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CHARACTERIZATION STEP REPORT FOR HADNOT POINT INDUSTRIAL AREA

CONFIRMATION STUDY TO DETERMINE EXISTENCE AND POSSIBLE MIGRATION OF SPECIFIC CHEMICALS IN SITU

MARINE CORPS BASE
Camp Lejeune, North Carolina

Contract No. N62470-83-C-6106

Prepared for:

NAVAL FACILITIES ENGINEERING COMMAND
Atlantic Division

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LIST OF ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm/sec	centimeters per second
DPDO	Defense Property Disposal Office
DRMO	Defense Reutilization and Marketing Office
EPA	U.S. Environmental Protection Agency
ESE	Environmental Science and Engineering, Inc.
ft	feet
ft/day	feet per day
ft^2/day	square feet per day
ft BLS	feet below land surface
ft/ft	feet per foot
gal	gallons
GC	gas chromatograph
GC/MS	gas chromatography/mass spectrometry
gpd/ft	gallons per day per foot
gpm	gallons per minute
gpm/ft	gallons per minute per foot
HPIA	Hadnot Point Industrial Area
IAS	Initial Assessment Study
ID	inside diameter
LANTDIV	Naval Facilities Engineering Command, Atlantic Division
MCL	Maximum Contaminant Level
MDL	method detection limit

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued, 2 of 2)

MEK	methylethylketone
mmHg	millimeters of mercury
NEESA	Naval Energy and Environmental Support Activity
O&G	oil and grease
OD	outside diameter
11DCA	1,1-dichloroethane
12DCA	1,2-dichloroethane
PCB	polychlorinated biphenyl
POL	petroleum, oil, and lubricant
ppb	parts per billion
PVC	polyvinyl chloride
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
T12DCE	trans-1,2-dichloroethene
TCE	trichloroethene
ug/L	microgram per liter
USGS	U.S. Geological Survey
VOC	volatile organic compound

EXECUTIVE SUMMARY

This report presents the findings of the Characterization Step for the Hadnot Point Industrial Area (HPIA) at Camp Lejeune, NC. The Characterization Step is the final field investigative step in the Confirmation Study process which, when completed, will be equivalent to the Remedial Investigation/Feasibility Study (RI/FS) process mandated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA). The Characterization Step was designed to delineate, in a sequential manner, the most likely contaminant source(s) of the volatile organic compounds (VOCs) and other hydrocarbon compounds initially identified during the Verification Step effort at HPIA.

The Verification Step efforts at HPIA identified the presence of VOCs both in the shallow aquifer at Site 22 (Hadnot Point Fuel Tank Farm) and in a single deep water supply well. As a result, Camp Lejeune closed the supply well and initiated investigation of the other water supply wells in the area. Four additional supply wells were found to be contaminated by VOCs and were immediately removed from the system. The Characterization Step effort was initiated to define the extent of the identified contamination and included the following sequential tasks: (1) a detailed records search throughout the industrial activities within HPIA, (2) soil gas investigations of those areas identified by the records search as potential sources of the observed contamination, (3) installation and sampling of shallow monitor wells in those areas in which VOC contamination was identified by the soil gas effort, (4) installation and sampling of intermediate depth and deep monitor wells in those areas in which shallow contamination was identified, and (5) quantification of aquifer parameters through an aquifer testing program.

RECORDS SEARCH

The records search effort identified the presence of several primary potential sources of the observed contamination. An underground tank formerly utilized for storage of trichloroethene (TCE) was identified adjacent to Bldg. 902 in the northern portion of HPIA. The area around Bldg. 902 was identified as a long-term general vehicle maintenance area, and warranted further investigation. The Base Maintenance Shop (Bldg. 1202), located in the north-central portion of the study area, was also identified as a potential source because of documented VOC storage and usage. Bldg. 1100, also located in the north-central area of HPIA, was identified as a former service station which conducted limited vehicle maintenance. Bldg. 1602, located in the south-central area of HPIA, was identified as a heavy vehicle maintenance facility with a long-term record of VOC storage and usage. In addition, Bldg. 1709 and the surrounding area was documented as a vehicle maintenance area, paint shop, and general maintenance area warranting further investigation.

SOIL GAS INVESTIGATION

Soil gas samples were collected and analyzed from the potential source areas identified by the records search effort. In all cases, VOC contamination was identified in the soil gas, with the highest levels located at Bldg. 1601.

MONITOR WELL INSTALLATION AND SAMPLING

A total of 33 monitor wells were installed at HPIA; 27 shallow wells, 3 intermediate wells, and 3 deep wells. In addition, two shallow monitor wells, previously installed at Confirmation Study Site 22 (Hadnot Point Fuel Farm), and five Camp Lejeune water supply wells (deep aquifer) were sampled. The analytical results indicated that three primary zones of contamination were present at HPIA, centered, respectively, in the vicinity of Bldg. 902, Site 22, and Bldg. 1602. Contaminant isopleth modeling suggested that the contaminant zones centered at Bldg. 902 and Site 22 may have coalesced into a single node of contamination. VOC contamination identified in the soil gas at Bldg. 1202 was not detected in the shallow groundwater. Groundwater flow in the shallow aquifer was identified to the south-southwest.

Intermediate depth (75 ft) and deep (150 ft) monitor wells were installed at the center of the three contaminant zones. Analysis of ground water samples from these wells identified VOC contamination only in the deep monitor wells adjacent to Bldgs. 1202 and 1601. In addition, methylethyl ketone (MEK) was the only VOC detected in these wells, and had not been identified in the shallow ground water.

AQUIFER TESTING

A 72-hour pump test was conducted utilizing Water Supply Well 642, located in the northeast corner of HPIA, to determine the aquifer coefficients for the sand and limestone aquifer which is the source of potable water for Camp Lejeune. These test data were analyzed by a number of analytical techniques to minimize potential bias introduced by a single technique. The results were consistent from method to method, and indicated that the aquifer transmissivity ranged from 6.1×10^3 to 1.3×10^4 gallons per day per foot (gpd/ft) and storage ranged from 5×10^{-4} to 1×10^{-3}. These values are in agreement with the range of values for the sand and limestone aquifer presented in the regional literature.

CONTAMINANT STATUS

The concentration and extent of the contamination in the shallow aquifer has been clearly identified. The concentration and extent of the contamination in the deep aquifer has not been fully described. VOC contamination which resulted in the closure of water supply wells in HPIA was not identified at the source areas identified in the shallow aquifer.

1.0 INTRODUCTION

This report presents the findings of the Characterization Step investigation of the Hadnot Point Industrial Area (HPIA) (Fig. 1-1) conducted as part of the Confirmation Study to Determine the Existence and Possible Migration of Specific Chemicals In Situ. This study is being conducted by Environmental Science and Engineering, Inc. (ESE) under contract (Contract No. N62470-83-C-6106) to Naval Facilities Engineering Command, Atlantic Division (LANTDIV).

The Characterization Step seeks to determine the extent and strength of the contaminant source(s) identified in the Verification Step efforts conducted in the area of Hadnot Point. In addition to extent and strength of observed contamination, the Characterization Step seeks to determine the rate and direction of any potential migration of the measured contamination.

The overall contract to conduct investigative efforts related to the presence and potential migration of contaminants at Camp Lejeune was initiated in 1984. Since that time, and in response to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as well as the Superfund Amendments and Reauthorization Act (SARA) of 1986, the Navy has committed to change the specific terminology of its Confirmation Study program to match that of the U.S. Environmental Protection Agency's (EPA's) Superfund program. The completed Confirmation Study at Camp Lejeune will equal the Remedial Investigation/Feasibility Study (RI/FS) format as mandated by CERCLA/SARA. The current report presents the findings of the RI for the shallow aquifer in HPIA.

For purposes of this report, HPIA is defined as that area delineated by Holcomb Blvd. to the west, Sneads Ferry Rd. to the north, Louis St. to the east, and Main Service Rd. to the south. The utility rights-of-way on either side of these boundary roads are included in the study area, as a number of the monitor wells and water supply wells are located within these utility corridors.

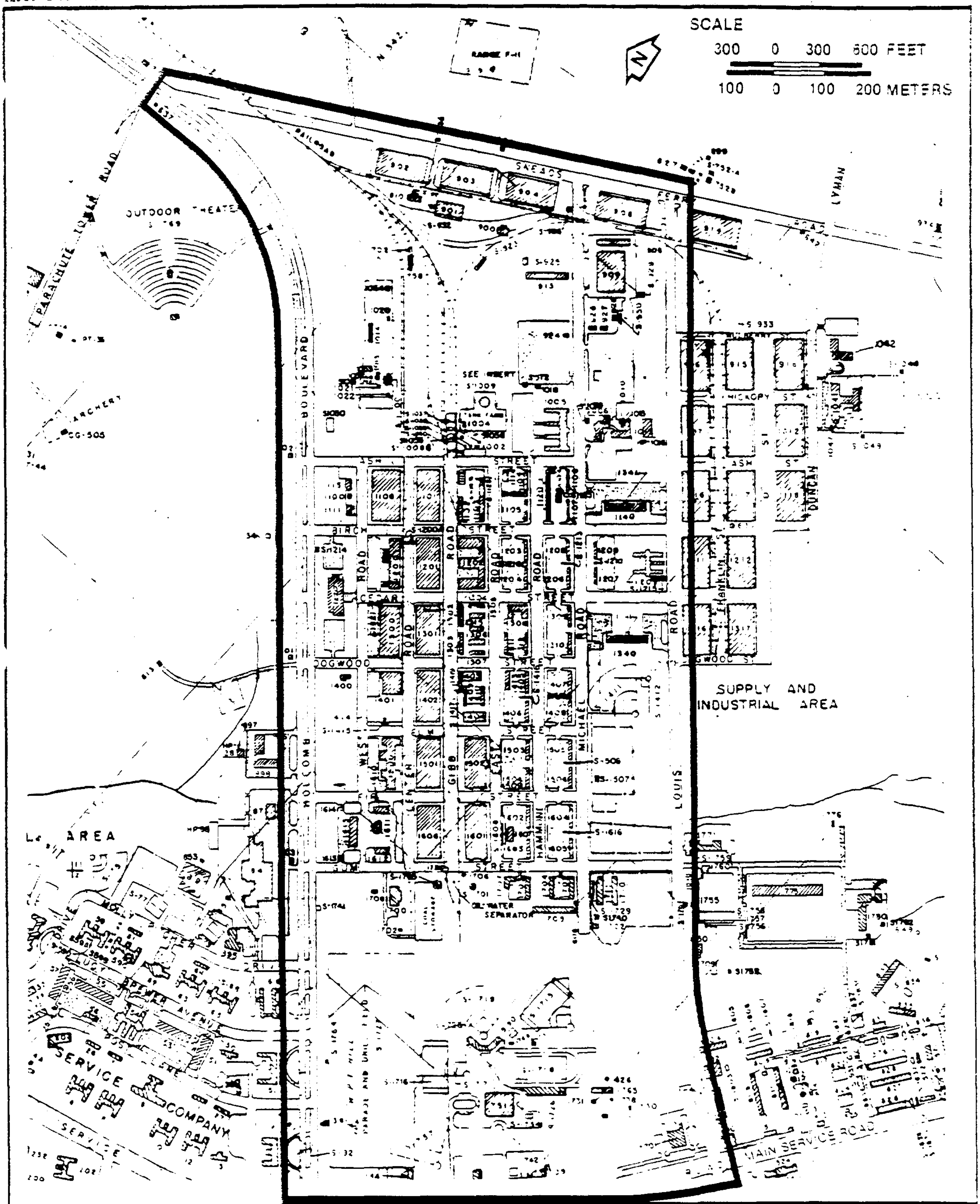

Figure 1-1
HADNOT POINT INDUSTRIAL AREA

SOURCE: Camp Lejeune, 1987.

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2.0 SUMMARY OF VERIFICATION STEP RESULTS

During the period April 1984 to January 1985, geological and groundwater quality investigative efforts were conducted at specific study areas within and adjacent to HPIA, as defined in Sec. 1.0; these areas were identified by the Initial Assessment Study (IAS) [Naval Energy and Environmental Support Activity (NEESA), 1983] as potential sources of contamination.

Several sites of potential contamination, Sites 21, 22, 24, and 28 (Fig. 2-1), identified by IAS are located within or adjacent to HPIA; these sites are under investigation as part of the on-going Verification Step efforts. Site 21 is a potential source of polychlorinated biphenyl (PCB) and pesticide compounds. Sampling completed to date has not identified the presence of volatile organic compounds (VOCs), suggesting that this site is not a source of the VOC contamination identified in the HPIA potable wells. Site 24 has been identified as a potential source of low-level metals contamination only. No VOCs have been detected in the groundwater here, indicating that it is unlikely that this site is a source of the contamination present in the deep aquifer. A range of contaminants has been identified at Site 28, including metals, pesticides, and VOCs. Although the suite of detected VOCs is similar to that detected in the potable wells at HPIA, three factors suggest that Site 28 is not the source of the contamination within the deep aquifer:

1. Non-VOC compounds detected within Site 28 were not detected in the deep aquifer within HPIA;
2. Site 28 is located in a position geohydrologically downgradient of HPIA, with discharge of groundwater to the south of the site; and
3. Measured drawdowns in the deep aquifer within HPIA resulting from pumping of deep wells are not large enough to create a cone of depression at HPIA capable of reversing the natural gradient of the deep aquifer to the south, which would allow contamination from Site 28 to flow northward into HPIA.

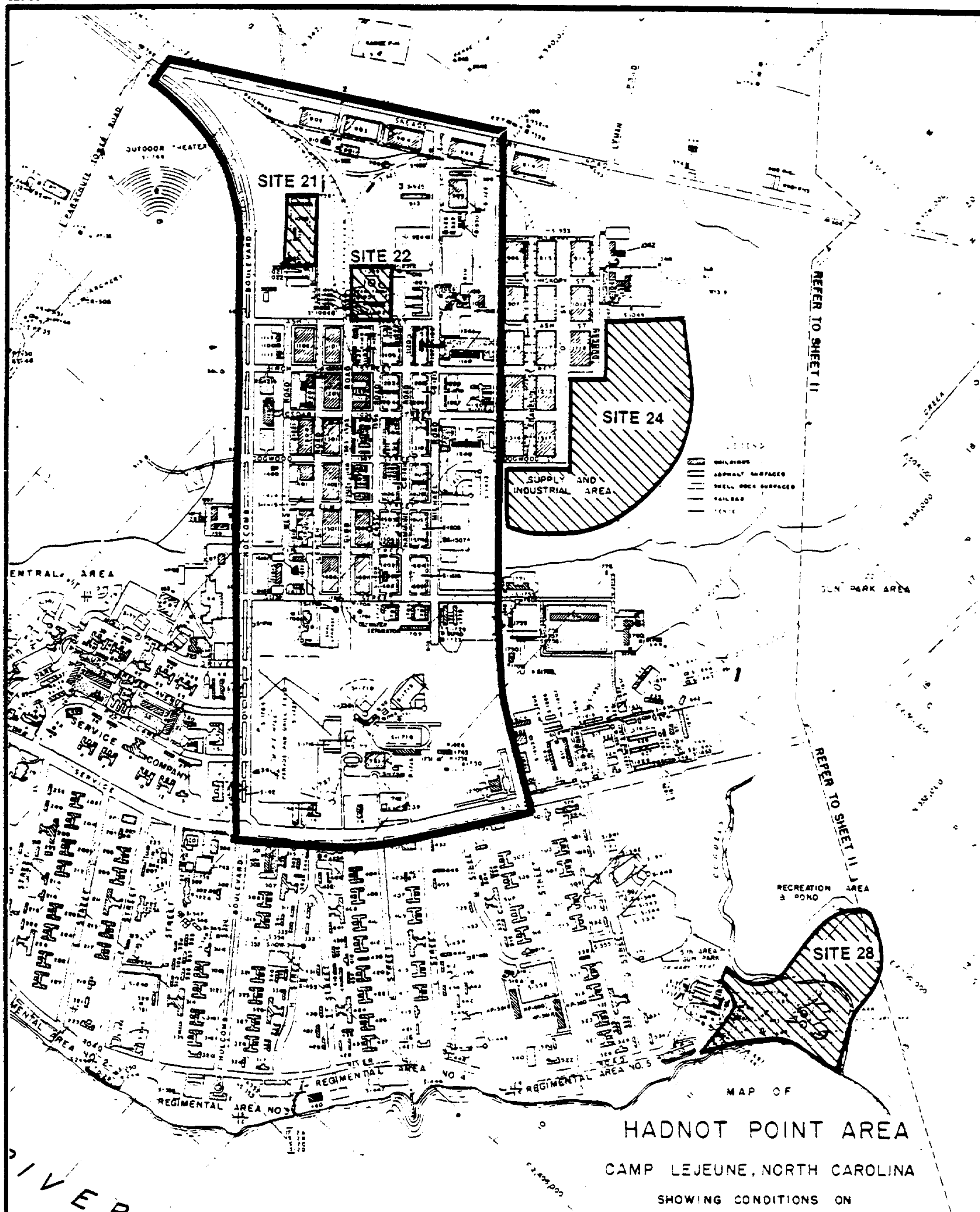

Figure 2-1
OTHER CONFIRMATION STUDY SITES ADJACENT TO HPIA

SOURCES: CAMP LEJEUNE, 1979; ESE, 1988.

