPLY No. PLEASE CONTACT R. HOFF WITH QUESTIONS.

¹ Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
² Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes.
Please Fax written changes to
214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 35017

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Env	Name: Baker
Address: 1723 Lejeune Blvd Jacksonville, NC	Address: 420 Rouser Rd Coraopolis, Pa 15108
Contact: Jim Culp	Contact: R. Holt
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: SITE 35 - Camp Geiger | No. of Containers[2]

ANALYSIS REQUIRED: EPA 601 | EPA 602 + BTBE | TCL SEMIVOLS | TAL METALS (DISSOLVED) | TAL METALS (TOTAL) | TCL VOLATILES

Lab use only — Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	5/12	0940		X	35-MW145-02					X X X X X
W	5/12	1025		X	35-MW14D-02					X X X X X
W	5/12	1140		X	35-MW16D-02					X X X X X
S	5/11	1810		X	35-MW33BS-05					T
W	5/12	0820		X	35-MW10S-02					X X X X X
W	5/12	1325		X	35-RB20					X X X X X
W	5/12			X	35-TB30					X

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
James S Culp	5/12/94	1440			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Call R. Holt with Questions.

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 35018

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: BAKER ENV	Name: BAKER ENV.
Address: 1723 LEJEUNE BLVD JACKSONVILLE, NC 28540	Address: 420 ROUSER RD. CORAOPOLIS, PA 15108
Contact: JIM CULP	Contact: R. HOFF
Phone: 910 353 3336	Phone: 412 269 2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: SITE 35 - CAMP GEIGER | No. of Containers²

ANALYSIS REQUIRED: EPA 601; EPA 602 + MTBE; TCL SEMI VOLS; TAL METALS (DISSOLVED); TAL METALS (TOTAL); PEST/PCB; TCL VOLATILES

Lab use only — Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

¹ Matrix	1994 Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	5/12	1600		X	35 - MW16S - 02	4	4			
W	5/12	1730		X	35 - MW19S - 02	4	4			
W	5/12	1730		X	35 - MW19S - 02D	4	4			
W	5/12	1730		X	35 - MW19S - 02 MS	4	4			
W	5/12	1730		X	35 - MW19S - 02 MSD	4	4			
W	5/12	1910		X	35 - MW19D - 02	4	4			
W	5/13	1125		X	35 - MW21S - 02	4	5			
W	5/13	1215		X	35 - MW21D - 02	4	5			
W	5/13	1450		X	35 - RB21	4	4/3			(HOLD)
W				X	35 - TB31	2				

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
William M Pelky	5/13/94	1530			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: IF ANY QUESTIONS CALL RICH HOFF 412 269 2099

¹ Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

² Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY

Inchcape Testing Services — NDRC Laboratories. CHAIN OF CUSTODY RECORD

COC # 35018

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker ENV	Name: Baker Env.
Address: 1723 Lejeune Blvd Jacksonville, NC 28540	Address: 420 Rouser Rd. Coraopolis, Pa
Contact: Jim Culp	Contact: ~~Jim~~ R. HOFF
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: SITE 35 - Camp Geiger | No. of Containers²

ANALYSIS REQUIRED: TCL VOLATILES

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

¹Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
S	5/13	0815		X	35-MW26BS-04					X

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
James S. Culp	5/13/94	1530			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: IF ANY QUESTIONS - CALL RICH HOFF 412-269-2099

¹ Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
² Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

COC # 35019

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: J Culp	Name: Baker
Address: 1723 Lejeune Blvd. Jacksonville, NC	Address: 420 Rousee Rd Coraopolis, Pa 15108
Contact: J Culp	Contact: R Hoff
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: SITE 35 - Camp Geiger Fuel Farm | No. of Containers[2]

ANALYSIS REQUIRED: EPA 601 | EPA 602 + MTBE | TAL SEMIVOLATILES | TAL METALS (TOTAL) | TAL METALS (DISSOLVED) | TAL VOLATILES

Lab use only — Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
S	5/14	0742		X	35-MW32BS-03					
W	5/14	1210		X	35-EMW05-03					USE LABLE I.D
W	5/13	1750		X	35-MW22D-02					Listed On C-O-C
W	5/15	1455		X	35-MW36BW-01					
W	5/13	1900		X	35-MW25S-02					
W	5/14	1030		X	35-EMW03-03					
W	5/14	1625		X	35-GWDW1-01					
W	5/16	1020		X	35-MW34BW-01					
W	5/16	1115		X	35-MW34AW-01					
W	5/16			X	35-TB31					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
J Culp	5/16/94	1540			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: IF YOU HAVE ANY QUESTIONS Call - R. HOFF