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Site 22 (Fig. 2-2) is the site of documented fuel leaks from the Hadnot Point Fuel Farm. Two Verification Step monitor wells were installed to determine the presence of fuel-derived contamination within the shallow groundwater in the vicinity of the tank farm. In addition to sampling and analysis of groundwater samples from these monitor wells, sampling and analysis of samples from adjacent Water Supply Well 602 was conducted. The samples from Well 22GW1 were found to contain high levels of fuel-derived compounds such as benzene, ethylbenzene, toluene, and lead. Only oil and grease (O&G) was detected in Well 22GW2, indicating that the zone of shallow groundwater contamination did not extend from the tank farm to Well 22GW2, a distance of approximately 500 feet (ft).

Benzene, ethylbenzene, 1,2-dichloroethane (12DCA), trans-1,2-dichloroethene (T12DCE), toluene, and trichlorofluoromethane were detected in deep Water Supply Well 602, located approximately 1,200 ft to the west of the fuel tanks. These data strongly indicated that contamination from the tank leaks was migrating significant distances from the source area via the deep potable aquifer. In addition, the detected VOCs (i.e., non fuel-derived contamination) suggested that other sources of contamination, in addition to those identified by IAS, existed within HPIA. A separate effort is currently underway to identify and recover fuel in the subsurface in the vicinity of the Site 22 fuel tank farm. As a result of the Confirmation Study sampling and analysis, Camp Lejeune initiated a sampling program that included all water supply wells within HPIA. This effort identified contamination by VOCs in eight water supply wells in and adjacent to HPIA. Five of these wells (Fig. 2-3) are located within the defined study area of this report. The five water supply wells have been sampled as part of the Confirmation Study and by Camp Lejeune staff. The results of these efforts, shown in Table 2-1, identified the presence of VOCs in the deep aquifer. The remaining three wells (Fig. 2-4) are located in areas that may not be affected by contaminant sources within the HPIA study area but have been affected by similar VOC contamination. The detected contamination at these three

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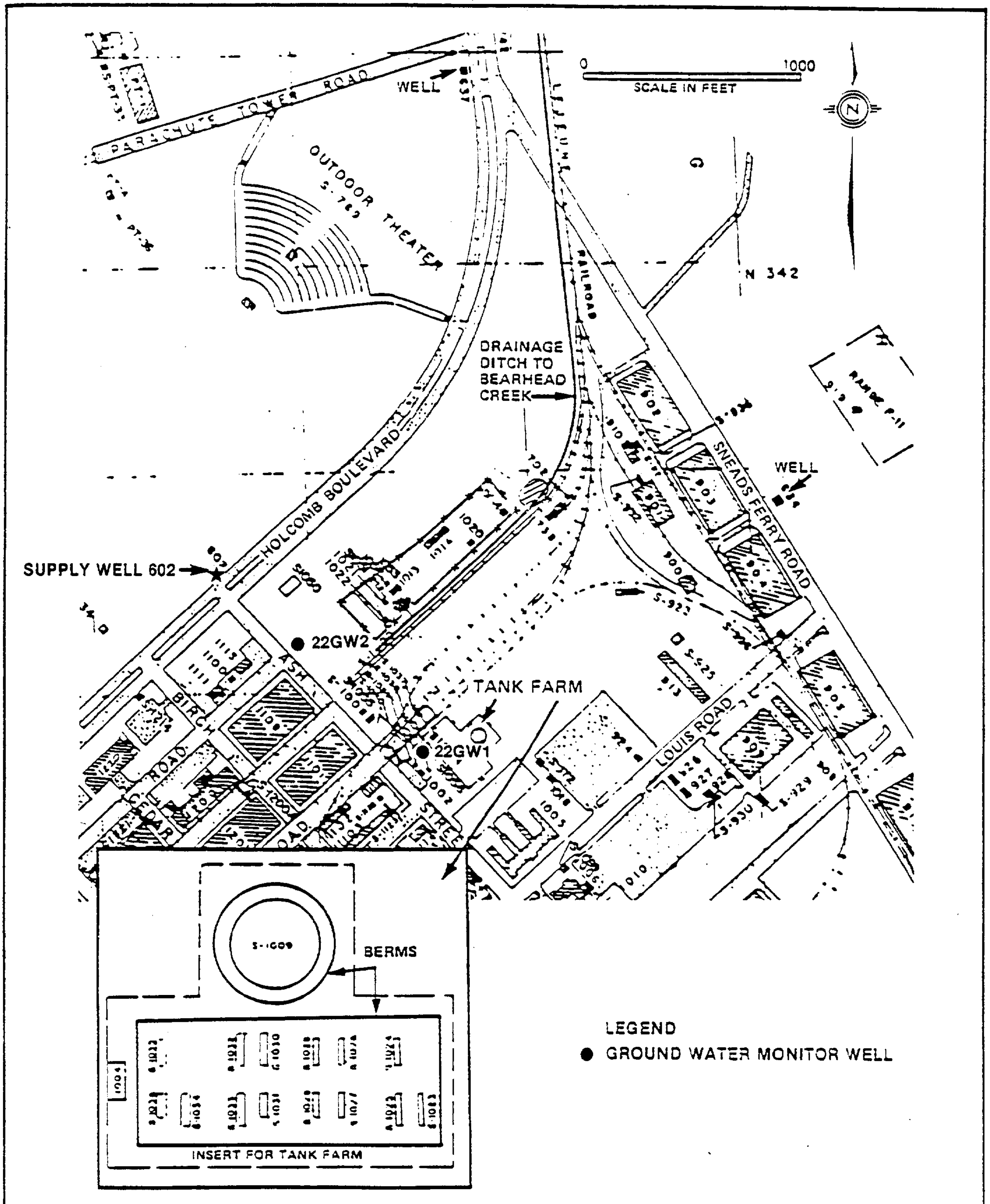

Figure 2-2
HADNOT POINT INDUSTRIAL AREA TANK FARM

SOURCES: Water and Air Research, Inc., 1983.
ESE, 1987.

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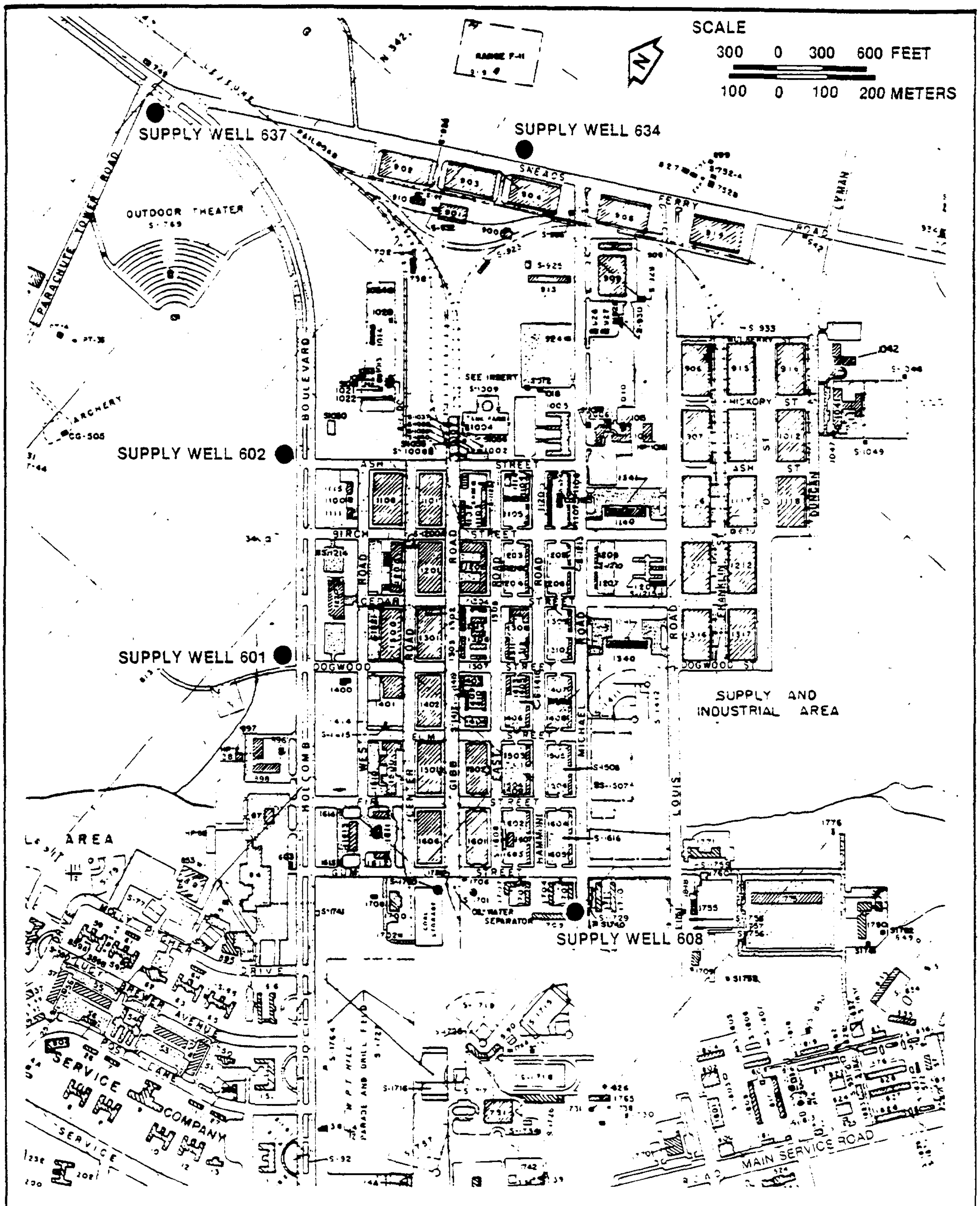

Figure 2-3 SUPPLY WELLS, HADNOT POINT INDUSTRIAL AREA SOURCE: Camp Lejeune, 1987.	CONFIRMATION STUDY MARINE CORPS BASE CAMP LEJEUNE

Table 2-1. Detected Target Analytes, Potable Wells--Hadnot Point Industrial Area

Parameter (Units)	Concentration by Well Number 601	602	608	634	637
Detected in July 1984 Analyzed by ESE					
Benzene (ug/L)	NA	380	NA	NA	NA
1,2-Dichloroethane (ug/L)	NA	46	NA	NA	NA
Trans-1,2-Dichloroethene (ug/L)	NA	7.8	NA	NA	NA
Ethylbenzene (ug/L)	NA	8	NA	NA	NA
Trichlorofluoromethane (ug/L)	NA	3	NA	NA	NA
Toluene (ug/L)	NA	10	NA	NA	NA
Detected on December 5, 1984 Analyzed by JTC Environmental Consultants					
Benzene (ug/L)	--	120	3.7	--	--
Trans-1,2-Dichloroethene (ug/L)	88	630	5.4	--	--
Trichloroethene (ug/L)	210	1,600	110	--	--
Toluene (ug/L)	--	5.4	--	--	--
Tetrachloroethene (ug/L)	5.0	24	--	--	--
Vinyl Chloride (ug/L)	--	18	--	--	--
Detected on December 12, 1984 Analyzed by JTC Environmental Consultants					
Benzene (ug/L)	--	720	4.0	--	--
Trans-1,2-Dichloroethene (ug/L)	99	380	2.4	2.3	--
Trichloroethene (ug/L)	230	540	13	--	--
Tetrachloroethene (ug/L)	4.4	--	--	--	--
Methylene Chloride (ug/L)	10	--	14	130	--

Table 2-1. Detected Target Analytes, Potable Wells--Hadnot Point Industrial Area (Continued, Page 2 of 3)

Parameter (Units)	Concentration by Well Number				
	601	602	608	634	637
Detected on December 19, 1984 Analyzed by JTC Environmental Consultants					
Benzene (ug/L)	NA	230	NA	NA	NA
Trans-1,2-Dichloroethene (ug/L)	NA	230	NA	NA	NA
Trichloroethene (ug/L)	NA	340	NA	NA	NA
Toluene (ug/L)	NA	12	NA	NA	NA
Detected in January 1985 Analyzed by JTC Environmental Consultants					
1,2-Trans-dichloroethene (ug/L)	8.8	NA	NA	700	--
Trichloroethene (ug/L)	26	NA	NA	1,300	--
Tetrachloroethene (ug/L)	--	NA	NA	10	--
Detected in November 1986 Analyzed by ESE					
Barium, Total (ug/L)	21.8	31.3	43.4	18.5	NA
Nitrogen, NO_2 + NO_3 (as N) (mg/L)	0.042	--	--	--	NA
Nitrogen, NO_2 (as N) (mg/L)	0.042	--	--	--	NA
Iron, Total (ug/L)	12,800	15,200	3,600	2,830	NA
Chloride (mg/L)	68.3	23.0	9.5	7.9	NA
Manganese, Total (ug/L)	97.6	134	67.8	19.5	NA
Sodium, Total (mg/L)	9.25	12.3	6.53	5.48	NA
Sulfate (mg/L)	5,170	92	12	--	NA
Color, True (PCU)	104	48	9	10	NA

Table 2-1. Detected Target Analytes, Potable Wells--Hadnot Point Industrial Area (Continued, Page 3 of 3)

Parameter (Units)	Concentration by Well Number 601	602	608	634	637
Detected in November 1986 Analyzed by ESE (Continued)					
Residue, Diss (mg/L)	358	524	270	226	NA
Turbidity (FTU/NTU)	17.0	18.0	10.0	11.0	NA
Chromium, Total (ug/L)	7.7	14.1	6.8	6.1	NA
Copper, Total (ug/L)	10.4	556	574	21.7	NA
Mercury, Total (ug/L)	0.6	0.5	0.7	0.6	NA
Zinc, Total (ug/L)	3,200	93.8	99.1	17.2	NA
Benzene (ug/L)	--	50	--	--	NA
1,2-Dichloroethane (ug/L)	--	9.2	--	--	NA
Trans-1,2-Dichloroethene (ug/L)	--	14	8.5	2.9	NA
Trichloroethene (ug/L)	--	2.2	66	--	NA
Bis(2-Ethylhexyl) Phthalate (ug/L)	1.3	--	--	--	NA

Note: ug/L = micrograms per liter.
mg/L = miligrams per liter.
FTU/NTU = formazin turbidity unit and nephelometric turbidity unit.
NA = not analyzed.
PCU = platinum-cobalt units.
-- = below detection limits.

Source: ESE, 1988.

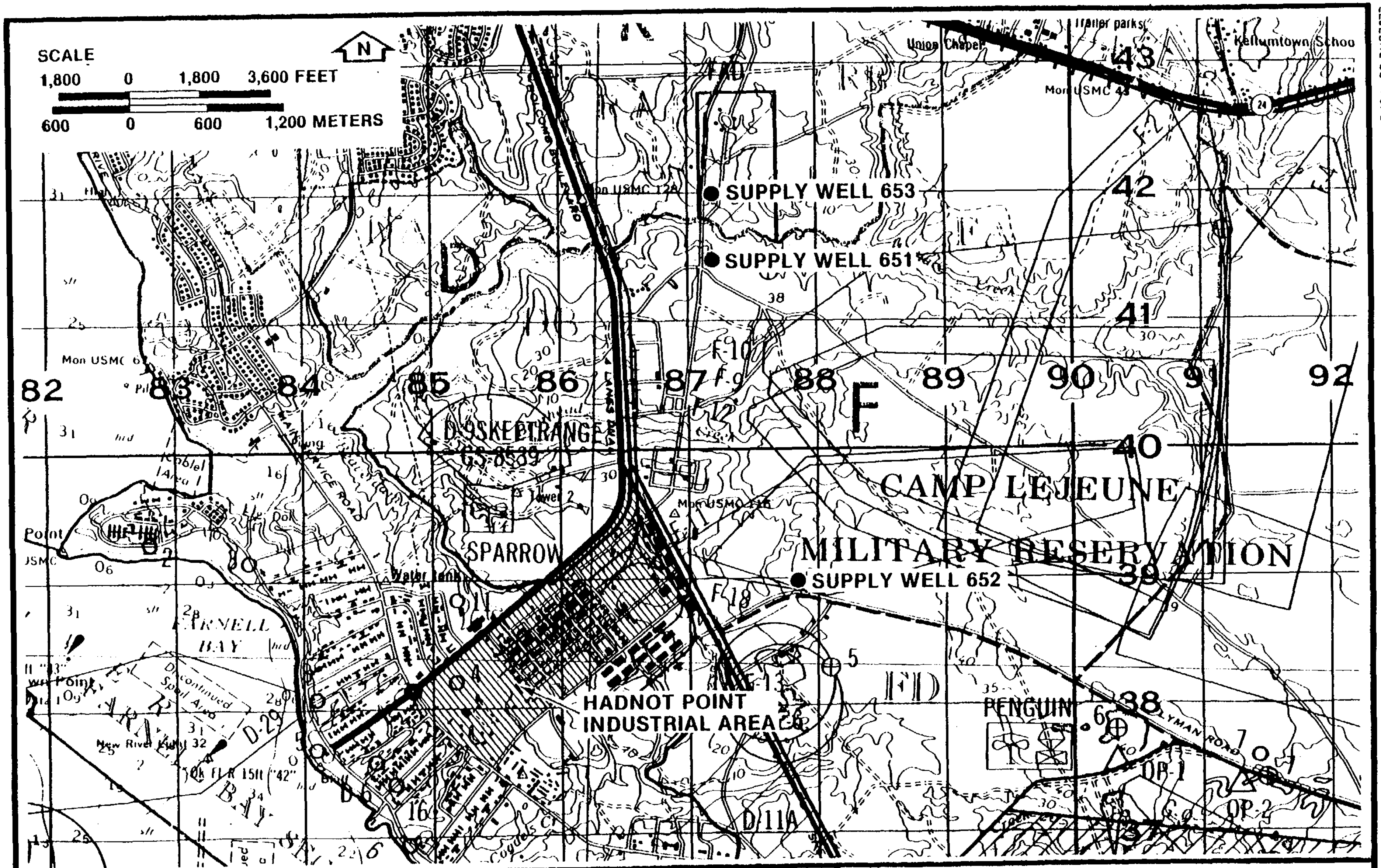

Figure 2.4
OTHER CONTAMINATED WATER SUPPLY WELLS

SOURCE: ESE, 1987.

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wells is the focus of a separate investigation being conducted as part of the overall Confirmation Study.

All affected water supply wells were immediately shut down by Camp Lejeune utilities staff. Investigations at HPIA were given the highest priority within the overall Confirmation Study; Characterization Step efforts were initiated for HPIA, and Verification Step efforts continued at the other study areas within Camp Lejeune.

3.0 CHARACTERIZATION STEP METHODOLOGY

The Characterization Step effort at HPIA was a multistep process designed to delineate in a sequential manner the most likely contaminant source(s) within HPIA. The sequence of work efforts was as follows: records search, soil gas investigation, installation and sampling of shallow monitor wells, sampling of deep supply wells, installation and sampling of intermediate and deep monitor wells, and aquifer pump test using an existing deep water supply well.

3.1 RECORDS SEARCH

The existing IAS report (NEESA, 1983) was reviewed, and potential sources of the contamination identified by the Verification Step efforts were noted. With the assistance of Camp Lejeune staff, a 2-person team from ESE conducted a building-by-building evaluation of all past and/or current activities that may have utilized any solvent compounds. As noted previously, buildings and other facilities identified in the IAS report were evaluated with extra caution. In many cases, the physical facilities of the buildings (i.e, floor drains, sumps, and unmarked pipe lines) were inspected to identify the general purpose and any interconnections. Any pits, tanks, or other drainage structures outside of the buildings were also closely investigated.

App. A lists, in tabular form, specific findings of the records search effort on a building-by-building basis. The records search effort identified a number of potential contaminant sources based on the use, storage, or disposal of VOCs.

3.2 SOIL GAS INVESTIGATION

To optimally site monitor well locations, soil gas sampling and analysis was conducted in the vicinity of all buildings that could potentially act as VOC source areas, as indicated by the records search effort. App. B lists the soil gas data, in tabular form, from all soil gas sampling stations within HPIA. App. C presents both the location of the soil gas sampling stations listed in the tables in App. B, and the detailed field analytical procedure.

VOCs, if present in groundwater or in the soil matrix, occupy the interstices or voids in the soil. Vapors from the interstitial space were sampled and characterized using a portable gas chromatograph (GC). Soil gas analysis provided a rapid method for tracing potential plumes resulting from leaks and/or spills of many VOCs. The method is particularly useful for compounds [such as trichloroethene (TCE)] that are more volatile than xylene [vapor pressure greater than 5 millimeters of mercury (mmHg)]. Determination of contaminant concentrations to the low parts-per-billion level was made with this system. TCE was used as the indicator compound at HPIA to trace volatile plumes. TCE has a high vapor pressure (57.9 mmHg), which made it ideal to track with the portable GC unit; TCE was detected in the deep potable aquifer in the vicinity of HPIA. In addition to providing rapid results, substantially more samples were analyzed at a much lower cost per sample compared to well drilling and gas chromatography/mass spectrometry (GC/MS) analysis of water samples. The system was shipped overnight and was ready to run within hours of arrival onsite.

3.2.1 Soil Gas Sampling Grids

The soil gas sampling locations were selected using various grids and spaced intervals along selected transects. The locations of these grids and transects (App. C) were determined by the physical location of suspected disposal features and as buildings, underground utilities, and pavement allowed. The specific sampling procedure was to obtain the initial samples from the central areas of the disposal features as determined by the records search. When the presence of VOCs was confirmed for a given feature/structure, the pattern of soil gas sampling was focused on delineating the extent of the soil gas plume. A total of 143 soil gas samples were obtained from HPIA and analyzed.

3.2.2 Soil Gas Sampling Procedure

Soil gas samples were collected in a grid pattern as described in the previous section and as shown in App. C. The grid in a specific sampling area was established manually using a surveyor's tape and was referenced to building corners and other permanent markers. To more easily interpret the results of the analyses, all soil gas samples were drawn from a depth of approximately 4 ft.

Once a sampling location was chosen, a pneumometer (soil gas sampling tube) was driven to its sampling depth by means of a pneumatic hammer. When the desired depth was reached, the deformed end of the pnuemometer tube was cut off using a pipe cutter, if necessary, and a Teflon® tube was attached using a silicone stopper. The other end of the tube was connected to a desiccator, and the system was evacuated to purge the existing air column and to draw in gases from the soil. A Tedlar® sample bag was then connected inside the desiccator, and the system was pumped again to fill the sample bag. The bag was removed and transported to the ESE field laboratory at HPIA for analysis. Once all of the samples were collected, the pneumometers were either removed or driven below ground level.

3.2.3 Data Analysis

Data collected during the soil gas sampling program were hand plotted in the ESE field office. When all data for a specific disposal structure/feature were collected, those data were plotted, and any data gaps or anomalies were noted. Additional samples were collected, or previously sampled sites were resampled at this time if required. Data plots for each completed disposal structure/feature were then analyzed, and monitor well locations were selected.

3.3 WELL INSTALLATION

After analysis of the soil gas data, monitor well locations were selected to provide the required geohydrological and geochemical information to evaluate the contaminant status within the groundwater underlying HPIA. Specific information needs included the horizontal extent of contamination, vertical extent of contamination, and contaminant concentration (i.e., source strength) at each specific study site within

HPIA as well as in each specific depth interval (discrete water-bearing zone) at each study site, if present. Additionally, the groundwater flow direction was determined for all definable aquifer zones.

3.3.1 Shallow Monitor Wells

All shallow monitor wells within HPIA were installed using 6-inch outside-diameter (OD) hollow-stem augers. Davis Drilling Co., of Safety Harbor, FL, was the drilling subcontractor for all of the shallow monitor wells.

All monitor wells installed as part of the field investigation at HPIA were composed of polyvinyl chloride (PVC) materials. The specific rationale for the use of PVC area as follows:

1. All monitor wells were installed, developed, and allowed to equilibrate with the aquifer prior to sampling;
2. Prior to sampling, the standing water in each well (including the volume of water in the saturated annulus) was purged, ensuring that formation water was sampled;
3. Each monitor well was sampled immediately after the purging process was completed to minimize any potential interaction between the groundwater and the well materials; and
4. Many of the monitor wells were sampled 3 times, and no trends were identified which would suggest that target analytes from the groundwater were being absorbed by the well materials, or that the well materials were contributing target compounds to the water samples.

These technical issues, in conjunction with the inherent cost efficiencies of PVC versus stainless steel or Teflon®, strongly indicate that the use of PVC at Camp Lejeune is compatible with the technical goals of the overall RI/FS.

App. D presents the detailed drilling methodology and the boring logs and well completion reports.

3.3.2 Deep Monitor Wells

All deep monitor wells (six) installed at HPIA were drilled with mud-rotary techniques. Two depth intervals were selected for installation of the deep monitor wells, 75 ft and 150 ft (see Sec. 4.3). Davis Drilling Co. and Atec Associates (of Raleigh, NC) were the drilling subcontractors utilized for the installation of the deep monitor wells. For those wells installed by Atec Associates (three 75-ft wells, one 150-ft well), a 5-inch hole was drilled to the design depth of the well. The detailed drilling procedures and all boring logs and well completion reports are presented in App. E.

3.3.3 Observation Wells

An aquifer pump test was conducted in HPIA to quantify flowrates within the deep potable aquifer (Sec. 3.6). Two deep observation wells (200-ft total depth) were installed adjacent to existing Water Supply Well 642 for the purpose of water-level observation during the aquifer pump test. Davis Drilling Co. was the contractor utilized for the installation of the observation wells. The detailed drilling procedures and all boring logs and well completion reports are presented in App. F.

3.4 MONITOR WELL SAMPLING

Each of the shallow monitor wells in HPIA were sampled three times, with a period of approximately 60 days between sampling events. For presentation and analysis of the geochemical data, the reader is referred to Sec. 4.4. The deep monitor wells were sampled once as part of the current effort.

Prior to sampling each of the monitor wells, the standing water in the well was purged using a centrifugal pump, a submersible pump, or a hand bailer. Any downhole pumping equipment which was used for more than one well was thoroughly washed with potable water between wells. All bailers were constructed of PVC and stainless-steel materials without the use of solvent-based glue and were dedicated for use in one well only. Table 3-1

Table 3-1. Sample Containers, Preservation, and Holding Times

Parameter	Container Water	Container Soil	Preservative Water	Preservative Soil	Maximum Holding Time for all Matrices*
Lead	P	G	HNO_3 to pH<2	Cool, 4°C	6 months
Oil and Grease	G	G	Cool, 4°C H_2SO_4 to pH<2	Cool, 4°C	28 days
Volatile Organics	S	S	Cool, 4°C	Cool, 4°C	14 days

Note: P = Polyethylene.
G = Amber Glass with Teflon® -lined cap.
S = Amber Glass Vial with Teflon® -lined septum cap.
°C = degrees Centigrade.

*Preservatives and holding times are from Federal Register, Vol. 49, No. 209, Friday, October 26, 1984, Page 43260 and Characterization of Hazardous Waste Sites: A Methods Manual--Volume II, Sampling Methods, Second Edition, EPA-600/4-84-076. Container requirements are consistent with these references.

Source: ESE, 1988.

lists the appropriate sample containers, preservation, and holding times for each of the target analytes.

3.5 CHEMICAL ANALYSIS

All shallow and deep monitor wells were analyzed for a specific group of target analytes. Table 3-2 lists the target analytes per well and EPA reference methods utilized in the analyses. These target analytes were selected as the most probable compounds which may exist in the vicinity of the study site based upon past usage of materials and/or actual presence in the environment as documented by previous investigations.

The observation wells installed for use in the aquifer pump test were used only for water-level observations; no chemical samples were obtained from these wells.

3.6 AQUIFER TESTING

The aquifer pump test at HPIA was conducted to determine site-specific aquifer parameters that are required to estimate the rate of flow of groundwater in the potable sand and limestone aquifer. A 72-hour pump test was conducted with Water Supply Well 642 as the pumped well. Two observation wells, each 200 ft deep, were installed to monitor the drawdown resulting from pumping at Well 642. In addition, an existing U.S. Geological Survey (USGS) observation well (90-ft total depth) was located adjacent to allow monitoring of intermediate depth zones during the pump test.

Water-level information was continuously recorded using an *in situ* digital signal recorder/processor with downhole pressure probes. After the completed test, all time-drawdown data for each of the observation wells were analyzed by a number of standard curve matching techniques to determine the required aquifer parameters. A detailed description of the pump test procedure and the data analysis is presented in Sec. 4.3.3.

Table 3-2. Target Analytes for HPIA Groundwater

Parameter	Reference Method
Lead, Total	EPA 200.7 (ICAP Spectroscopy)
Oil and Grease	EPA 413.2 (IR Spectroscopy)
Benzene	EPA 624 (GC/MS Purgeables)
Bromodichloromethane	EPA 624 (GC/MS Purgeables)
Bromoform	EPA 624 (GC/MS Purgeables)
Bromomethane	EPA 624 (GC/MS Purgeables)
Carbon Tetrachloride	EPA 624 (GC/MS Purgeables)
Chlorobenzene	EPA 624 (GC/MS Purgeables)
Chloroethane	EPA 624 (GC/MS Purgeables)
2-Chloroethylvinyl Ether	EPA 624 (GC/MS Purgeables)
Chloroform	EPA 624 (GC/MS Purgeables)
Chloromethane	EPA 624 (GC/MS Purgeables)
Dibromochloromethane	EPA 624 (GC/MS Purgeables)
1,1-Dichloroethane	EPA 624 (GC/MS Purgeables)
1,2-Dichloroethane	EPA 624 (GC/MS Purgeables)
1,1-Dichloroethylene	EPA 624 (GC/MS Purgeables)
trans-1,2-Dichloroethene	EPA 624 (GC/MS Purgeables)
1,2-Dichloropropane	EPA 624 (GC/MS Purgeables)
cis-1,3-Dichloropropene	EPA 624 (GC/MS Purgeables)
trans-1,3-Dichloropropene	EPA 624 (GC/MS Purgeables)
Ethylbenzene	EPA 624 (GC/MS Purgeables)

Table 3-2. Target Analytes for HPIA Groundwater (Continued, Page 2 of 2)

Parameter	Reference Method
Methylene Chloride	EPA 624 (GC/MS Purgeables)
1,1,2,2-Tetrachloroethane	EPA 624 (GC/MS Purgeables)
Tetrachloroethene	EPA 624 (GC/MS Purgeables)
Toluene	EPA 624 (GC/MS Purgeables)
1,1,1-Trichloroethane	EPA 624 (GC/MS Purgeables)
1,1,2-Trichloroethane	EPA 624 (GC/MS Purgeables)
Trichloroethene	EPA 624 (GC/MS Purgeables)
Trichlorofluoromethane	EPA 624 (GC/MS Purgeables)
Vinyl Chloride	EPA 624 (GC/MS Purgeables)
Acrolein	EPA 624 (GC/MS Purgeables)
Acrylonitrile	EPA 624 (GC/MS Purgeables)
Dichlorodifluoromethane	EPA 624 (GC/MS Purgeables)
m-Xylene	EPA 624 (GC/MS Purgeables)
o- and/or p-Xylene	EPA 624 (GC/MS Purgeables)
Methyl Ethyl Ketone	EPA 624 (GC/MS Purgeables)
Methyl Isobutylketone	EPA 624 (GC/MS Purgeables)

Source: ESE, 1987.

4.0 DATA RESULTS AND ANALYSIS

4.1 RECORDS SEARCH

As described in Sec 3.1, a 2-man team from ESE conducted a detailed records and physical search within HPIA to identify the presence of potential waste solvent disposal features/structures that could account for the observed VOC contamination in the deep potable aquifer. App. A lists each building that was investigated, the use(s) of the building through time, and the division/department within Camp Lejeune that has/had jurisdiction over the physical structure and the operations within.

Table 4-1 lists all of the areas within HPIA that were identified as potential source areas for waste solvent materials. Also included in the table are the primary indications leading to a preliminary classification as a potential source, as well as the specific pages in App. A of this report which present the appropriate pages from the field logbooks where the suspect features/structures are identified.

Each of the areas listed in Table 4-1 warranted further study in the next phase of field efforts, i.e., the soil gas investigation.

4.2 SOIL GAS INVESTIGATION

Each of the areas identified by the records search as potential sources of VOCs was investigated with the use of the soil gas technique. As described in Sec. 3.2, the general field methodology was to collect the initial samples from the central area of the suspect feature/structure and, as data became available, to expand the soil gas grid to delineate the limits of any detected contamination.

All soil gas data are presented in App. B; all soil gas sampling station locations are shown in App.C. The remainder of this section discusses only those areas in which VOC contamination was detected in the soil gas.

Table 4-1. Potential Source Areas Identified by Records Search

Bldg.	Primary Indicators	Reference Pages
901 902 913	o Underground Tank (TCE) o Engine Degreasing	A-1, A-2, A-20, A-21
915	o Solvent Drain from Wash Line o Bare Spot on Ground, South Side of Building	A-21
1100	o Former Service Station Drum (Empty) of Solvent Currently at Site	A-24
1101 1102	o Paint Shop/Emergency Maintenance; Proximity to 1202	A-3, A-7, A-15
1202	o Base Maintenance Shop Documented Solvent Use and Storage	A-7, A-16
1300 1302	o Cold Storage Facility with Maintenance Shop; Solvent Usage	A-4
1502	o Motor T Shop, Documented Oils, Grease, Solvents, Gasoline	A-5, A-18, A-19
1601 1602	o Vehicle Maintenance and Repair; Solvent Use; Visible Ground Stains	A-8, A-22
1709 1710	o Former Combat Vehicle Maintenance, Underground "Waste" Tanks; Bags of Contaminated Soil (Uncovered)	A-9

Source: ESE, 1987.

4.2.1 Bldgs. 901, 902, and 903

The IAS identified the presence of a 440-gallon (gal) underground tank at Bldg. 901 (Fig. 4-1). This tank was used for storage of TCE that was used to degrease engines. Available information at the time of the IAS indicated that the contents of the tank had been drained and sent to the Defense Property Disposal Office (DPDO), which now operates under the title of the Defense Reutilization and Marketing Office (DRMO). No information regarding spills, leaks, or discharges from the tank while it was in active use was available.

Additional inquiries conducted as part of the current Confirmation Study reconfirmed the presence of the underground tank adjacent to the eastern side of Bldg. 901; it remains in-place but is reportedly empty and/or filled with sand.

The documented presence of the underground tank and the use of TCE strongly indicated that a soil gas investigation should be conducted in the area between Bldgs. 902 and 903. Subsequent conversations, during the well drilling phase of the field efforts, with active Marine Corps staff working in the vicinity of Bldgs. 901, 902, and 903 indicated that degreasing of engines took place over a large area between Bldgs. 902 and 903 and the railroad lines.

The results of the soil gas investigation (Fig. 4-1) identified the presence of TCE vapors in the soil column in the vicinity of the underground tank, verifying the records search data. The soil gas data and the documented history of TCE usage throughout the area bounded by Bldgs. 901, 902, and 903 and the rail lines strongly suggest that VOC contamination is present in the groundwater and that installation of monitor wells in this area was warranted.