~~All LABELS May not~~

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other ____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. **CHAIN OF CUSTODY RECORD** COC # 35019 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker	Name: Baker
Address: 1723 Lejeune Jacksonville, NC	Address: 420 Rouser Rd Coraopolis Pa 15108
Contact: J. Culp	Contact: R. Holt
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name SITE 35 | No. of Containers[2]

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL Volatiles	EPA 601	EPA 602 + MTBE	TCL Semivol.	TAL Metal (Dissolved)	TAL Metals (Total)	Lab. Sample ID
S	5/16	0900		X	35-MW37BS-03 ✓						X	X				
W	5/15	1410		X	35-MW36AW-01						X	X				USE LABLE ID LISTED ON C-O-C
W	5/14				35-TB32					X						
W	5/14	1800		X	35-~~MW~~GWDW2-01					(X)	X	X				
W	5/15	0920		X	35-GWDW3-01						X	X				
W	5/14	1745		X	35-MW35AW-01						X	X				
S	5/15	0803		X	35-MW37BS-03 ✓					X						

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
James D Culp	5/16/94	1540			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: IF You have Questions call— R. HOFF

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 35019 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker	Name: Baker
Address: 420 Rouser Rd. Coraopolis, Pa 15108	Address: 420 Rouser Rd. Coraopolis Pa.
Contact: Jim Culp	Contact: R Hoff
Phone: 412-269-2098	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: SITE 35 - Camp GEIGER Fuel FARM | No. of Containers²

ANALYSIS REQUIRED: EPA 601 | EPA 602 + MTBE | TAL SEMIVOLATILES | TAL METAL (DISSOLVED) | TAL METAL (TOTAL) | TAL PEST/PCB

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

Matrix¹	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	5/14	1450		X	35-EMW7-03					
W	5/15	1630		X	35-MW30BW-01					
W	5/15	1612		X	35-GWDW5-01D					USE LABLE ID
W	5/15	1612		X	35-GWDW5-01					LISTED ON C-O-C
W	5/14	1500		X	35-MW31AW-01					
W	5/15	1130		X	35-GWDW1-01 (154)					
W	5/14	1500		X	35-MW31BW-01					
W	5/15	1450		X	35-MW35BW-01					
W	5/13	1820		X	35-MW22S-02					
W	5/13	1950			35-MW25D-02					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
James S. Culp	5/16/94	1540			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: IF YOU HAVE ANY QUESTIONS CALL - R. HOFF

¹ Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

² Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other ____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker Environ.	Name: Baker
Address: 1723 Lejeune Blvd. Jacksonville, NC 75	Address: 420 Rouser Rd. Coraopolis, Pa 15108
Contact: J. Culp	Contact: R. Hoff
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: Site 35 - Camp Geiger | No. of Containers[2]

ANALYSIS REQUIRED: EPA 601 | EPA 602 + MTBE | TCL SemiVols. | TCL Pest/PCB | TAL Metal (Total) | TAL Metal (Dissolv) | TCL Vols.

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	5/16	1200		X	35-RB32					
W	5/15	1600		X	35-RB33					(HOLD)
W	5/16	1800		X	35-RB34					
W	5/17	0920		X	35-MW53BW-01					
W	5/17	1115		X	35-MW26AW-02					
W	5/17			X	35-TB34					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
James O. Culp	5/17/94	1700			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: IF QUESTIONS - Contact R. HOFF.

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD COC # 3502

1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker	Name: Baker
Address: 1723 Lejeune BLVD. Jacksonville, NC 28540	Address: 420 Rouser Rd. Coraopolis, Pa 15108
Contact: Jim Culp	Contact: Rich Hoff
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: SITE 35 - Camp Geiger Fuel Farm | No. of Containers[2]

ANALYSIS REQUIRED: TCL Volatiles; TCL Semivolatiles; TAL Metals; TCL Pesticides/PCB; Full TCLP, Chromium, Lead, TAC; Ignitability, Reactivity, TKN, Total Phosphorous, Microbial Examination

Lab use only — Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
S	5/16	1710		X	35-GWDS4-02					
S	5/16	1720		X	35-GWDS3-03					
S	5/16	1725	X		35-GWDS3-04					
S	5/16	1800		X	35-GWDS2-03					
S	5/18	1135		X	35-SS12-00					
S	5/18	1120		X	35-SS11-00					
S	5/18	0815		X	35-SS07-00D					
S	5/18	0815		X	35-SS07-00					
S	5/18	0840		X	35-SS03-00					
S	5/18	0915		X	35-SS04-00					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
James Culp	5/18/94	1530			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: IF YOU HAVE QUESTIONS - PLEASE CONTACT R. HOFF