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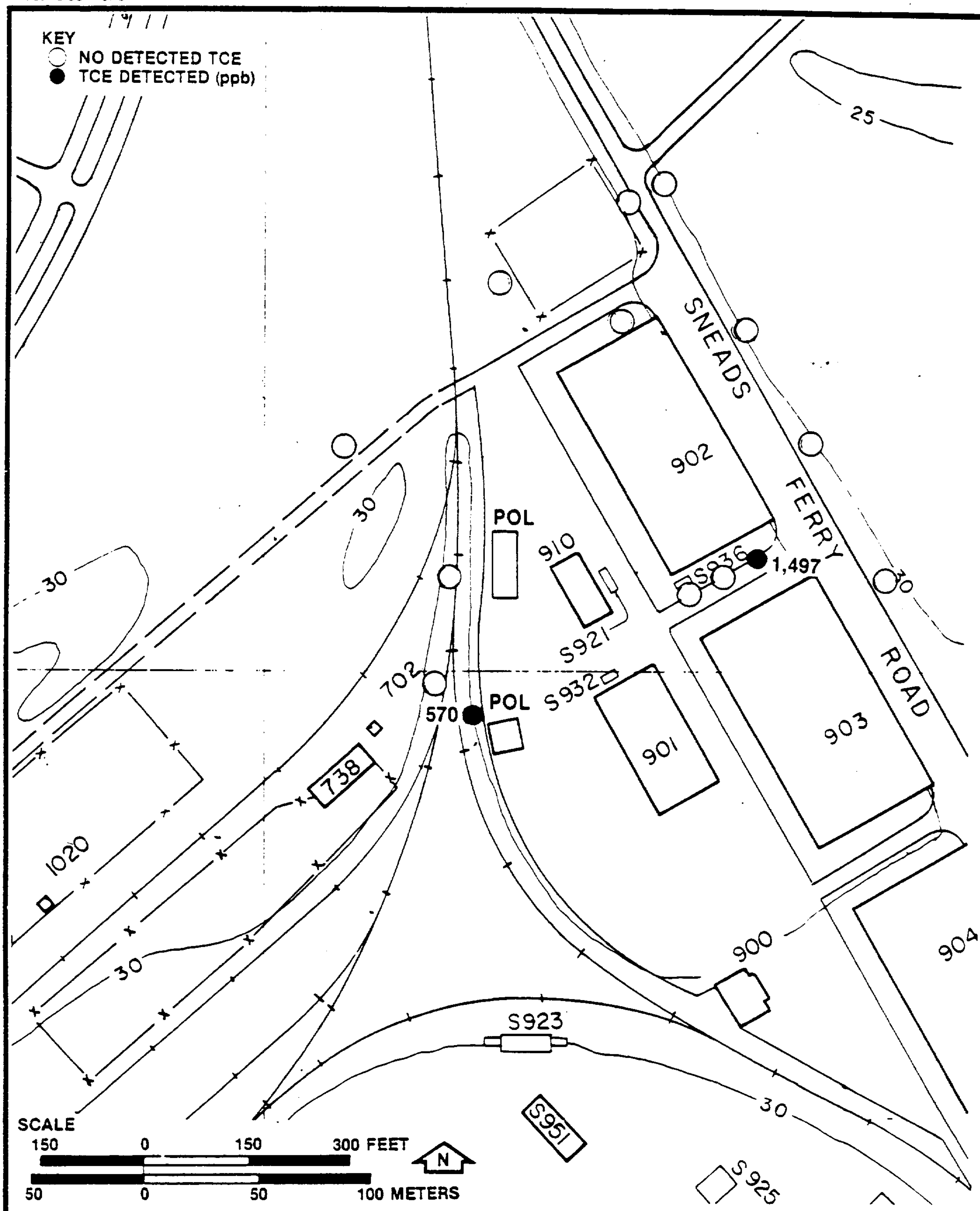

Figure 4-1
SOIL GAS FINDINGS — BLDGS. 901, 902, AND 903

SOURCE: ESE. 1987.

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MARINE CORPS BASE
CAMP LEJEUNE

4.2.2 Bldg. 1100

This building (Fig. 4-2) was a small service station when it was first constructed (1943). It was most recently used as a printing plant. An empty drum labeled as 1,1,2,2-tetrachloroethene was found adjacent to the building at the time of the investigation. The field staff was verbally informed that this drum had developed a leak and was placed outside; the contents of the drum drained onto the ground. A single value of TCE was detected to the west of Bldg. 1100, although two samples obtained to the east of the building had high detection limits due to the presence of other unknown compounds. Because TCE was identified at this study site, inclusion of the site in the monitor well installation and sampling phase was warranted.

4.2.3 Bldgs. 1101, 1102, 1202, 1300, 1301, and 1302

The IAS identified and described several of the industrial/maintenance activities that have or are now occurring at Bldg. 1202, Base Maintenance Shop (Fig. 4-3). No specific contaminant sources were identified by the database available at that time. Further inspection of Bldg. 1202 as part of the current Confirmation Study identified a number of potential sources of VOC contamination. The most significant areas warranting further study are the location(s) of former underground storage tanks, and storage areas for drums and other containers of waste thinners, paints, and solvents. Currently, the handling of potentially toxic or hazardous materials at Bldg. 1202 appears to be within applicable protocols and guidelines. The area is well kept and visually clean. However, because of past practices, and the fact that pavement covers most of the area surrounding the structures precluding inspection of possible ground staining, the area surrounding Bldg. 1202 was included in the soil gas investigation. Bldgs. 1101, 1102, 1301, and 1302 are general-purpose storage warehouses and are involved in the investigation only because of proximity to Bldg. 1202. Bldg. 1300 is a cold storage facility and does contain a maintenance shop. It was included as a separate potential source of contaminants.

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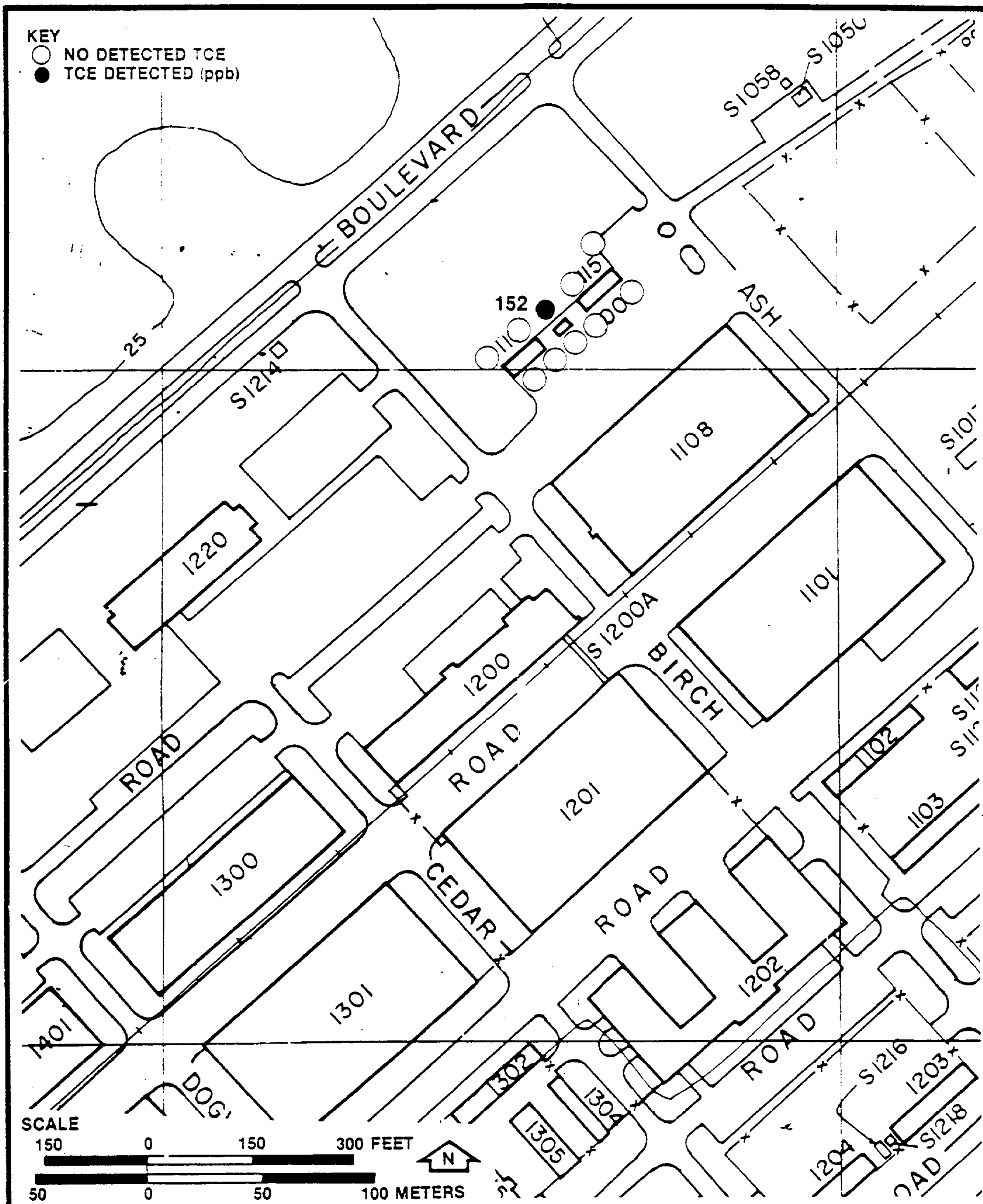

Figure 4-2
SOIL GAS FINDINGS — BLDG. 1100

SOURCE: ESE, 1987.

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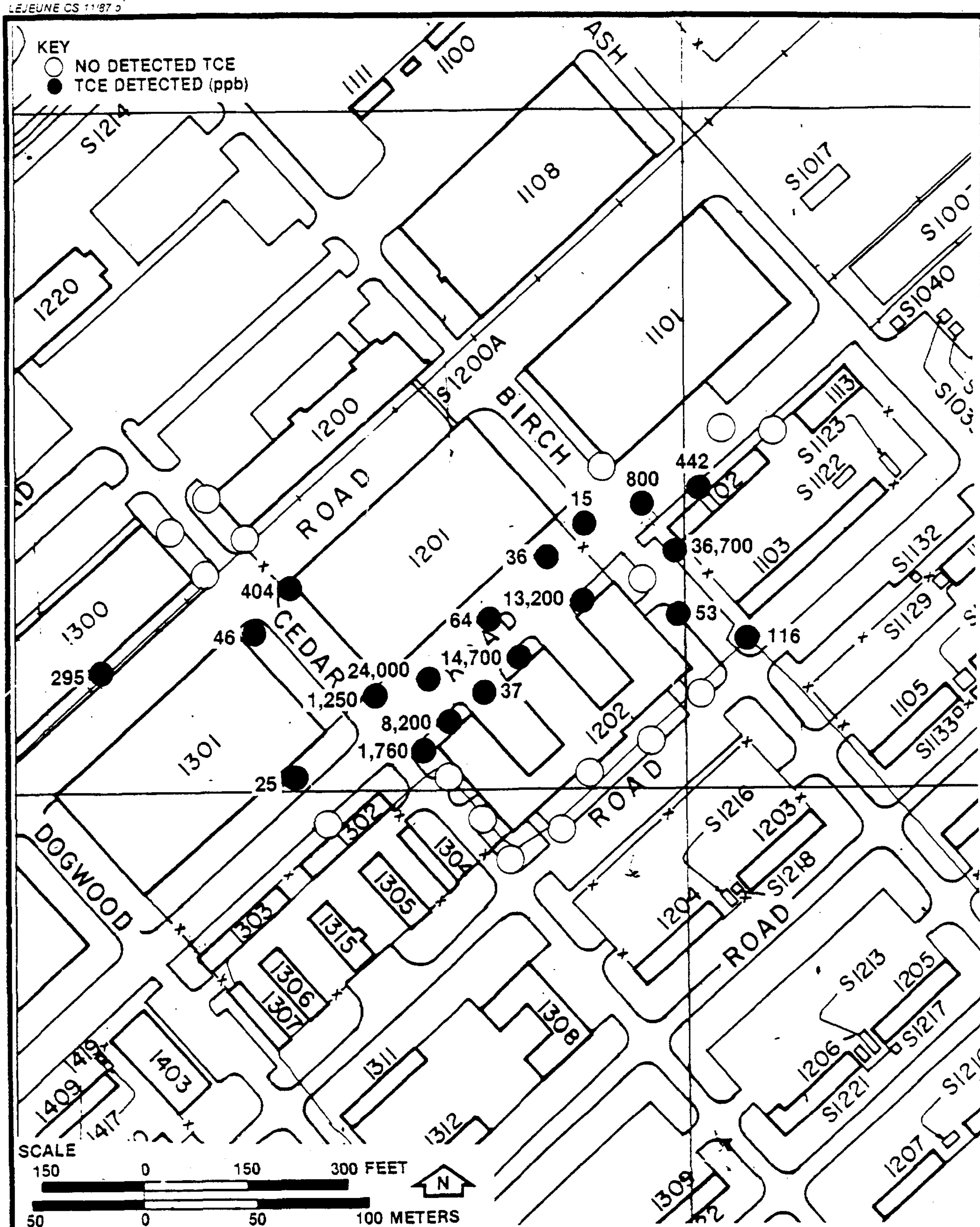

Figure 4-3
SOIL GAS FINDINGS — BLDGS. 1101, 1102, 1202, 1300, 1301, AND 1302

SOURCE: ESE, 1987.

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TCE was detected in the soil vapors over a major portion of the western and northwestern areas of the Bldg. 1202 complex, with values ranging from 15 to 36,770 parts per billion (ppb). The highest concentrations were located at the northern and southwestern ends of the building. This corresponds closely with use and disposal history of solvents at this facility. A single value of TCE was detected on the eastern side of Bldg. 1300, but may be related to the TCE seen throughout the western side of Bldg. 1202 and adjacent facilities. Installation of monitor wells in this study site was required in order to identify/quantify potential VOC contamination in the groundwater.

4.2.4 Bldgs. 1502, 1601, and 1602

The area encompassed by Bldgs. 1502, 1601, and 1602 has been a vehicle maintenance and repair facility since initial construction (circa 1942-1943). The IAS identified the presence of a 440-gal underground storage tank of TCE at Bldg. 1601, the current status of which is unknown. The Confirmation Study records search documented heavy solvent and petroleum, oil, and lubricant (POL) usage. In addition, heavy ground staining was observed. The results of the soil gas investigation (Fig. 4-4) strongly corroborate the records search data. The soil vapors in the area between Bldgs. 1601 and 1502 are highly contaminated with TCE, with levels as high as 703,000 ppb. In addition, soil gas sampling stations on all sides of Bldg. 1502 recorded TCE contamination. Similarly, TCE contamination was detected at sampling stations on the southern and eastern sides of Bldg. 1601. High levels of TCE contamination in the soil adjacent to these buildings resulted in a high-priority classification of this study site in the following investigative efforts. Installation of a monitor well network was warranted.

4.2.5 Bldgs. 1709 and 1710

The area encompassing Bldgs. 1709 and 1710 (Fig. 4-5) has been a combat vehicle maintenance area, paint shop, and general maintenance area for much of its history. Underground "waste" tanks were identified at Bldg. 1709; the current status of these tanks is not known. Bags of soil

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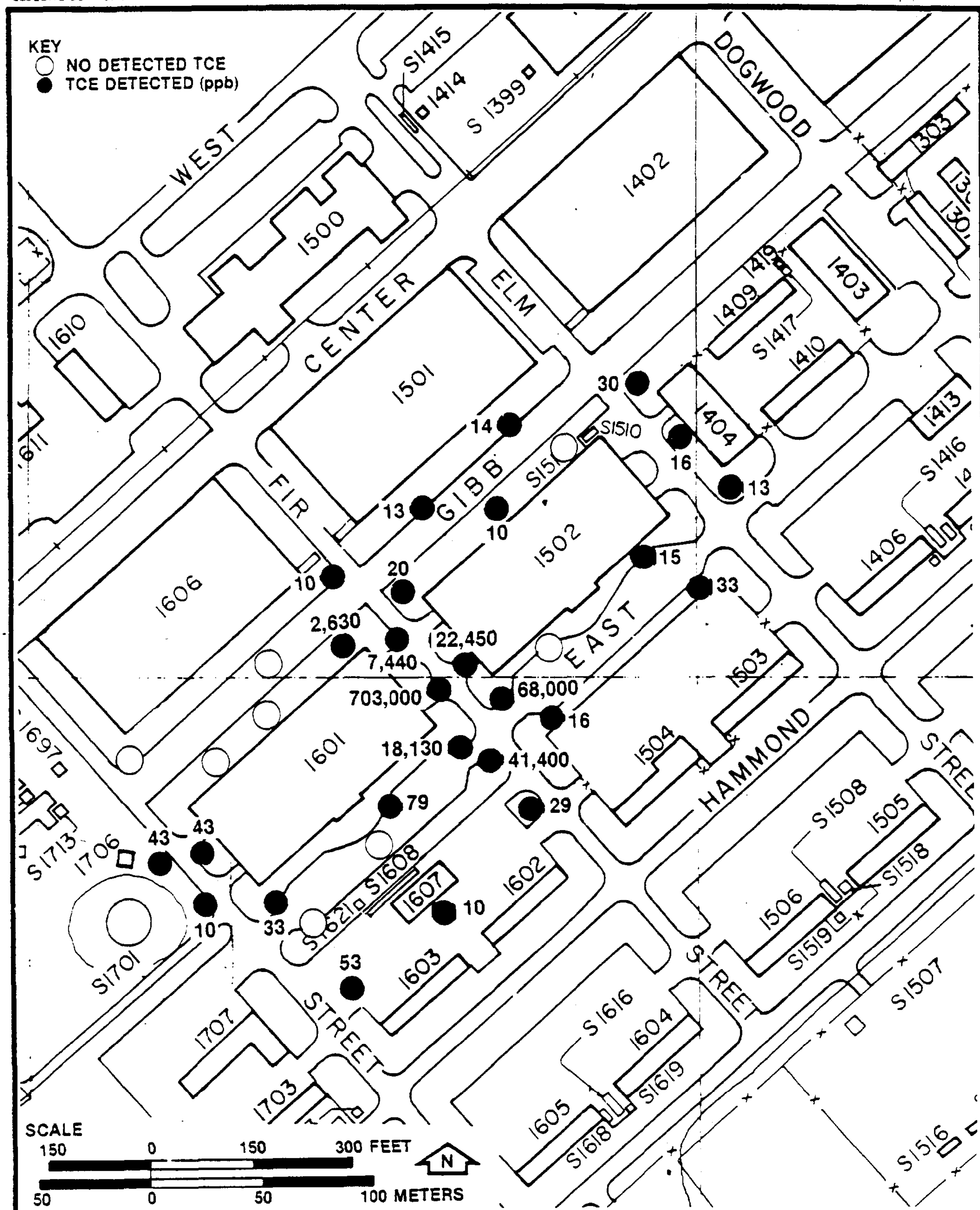

Figure 4-4
SOIL GAS FINDINGS — BLDGS. 1502, 1601, AND 1602

SOURCE: ESE, 1987.

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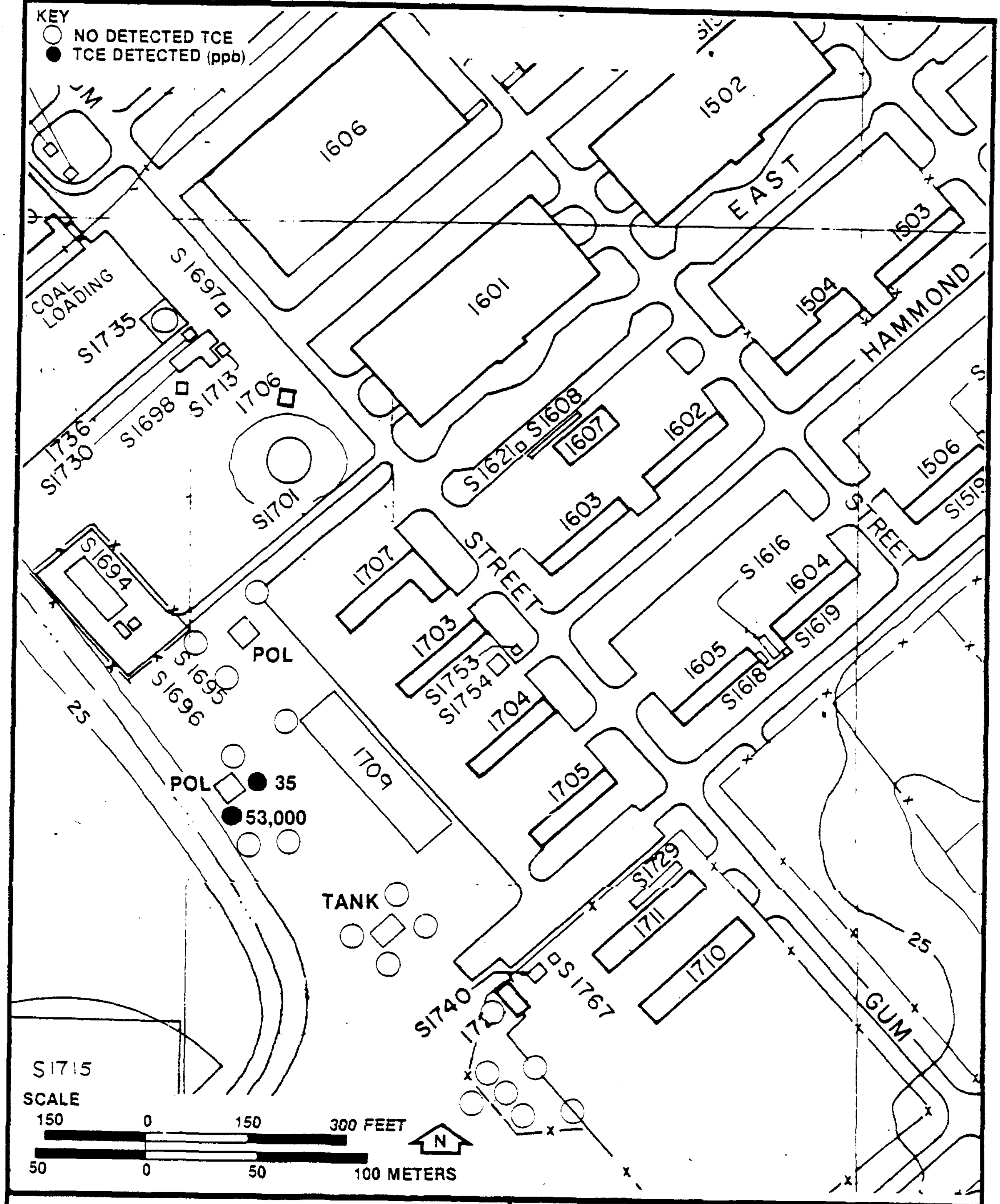

Figure 4-5
SOIL GAS FINDINGS — BLDGS. 1709 AND 1710

SOURCE: ESE, 1987.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

marked as contaminated were found to the south of Bldg. 1709. These bags are exposed to weather and are in very poor condition.

The soil gas investigation identified TCE in the soil vapors in only two locations, adjacent to the bags of contaminated soil. However, in a large number of samples obtained from an area to the south of Bldg. 1710, the method detection limit was extremely high due to dilution of the samples in an attempt to resolve a large unknown peak in the data. Although not specifically analyzed, it appears that a large amount of O&G is present in the soil in the vicinity of these samples. TCE may be present, but was not detected because of the sample dilution process.

The sporadic detection of TCE, and the presence of other unknown contaminants, required that this study site be included in the next phase of the field investigation--monitor well installation and sampling.

4.3 GEOHYDROLOGY

Two groundwater systems appear to be operative at HPIA. The shallow aquifer is encountered at a depth of less than 10 feet below land surface (ft BLS) in most areas, and in many areas is at or just below the land surface. The deep aquifer, which is the producing zone for all of the water supply wells at HPIA and throughout Camp Lejeune, is encountered at a depth of approximately 100 ft BLS. This deep zone can be 100 ft or more in thickness. Between these two distinct zones is an alternating sequence of sands, silts, and clays which are poorly described both in lithology and water-bearing properties.

A total of 33 monitor wells were installed in HPIA to describe the subsurface geologic units, define the groundwater flow directions, and characterize the geochemical character of the groundwater at HPIA. Of this total, 27 wells were completed in the shallow aquifer, and 6 penetrated intermediate and deep aquifer zones. In addition to these 33 wells, 2 monitor wells previously installed at Site 22 were sampled and analyzed as part of the Characterization Step effort.

Fig. 4-6 shows the location of the monitor wells installed as part of the current study at HPIA. These locations monitor all "hot spots" as defined by the soil gas investigation. In addition, a few of the monitor wells provide additional detail to the groundwater contour maps and/or define the extent of contamination derived from the potential source areas. More specific well location rationale is presented on a site-by-site basis in Sec. 4.4.

4.3.1 Shallow Aquifer

4.3.1.1 Geology

Fig. 4-7 shows the location of seven cross sections (Figs. 4-8 through 4-14) which have been prepared using lithologic information collected during the drilling and installation of the shallow monitor wells. These cross sections show the site to be underlain primarily by silty sand and extensive but discontinuous layers of silty clay and silty sandy clay which dip toward the south-southwest. The southwestern side of HPIA (Section D-D′, Fig. 4-11) is covered by a shallow 1- to 2-ft layer of peat which reflects the lesser developed state of this area. Other peat-covered areas, common in coastal marshland environments, may have been present in the past, but would have been removed during development. Additionally, a deeper layer of sand peat was identified in borehole HPGW24 at a depth of approximately 18 ft BLS (Section E-E′, Fig. 4-12). Marl, a combination of calcium carbonate mud and clay, was identified in two boreholes (HPGW4 and HPGW21).

4.3.1.2 Groundwater Movement

A potentiometric map for the shallow aquifer (Fig. 4-15) was prepared using water-level measurements collected on April 15, 1987. Well survey information and water level data are presented in App. K. Depth to water ranged from 6.17 ft BLS in Well HPGW26 to 22.36 ft BLS in Well HPGW1. In general, the shallow groundwater flows toward the New River, with direction of flow ranging from the south-southwest in the northern corner of HPIA to the west-southwest in the southwestern half of HPIA. Slight groundwater mounding can be seen in the west-central section of

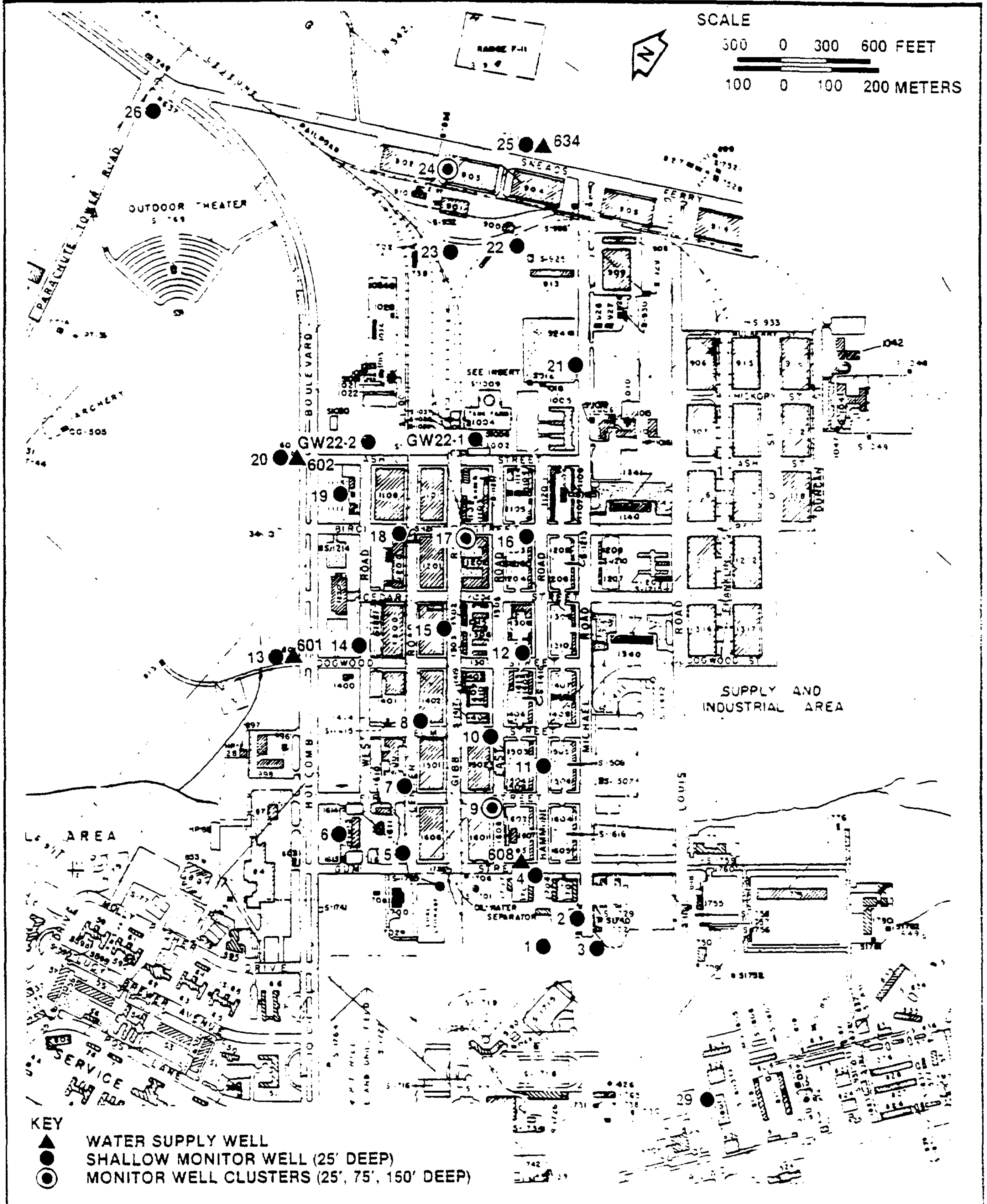

Figure 4-6
LOCATION OF MONITOR WELLS AT HADNOT POINT INDUSTRIAL AREA INSTALLED AFTER SOIL GAS INVESTIGATION
SOURCE: ESE, 1987.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

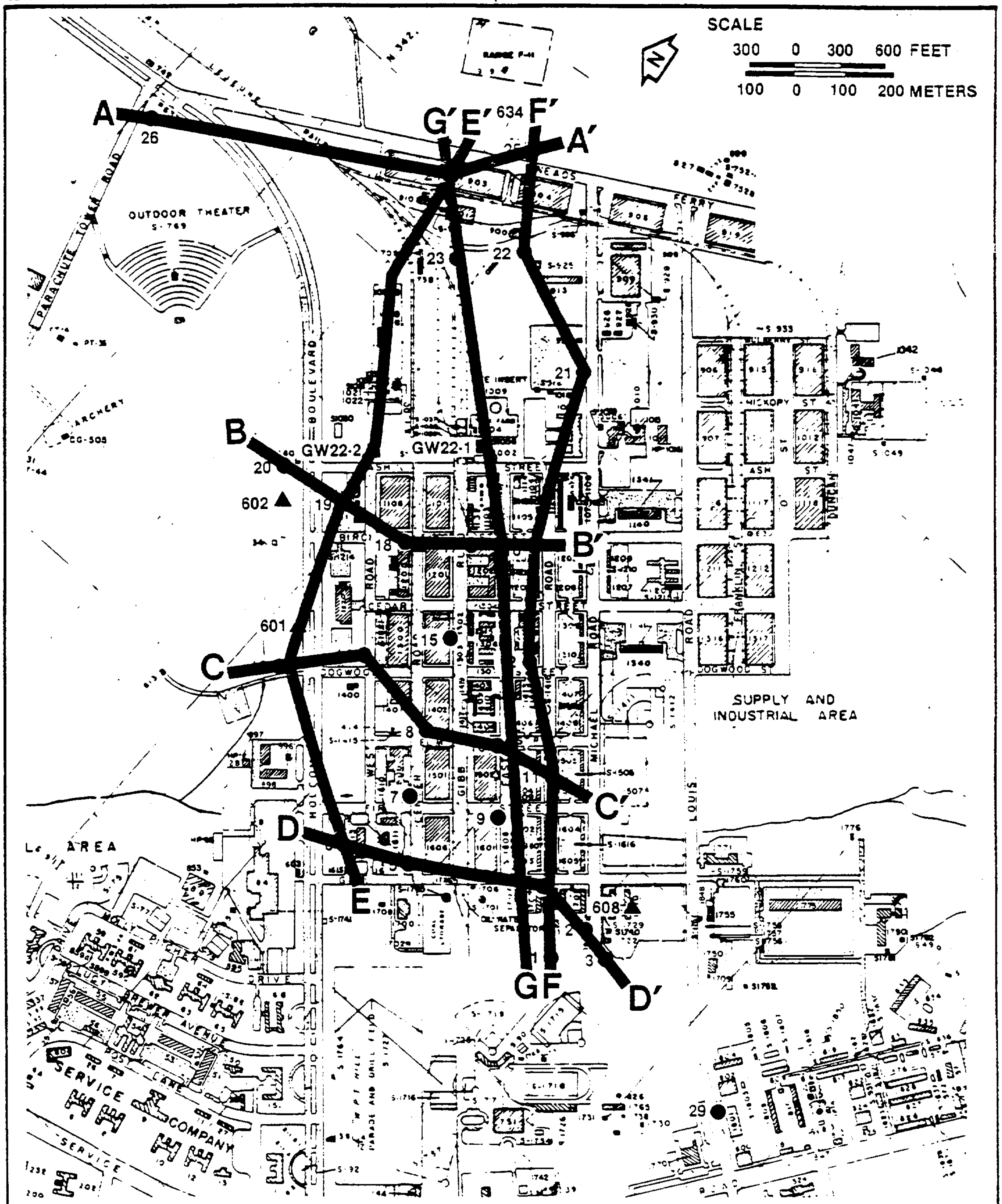

Figure 4-7
LOCATION OF CROSS SECTIONS AT
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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MARINE CORPS BASE
CAMP LEJEUNE