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

CoC # 35021

Submitted by	Bill to
Name: Baker	Name: Baker
Address: 1723 Lejeune Blvd. Jacksonville, NC 28540	Address: 420 Rouser Rd. Coraopolis, Pa 15108
Contact: J. Culp	Contact: R. Hoff
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name Site 35 - Camp Geiger | No. of Containers

ANALYSIS REQUIRED: TCL VOLATILES; TCL SEMIVOLATILES; TCL PESTICIDES/PCB; TAL METALS

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. ____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	TCL VOLATILES	TCL SEMIVOLATILES	TCL PESTICIDES/PCB	TAL METALS	Lab. Sample ID
S	5/18	0815		X	35-SS07-00MS/MSD					X	X	X	X	
W	5/17	1450		X	35-RB35					X	X	X	X	(HOLD)
W	5/18	1570		X	35-RB36					X	X	X	X	2-VOAS ARE LABLED 35-TB-36 INSTEAD OF 35-RB36 PLEASE CORRECT
W	5/18			X	35-TB35					X				
S	5/17	1745		X	35-SS09-00					X	X	X	X	
S	5/17	1615		X	35-SS01-00					X	X	X	X	
S	5/17	1630		X	35-SS10-00					X	X	X	X	
S	5/17	1515		X	35-SS02-00					X	X	X	X	
W	5/18			X	35-TB36					X				

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	5/18/94	1625			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: IF you have Questions — Call R. Hoff.

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other ____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. **CHAIN OF CUSTODY RECORD** 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Aaron Bernhardt	Name:
Address: Baker Environmental	Address:
Contact: Rich Hoff	Contact:
Phone: 412-269-2099	Phone:
Fax: 412-269-6097	PO #:

ANALYSIS REQUIRED: TCL - VOA; TCL - SVOA; TCL - Pest/PCB; TAL - Metals

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
SD	5-17-94	1324 ~~0902~~		X	35-SD03-06	1		3		
SD	5-17-94	1322 ~~0900~~		X	35-SD03-612	1		3		
SD	5-17-94	1357		X	35-SD05-06	1		3		
SD	5-17-94	1355		X	35-SD05-612	1		3		
SD	5-17-94	1429		X	35-SD06-06	1		3		
SD	5-17-94	1427		X	35-SD06-612	1		3		
SD	5-17-94	1632		X	36-SD02-06	1		3		
SD	5-17-94	1632		X	36-SD02-06D	1		3		
SD	5-17-94	1630		X	36-SD02-612	1		3		
SD	5-18-94	0807		X	36-SD01-06	1		3		

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
	5-18-94	1700				Fed Ex #
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Aaron Bernhardt	Name:
Address: Baker Environmental	Address:
Contact: Rich Hoff	Contact:
Phone: 412-269-6002099	Phone:
Fax: 412-269-6097	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

ANALYSIS REQUIRED: TLL-VOA; TLL-SVOA; TLL-Pest/PCB; TAL-metals

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. ____ °C

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
SD	5-18-94	0902		X	36-SD03-06	1		3		
SD	5-18-94	0900		X	36-SD03-612	1		3		
SD	5-18-94	1302		X	36-SD05-06	2		6		MS/MSD
SD	5-18-94	1302		X	36-SD05-06D	1		3		
SD	5-18-94	1300		X	36-SD05-612	1		3		
SD	5-18-94	1344		X	36-SD06-06	1		3		
SD	5-18-94	1342		X	36-SD06-612	1		3		
SD	5-18-94	1407		X	36-SD07-06	1		3		
SD	5-18-94	1405		X	36-SD07-612	1		3		
~~5-18-94~~				~~X~~						

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	5-18-94	1700				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Fed Ex #
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker	Name: Baker
Address: 1723 Lejeune Blvd Jacksonville, NC	Address: 420 Rouser Rd. Coraopolis Pa. 15108
Contact: J. Culp	Contact: R. Holt
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: SITE 35 | No. of Containers[2]

ANALYSIS REQUIRED: EPA 601 | EPA 602 + MTBE | TCL SEMI VOLS. | TCL PESTS | TAL METALS (DISSOLV) | TAL METALS (TOTAL) | TCL VOLS. | BOD, COD, TSS, TDS, TOC, TKN | TOTAL PHOSPHOROUS, ALKALIN | MICROBIAL ENUMERATION