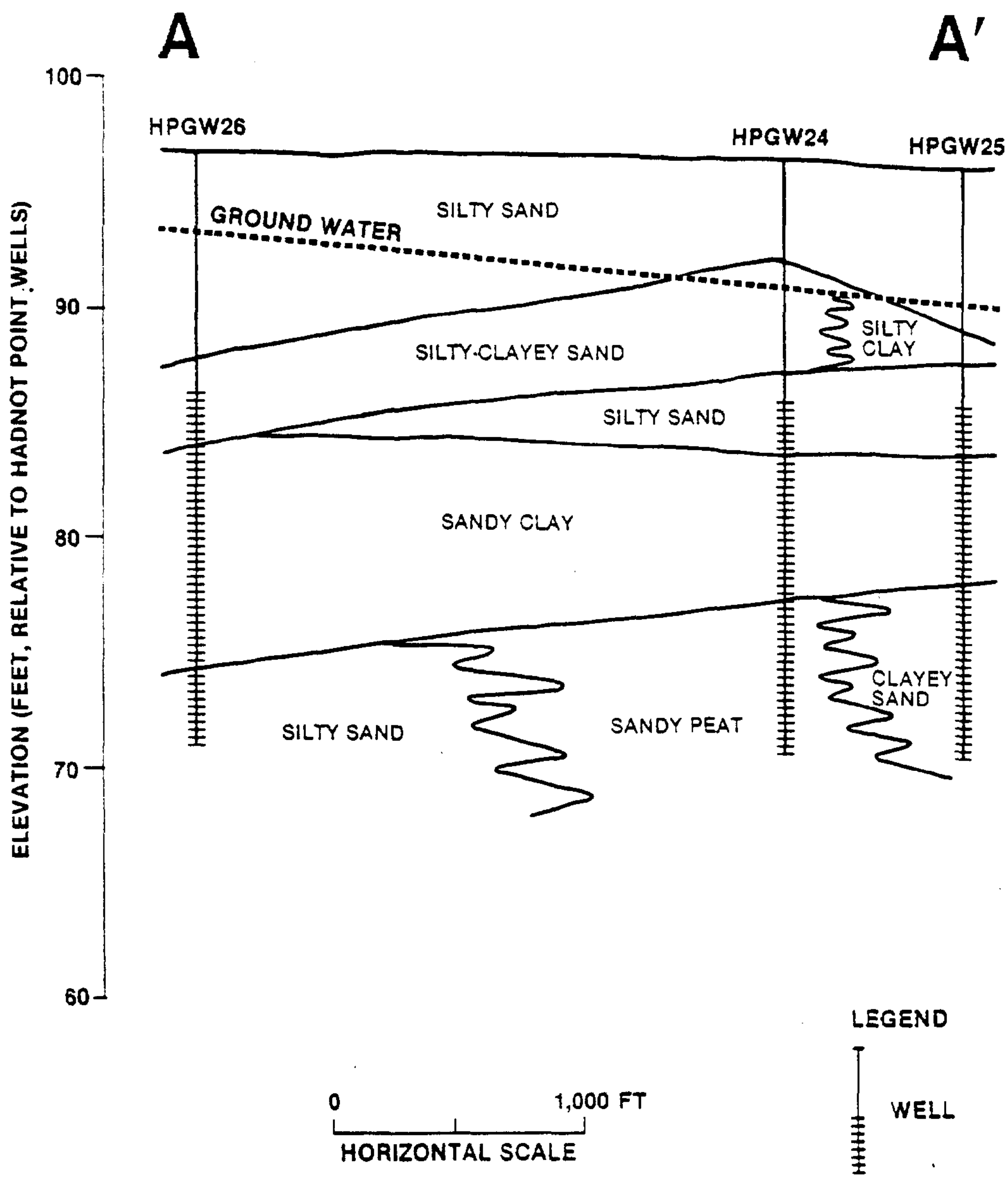

Figure 4-8
GEOLOGIC CROSS SECTION A—A′
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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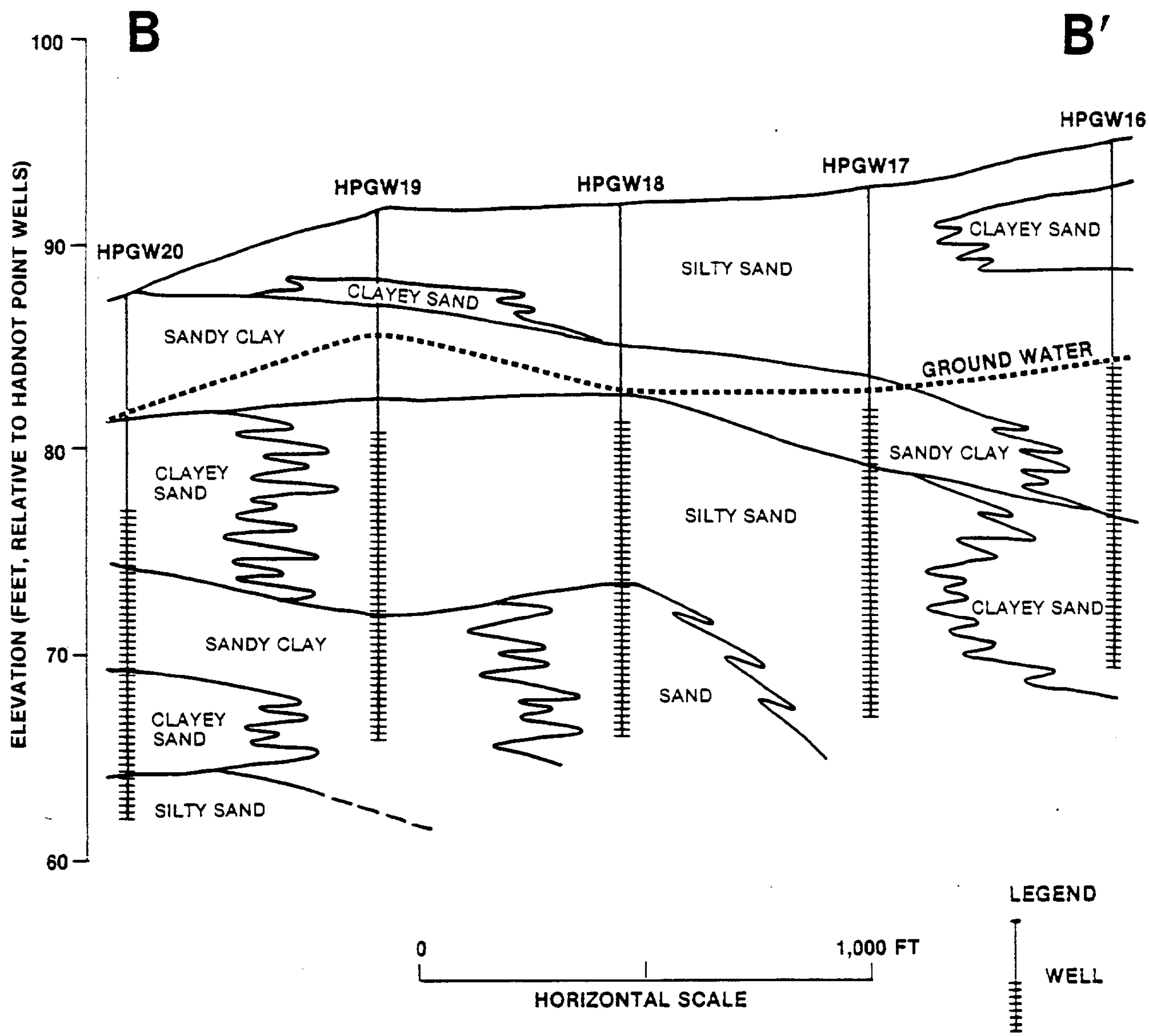

Figure 4-9
GEOLOGIC CROSS SECTION B—B′
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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MARINE CORPS BASE
CAMP LEJEUNE

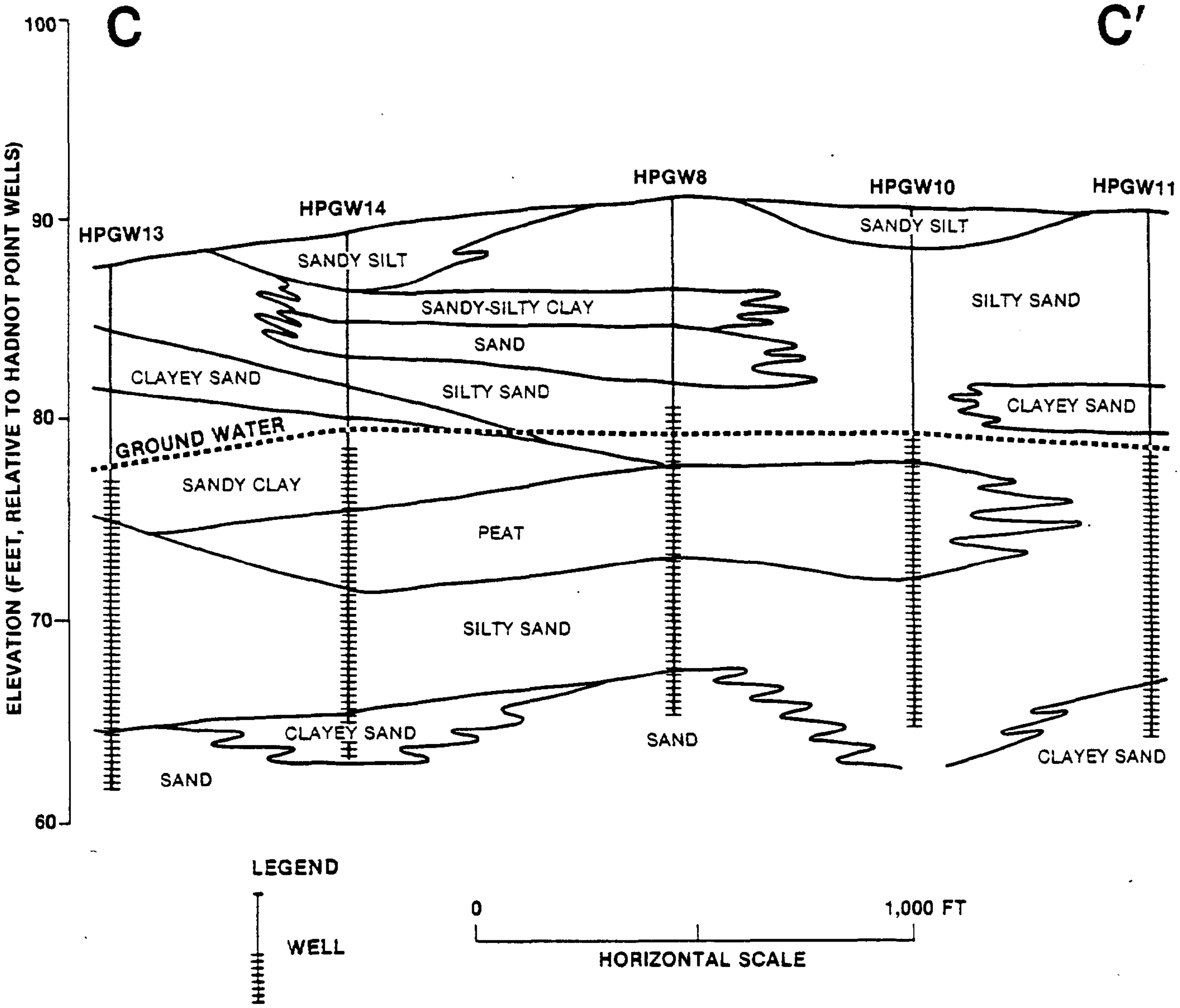

Figure 4-10
GEOLOGIC CROSS SECTION C—C′
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

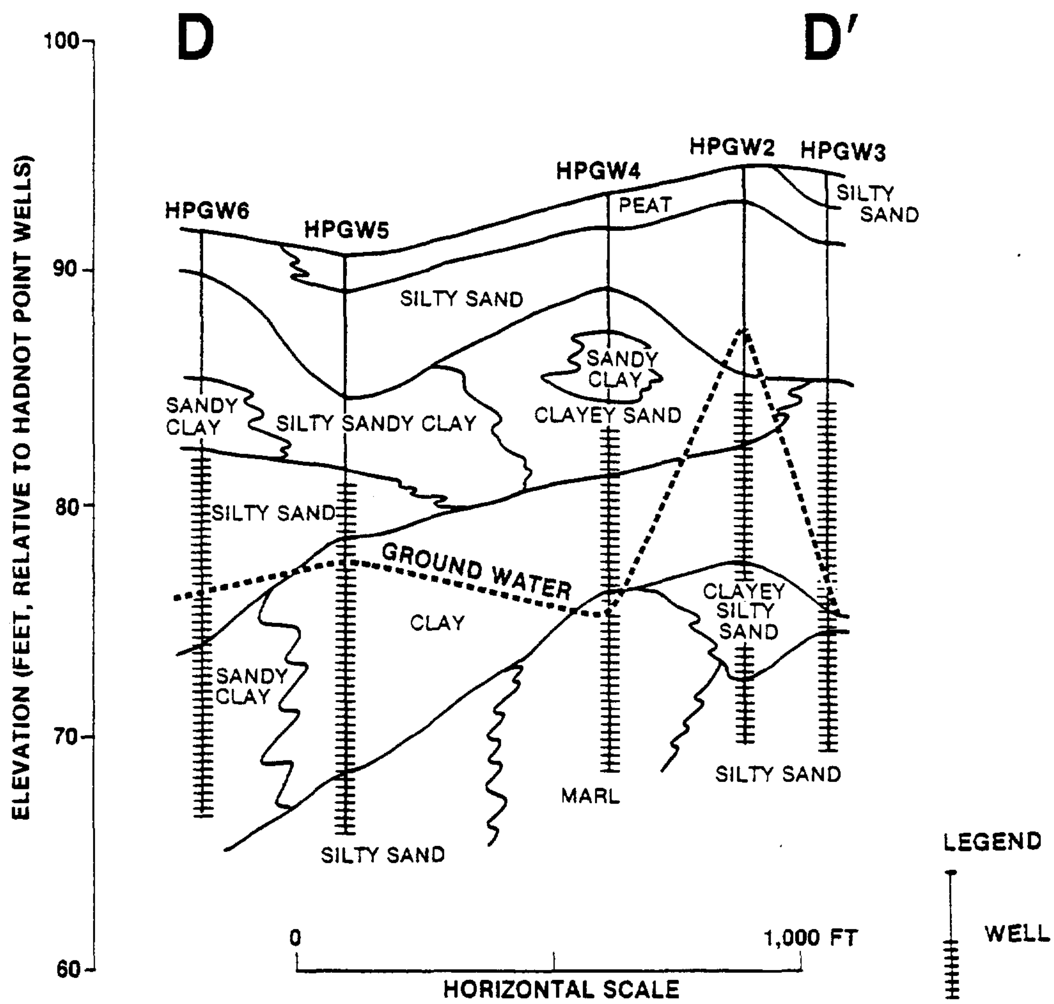

Figure 4-11
GEOLOGIC CROSS SECTION D—D'
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

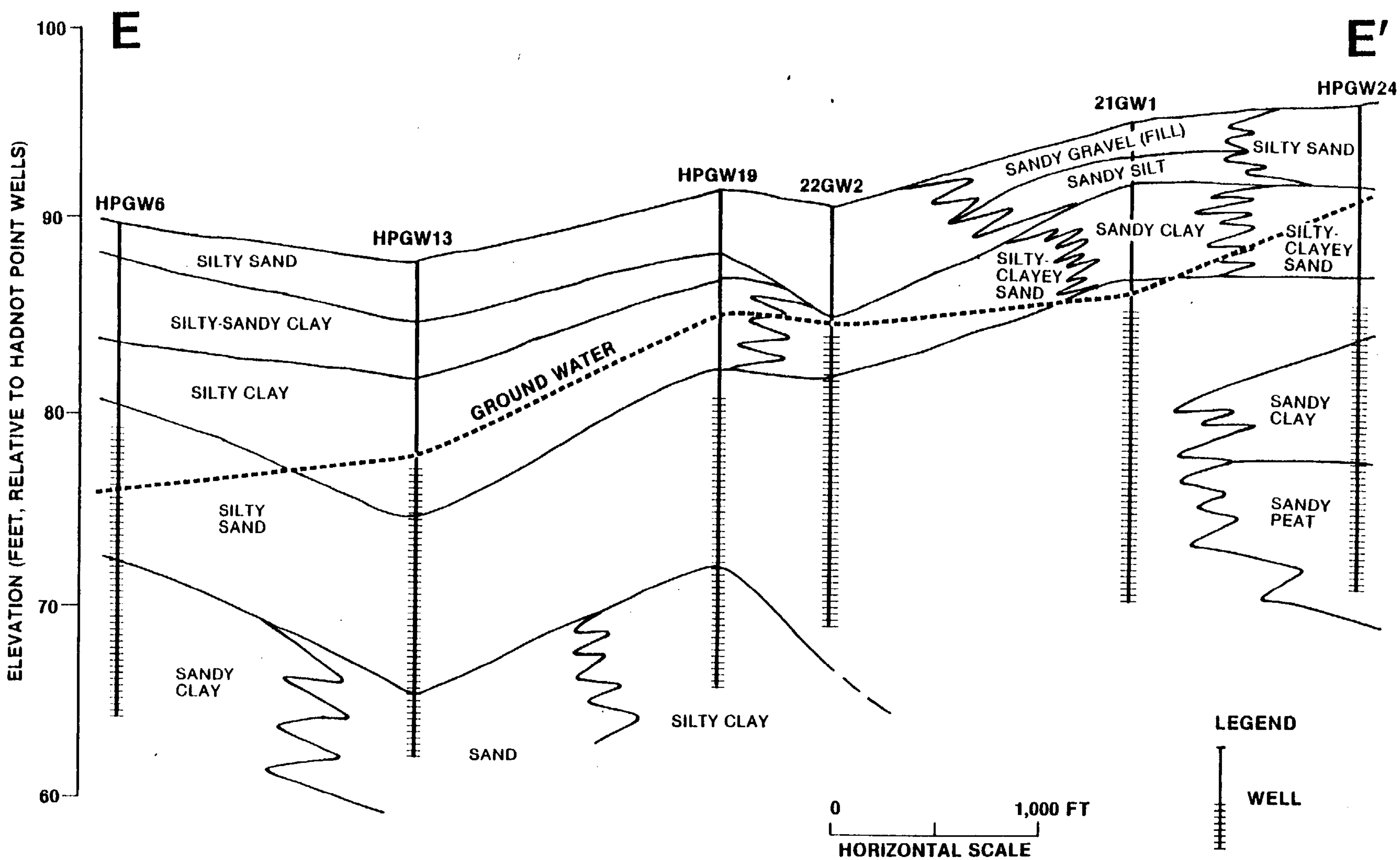

Figure 4-12
GEOLOGIC CROSS SECTION E—E′
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

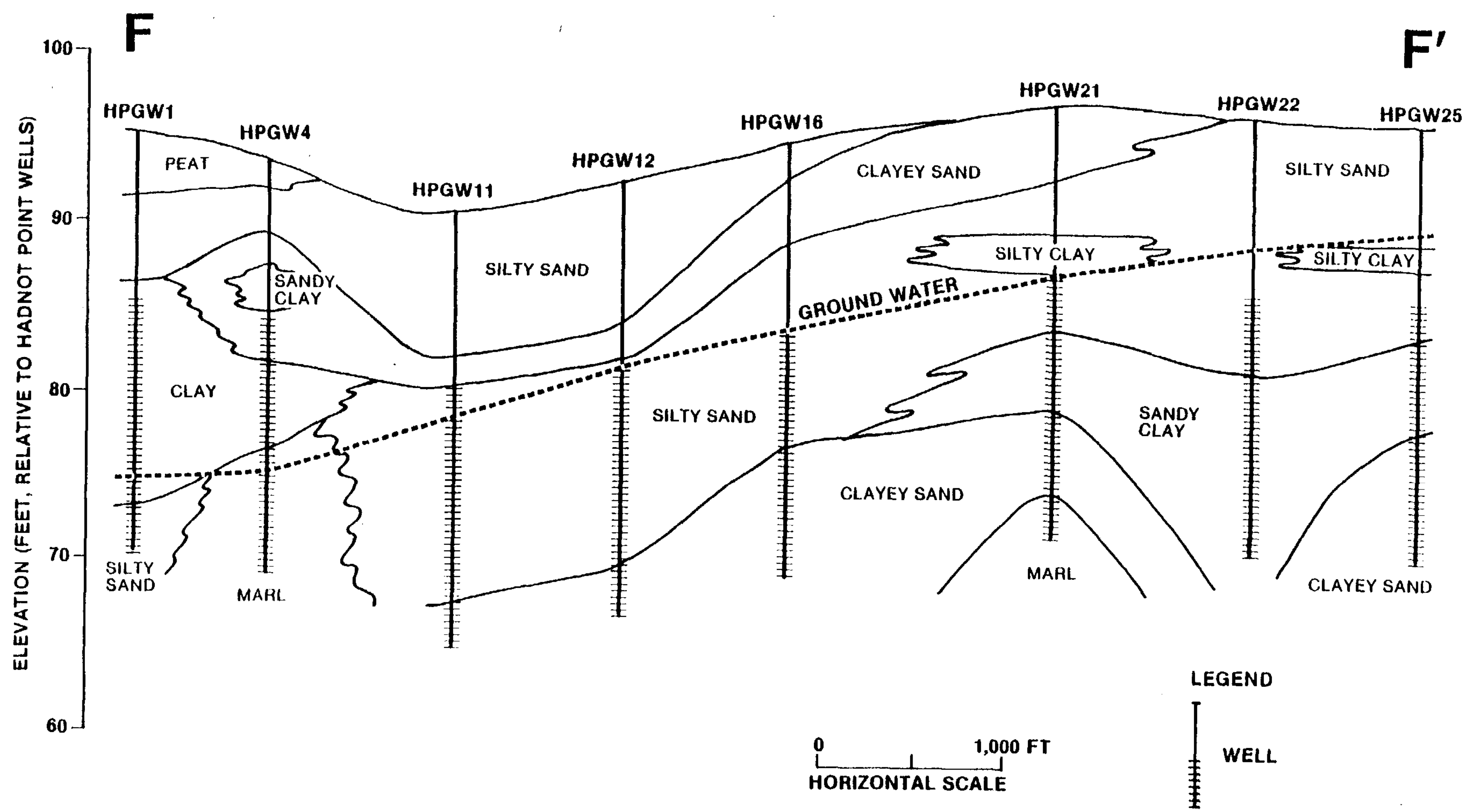

Figure 4-13
GEOLOGIC CROSS SECTION F—F'
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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MARINE CORPS BASE
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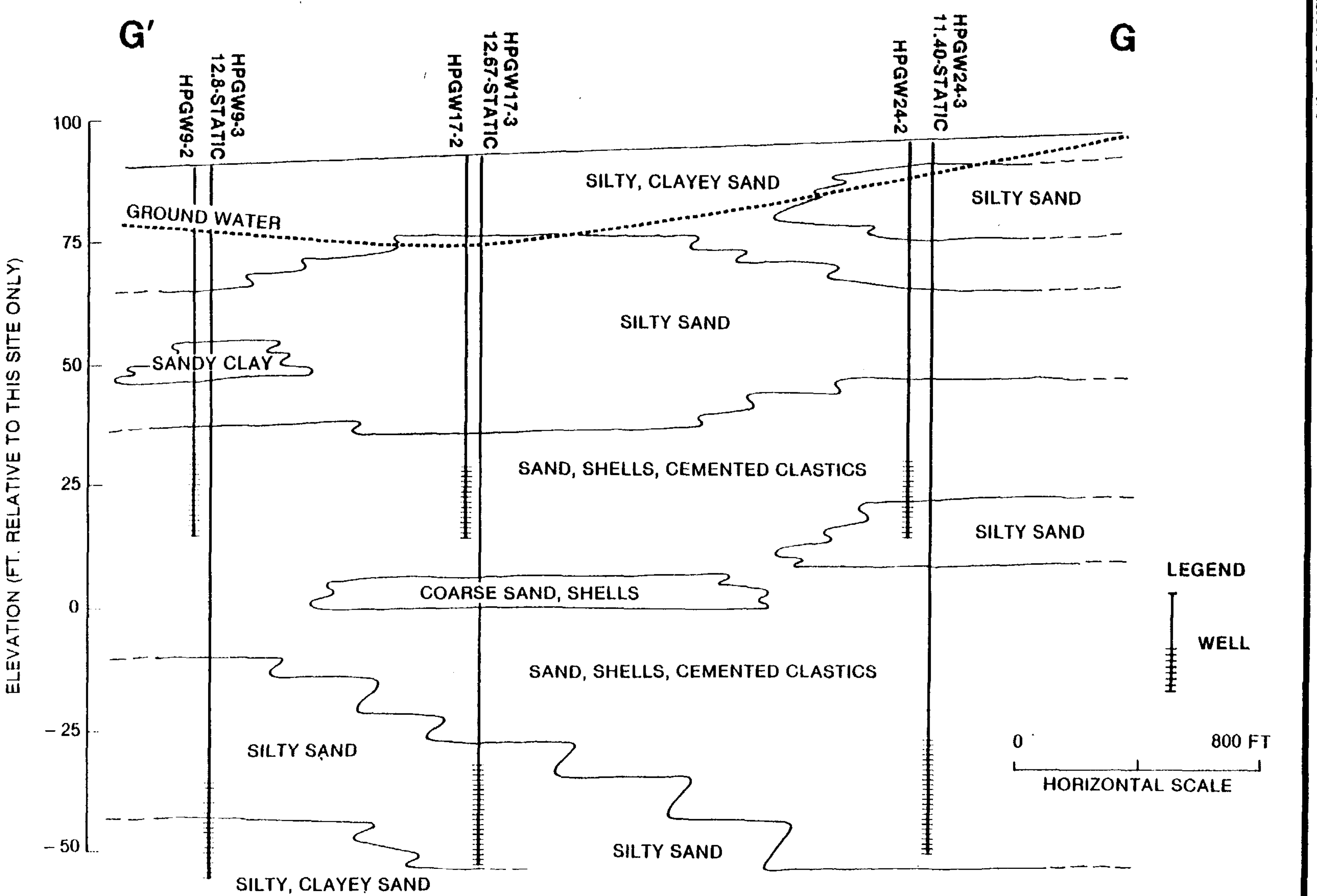

Figure 4-14
GEOLOGIC CROSS SECTION G—G'
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

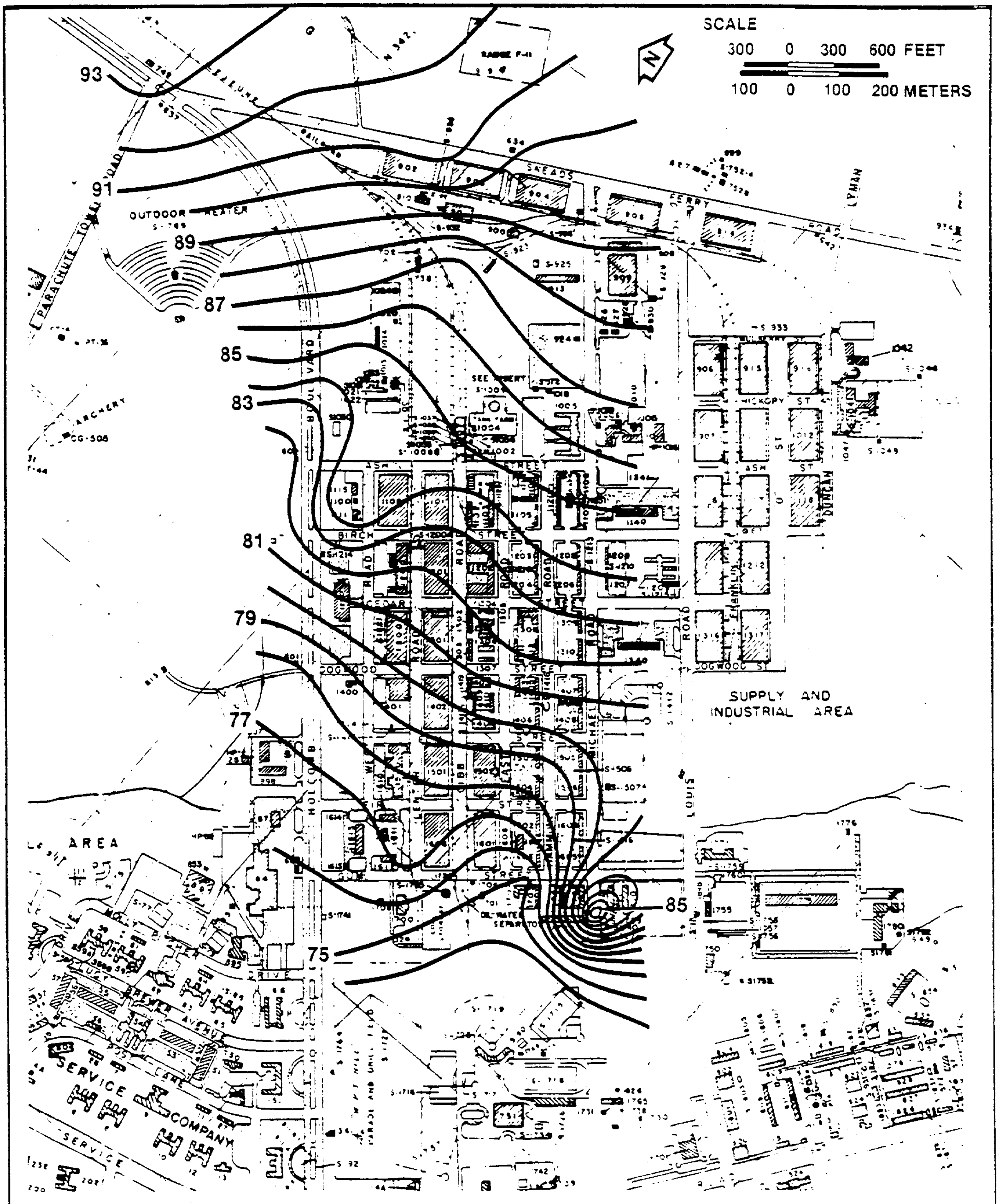

Figure 4-15
POTENTIOMETRIC SURFACE, SHALLOW AQUIFER
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

HPIA, and a larger mound can be seen in the southeastern corner of HPIA. This mounding may be due to increased surface infiltration in the west-central section and a reflection of surface water (drainage ditch) in the south section. The average groundwater gradient is 0.20 feet per foot (ft/ft).

4.3.2 Deep Aquifer

4.3.2.1 Geology

One cross section (G-G', Fig. 4-14) was prepared using lithological information collected from the six deeper wells (75 to 150 ft). This section shows the silty sand, sandy clay layer continued to a depth of approximately 50 ft BLS, where a zone of sand, shells, and cemented clastics is encountered. This zone ranged in thickness from approximately 35 ft in HPGW9-3 to greater than 80 ft in HPGW24-3. This unit was underlain by silty sand and silty clayey sand.

4.3.2.2 Groundwater Movement

The water levels in the deeper wells are similar to those observed in the shallow wells, ranging from 11.40 ft BLS in HPGW24-3 to 12.8 ft BLS in HPGW17-3. There is not enough information available to prepare a potentiometric map for the deeper aquifer, but groundwater flow would be expected to be toward the Atlantic Ocean (east, southeast). Pumping of domestic and industrial wells completed in this zone may cause regional differences in the flow direction.

4.3.3 Aquifer Pump Test

An aquifer pump test was performed on the deep aquifer at HPIA. Existing Water Supply Well No. 642 was selected as the pumped well because it was the closest active well to HPIA which was not actually within the zone of deep groundwater contamination. Use of this well eliminated the need to dispose of large quantities of contaminated groundwater generated during the test. In addition, the existing well log for Well 642 indicated that the subsurface materials were typical of those encountered throughout HPIA. This ensured that the aquifer parameters quantified by the pump test would be representative of HPIA as a whole. Three observation wells provided drawdown data for analyses. These three wells included an existing USGS observation well, located 90 ft from the pumping well; observation well No. 642-1, located 200 ft from the pumping well; and observation well No. 642-2, located 300 ft from the pumping well. The location of the wells used in the analyses are shown in Fig. 4-16.

The sequence of geologic materials at HPIA begins with an interval of sands approximately 30 ft thick, which overlies a clay and sandy clay layer. The clayey interval is discontinuous throughout the area and variable in thickness. Each of the boring logs for all monitor and observation wells installed in the northern area of HPIA was reviewed to determine the thickness of the clay-rich layer underlying the shallow aquifer. Variability of thickness was noted across the area, and an average value of 17 ft was used in all calculations. Below the clayey interval, the remainder of the material of interest consists of sand and limestone with minor amounts of silt, silty sand, and rock.

The presence of water within this sequence of geologic materials creates two aquifers separated by the clayey interval. From the surface of the shallow groundwater (which occurs at a depth of 12 ft BLS in Well 642), to the top of the clayey interval, an unconfined aquifer is present in the near-surface sands. The regional literature indicates that the clayey interval acts as a semiconfining unit retarding flow between the unconfined aquifer above and a semiconfined aquifer present in the sand and limestone below. The sand and limestone aquifer was assumed to extend to the base of the freshwater system, a depth of approximately 300 ft below mean sea level (NEESA, 1983).

4.3.3.1 Well Construction

The wells used for the pump test and analyses provided data concerning the sand and limestone aquifer. A construction log of pumping well No. 642 was provided to ESE by Camp Lejeune. The well is similar to other supply wells at Camp Lejeune, which are approximately 6-inch

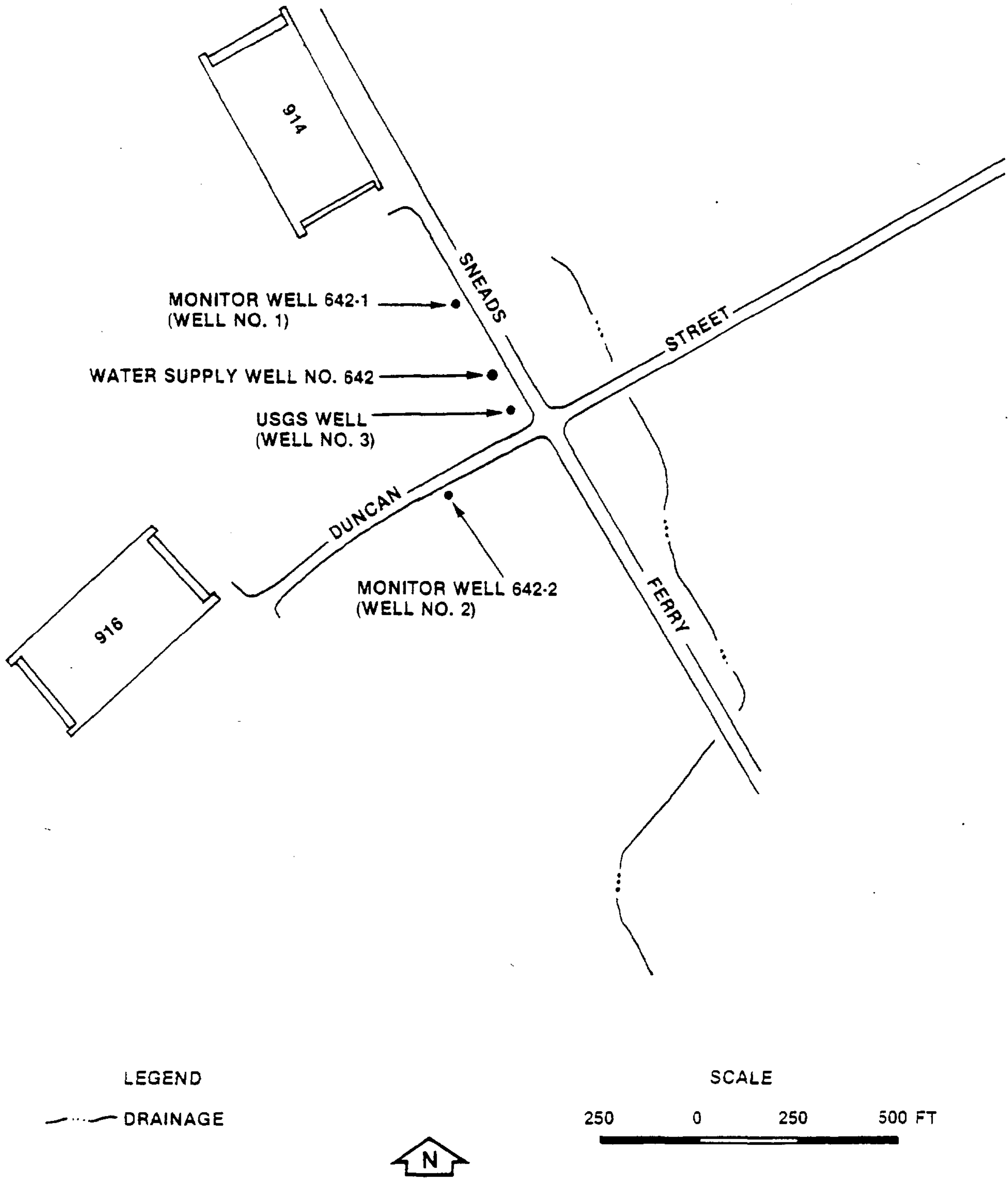

Figure 4-16
LOCATION OF CAMP LEJEUNE PUMP TEST
IN HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

inside diameter (ID) and 200 ft deep. These wells are screened to produce water from the intermittent sand and limestone aquifer.