Lab use only — Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
					35-TB38					
	5/20	1035		X	35-MW21S-02					
	5/19	1140		X	35-MW33AW-01					
	5/19	1120		X	35-MW32AW-01					
	5/20	1205		X	35-MW38BW-01					
	5/20	0920		X	35-MW26BW-01					
	5/19	1055		X	35-MW32BW-01					
	5/20	1315		X	35-MW38AW-01					
	5/19	1845		X	35-MW37AW-01					
	5/19	1600		X	35-RB37-					

Turn around time ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	5/20/94	1735			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other_____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name:	Name:
Address:	Address:
Contact:	Contact:
Phone:	Phone:
Fax:	PO #:

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. | Project Name | No. of Containers[2]

ANALYSIS REQUIRED: EPA 601 | EPA 602 + MTBE | TCL SEMIVOLS. | TAL METALS (DISSOLV.) | TAL METALS (TOT) | TCL PEST/PCB | TCL VOLS.

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Screened For Radioactivity ☐
Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
	5/19	1510		X	35-MW31AW-01					
	5/19	1704		X	35-MW37BW-01					
	5/18	1735		X	35-SS09-00					
	5/18	1650		X	35-SS13-00					

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
[signature]	5-20-94	1735				
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by		Bill to	
Name:	Baker	Name:	Baker
Address:	1723 Belguine Blvd. Jacksonville NC	Address:	420 Rouser Rd. Coraopolis, Pa 15108
Contact:	J. Culp	Contact:	R. Hoff
Phone:	910-353-3336	Phone:	412-269-2099
Fax:		PO #:	62470-232

Lab use only
Due Date:

☐ RCRA
☐ NPDES
☐ Screened For Radioactivity
Temp. ______ °C

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No.: 232
Project Name: Site 35

ANALYSIS REQUIRED: EPA 601; EPA 602 + MTBE; TCL Semivols; TCL Pests/PCB; TAL Metals (Dissolv); TAL Metals (Total); TCL Vols

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	EPA 601	EPA 602 + MTBE	TCL Semivols	TCL Pests/PCB	TAL Metals (Dissolv)	TAL Metals (Total)	TCL Vols				Lab. Sample ID
S	5/20	1930	X		35-IDWRB-01							X	X		X	X				14 Day Turn
W	5/21	0815	X		35-IDWTK-02					X	X	X	X	X	X					14 Day Turn
W	5/21	0730	X		35-IDWTK-01					X	X	X	X	X	X					14 Day Turn
W	5/19	2045	X		~~35~~ (JSC) 35-IDW-DR-01					X	X	X	X		X					14 Day Turn
W	5/20	1830	X		35-IDWDR-02					X	X	X	X	X	X					14 Day Turn
W	5/20	1810		X	35-MW26BW01					X	X									Replace 35-MW26BW-01
W	5/20	1810		X	35-MW26BW01D					X	X									Sent on 5-20-94 with
W	5/20	1810		X	35-MW26BW-01 MS					X	X									this sample
W	5/20	1810		X	35-MW26BW-01 MSD					X	X									
~~W~~ (JSC)																				

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	5/21/94	1100			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: If you have Questions - Call Rich Hoff

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other________

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

Inchcape Testing Services NDRC Laboratories. CHAIN OF CUSTODY RECORD 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Baker	Name: Baker
Address: 1723 Cajeune Blvd Jacksonville, NC	Address: 420 Rousers Rd. Coraopolis, Pa 15108
Contact: Jim Culp	Contact: R. Hoffs
Phone: 910-353-3336	Phone: 412-269-2099
Fax:	PO #: 62470-232

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

Proj. No. 232 | Project Name: SITE 35 | No. of Containers[2]

ANALYSIS REQUIRED: EPA 601 | EPA 602 + MTBE | TCL VOLS.

Lab use only
Due Date:

RCRA ☐ NPDES ☐ Screened For Radioactivity ☐ Temp. _____ °C

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	EPA 601	EPA 602 + MTBE	TCL VOLS.	Lab. Sample ID
W	5-20	2020		X	35-MW38BAW-01					X	X		Replace 35-MW38AW-01 Recieved on 5-21-94 With this Sample
W	5-20	2020		X	35-MW38AW-01D					Y	X		
W	5-20	2020		X	35-MW38AW-01MS					Y	X		
W	5-20	2020		X	35-MW38AW-01MSD					Y	Y		
W	5-21			X	35-TB39					~~X~~ 35X	X		

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	5/21/94	1100			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: If you have question - Please Call R. Hoffs.

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