Wells No. 642-1 and 642-2 were constructed under the direction of ESE, specifically to monitor the sand and limestone aquifer during a pump test. The wells were drilled at distances of 200 ft and 300 ft, respectively, from the pumping well. These distances were determined after review of the available geohydrologic information for the sand and limestone aquifer. As a common practice, pump test observation wells are installed at distances related to multiples of the aquifer thickness. The greater the distance from the pumped well that an observation well is installed, the more the aquifer parameters derived from that observation well are representative of the aquifer as a whole. However, at some distance from the pumped well, drawdown may no longer be measurable in the observation well. Review of the data for the sand and limestone aquifer, conducted with the USGS in Raleigh, NC, strongly suggested that drawdown at distances greater than 2 times the aquifer thickness (i.e., 2 times 200 ft) would not be measurable. As a result, two observation wells were installed at distances equal to 1.0 and 1.5 times the aquifer thickness. Each observation well was drilled to a depth of 200 ft and screened continuously from 100 ft to 200 ft (i.e., similar to the existing water supply wells). Well No. 642-1 is designated Well 1; Well No. 642-2 is designated Well 2.

The third well used for the analyses is an existing USGS observation well. This well is 90 ft deep and assumed to be screened over the lower portion of the well. The USGS well is designated Well 3.

4.3.3.2 Pump Test Procedures

The pump test started at 11:36 a.m. on April 13, 1987. A pumping rate of 85 gallons per minute (gpm) from pumping well No. 642 was maintained for a period of 42.96 hours (2,577.6 minutes). Prior to the start of the test, during the pumping period, and during the recovery period, water levels were measured both with pressure transducers and hand measurements. In Situ® pressure probes and a data logger were used in the Observation Wells No. 1, 2, and 3 to record water levels. Measurements of water level by the USGS wetted-tape method were also made in the 3 wells mentioned above and in 11 other wells in the immediate vicinity of the pump test. For the most part, the data obtained by the pressure transducers were used for the analyses. Ninety-four minutes into the test, the pressure transducer monitoring the water level in the USGS well (Well No. 3) malfunctioned, and water levels as recorded by the data logger appeared to rise in this well. Hand measurements indicated the water level continued to decline. The early-time data analyzed for Well No. 3 were recorded by the data logger; after 94 minutes, data from Well No. 3 used for the analysis were recorded by the ESE field team.

A decision was made to discontinue pumping based on observations that drawdown levels had reached a steady-state condition. At 5:32 a.m. on April 15, 1987, the pumping well was turned off and recovery of the aquifer was monitored for 10.68 hours (641.25 minutes). Recovery was terminated when recharge from a rainstorm caused water levels to rise above initial static water levels.

4.3.3.3 Pump Test Analysis Methods

Analyses of the drawdown and recovery data generated by the pump test were performed by ESE. All analytical techniques are most accurate if the actual field conditions parallel the assumptions utilized in the derivation of the techniques. Actual field conditions rarely are identical to these assumptions. As a result, a wide range of analytical techniques was utilized to evaluate if any one technique biased the results to a measurable extent. Drawdown data were analyzed for values of aquifer transmissivity and storage coefficient by methods developed by Theis (1935), Hantush and Jacob (1955), and Walton (1962). The data were also analyzed by the distance-drawdown method developed by Cooper and Jacob (1946). The methods of Hantush and Jacob (1955) and Walton (1962) were also used to evaluate properties of the semiconfining layer.

The first three methods interpret the aquifer parameters from logarithmic plots of the drawdown data as compared to type curves based on ideal conditions. The distance drawdown method is a semi-logarithmic straight-line data plot in which the slope of the straight line is characteristic of the aquifer.

The recovery data were analyzed by the recovery method and the residual drawdown method. These are both semi-logarithmic straight-line methods based on the equations developed by Cooper and Jacob (1946).

Pumping well efficiency was evaluated. This was done by considering the actual specific capacity of the well as compared to that which would be possible if the well were theoretically 100-percent efficient.

Evaluation of the effects of tidal fluctuations on the drawdown data was made by examining the plots of drawdown versus time, and also water-level data during the pump test from background wells. The plotted pump test data represent smooth curves which do not show any variability associated with tidal effects. The background well data indicate that the maximum total cyclic fluctuation observed was 0.2 ft. Based on adjustment to a central level, a maximum correction for tidal fluctuations would be 0.1 ft, with most corrections being less than 0.1 ft. As the plotted data do not show any variability because of tidal fluctuations, and the correction would be 0.1 ft or less, no corrections to the drawdown data were made.

Theis Method

The Theis method is a classical method of drawdown analysis which was developed by Theis in 1935. The method of analysis is based on certain assumptions concerning the configuration and character of the aquifer, most importantly that the aquifer is confined. The assumptions can be found in most texts describing the method including Driscoll (1986), Freeze and Cherry (1979), and Lohman (1972).

Even though many of the assumptions were violated at Camp Lejeune, the method can still be used to obtain a reasonably reliable estimate of the aquifer parameters. The Theis analysis was performed with the aid of computer software. The particular computer program that was used plotted the data on a log-to-log scale, chose the best-type curve match, and calculated values for the aquifer parameters of transmissivity and storage coefficient, The computer-generated data plot, type curve matches, and calculated parameters based on the Theis method for Wells No. 1, 2, and 3 are shown in Fig. 4-17.

Hantush-Jacob Method

The Hantush-Jacob (1955) method is similar to the Theis method in that the data plot is compared to type curves to arrive at values for the aquifer parameters. The Hantush-Jacob method differs in that the equations and type curves were developed for a leaky, semiconfined aquifer, an aquifer which receives water by leakage through an overlying, semiconfining layer. As the clayey interval overlying the sand and limestone aquifer at Camp Lejeune is discontinuous and non-uniform, it can be considered a leaky semiconfining layer. The Hantush-Jacob method would potentially yield the most accurate values for the aquifer parameters, as the method interprets a hydrogeologic system similar to the system at Camp Lejeune. The Hantush-Jacob analysis was also performed with the aid of computer software. Results of the Hantush-Jacob analysis for Wells No. 1, 2, and 3 are shown in Fig. 4-18.

Walton Method

The Walton (1962) method was applied to the data, with the best fit-type curve being chosen by the visual inspection as a check on the computer-generated values. Walton's method is based on the same equations for a leaky semiconfined aquifer system developed by Hantush and Jacob (1955) and expanded on by Hantush (1956). Walton developed and published the type curves based on Hantush's calculations. The data plots, type-curve

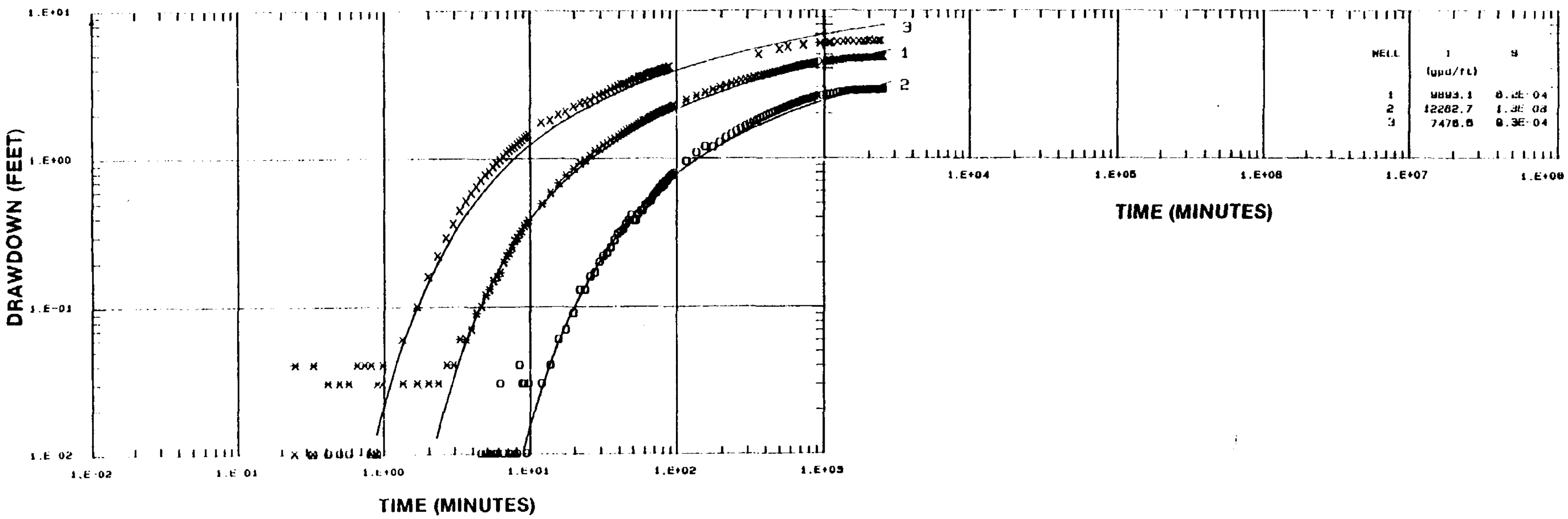

Figure 4-17
OBSERVATION WELLS NO. 1, 2, AND 3 — THEIS METHOD
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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MARINE CORPS BASE
CAMP LEJEUNE

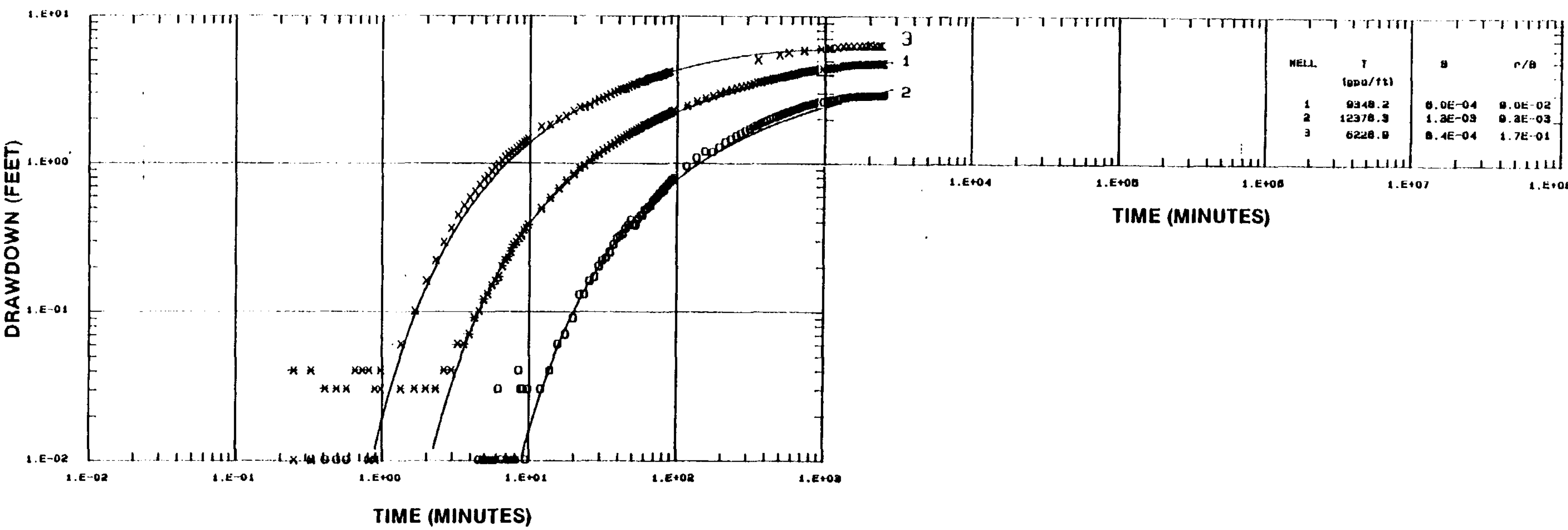

Figure 4-18
OBSERVATION WELLS NO. 1, 2, AND 3 — HANTUSH-JACOB METHOD
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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match, and associated calculations for the Walton method for Wells No. 1, 2, and 3 are shown in Fig. 4-19.

Distance-Drawdown Method

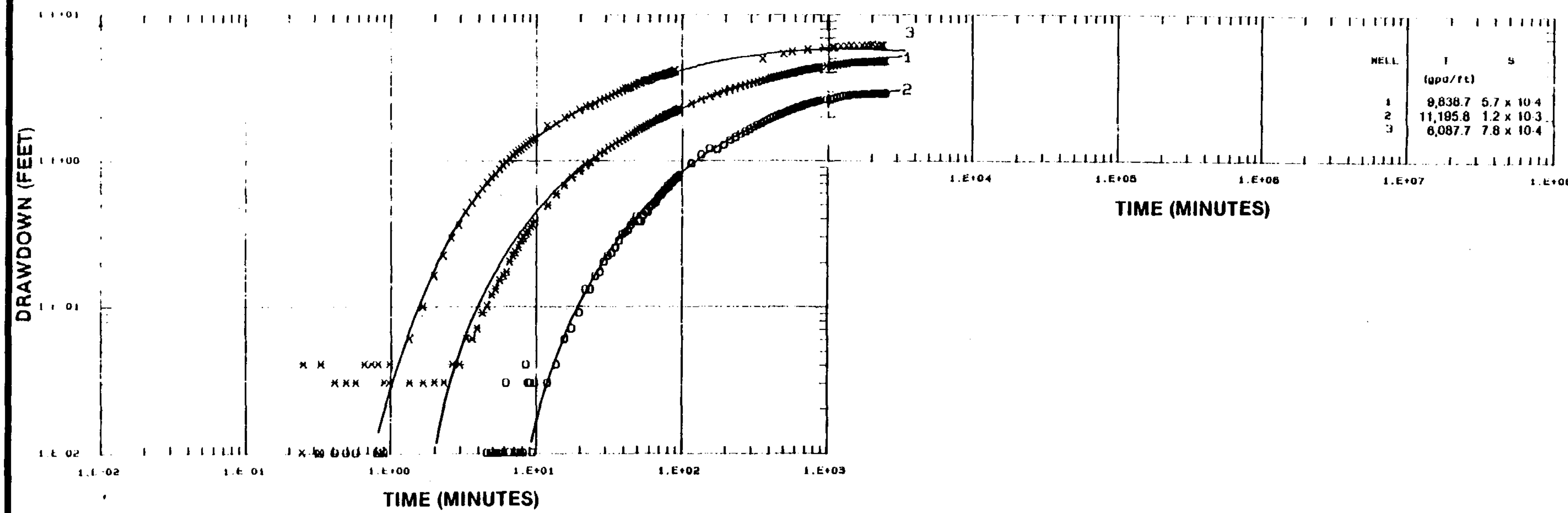
The distance drawdown method, based on the Theis solution, was developed by Cooper and Jacob (1946) utilizing semi-log plots of the drawdown data. The method requires plotting of drawdown values from two or more wells taken at the same time during the pump test. For the Camp Lejeune analyses, drawdown data at the end of the test from Wells No. 1, 2, and 3 were plotted and analyzed by the distance-drawdown method. The distance-drawdown analysis calculations are shown in Fig. 4-20.

Recovery Method

The recovery method is another straight-line analysis method based on the Theis solution. To determine the recovery, time versus drawdown and recovery is plotted on arithmetic scale. Recovery is calculated as the difference between extrapolated time-drawdown data (s) and the actual recovering water-level curve data (s'). The recovery data calculated in this way are plotted on a semi-log scale, and the best straight line is drawn through the points. The slope of this line and the intercept of the line with the zero-drawdown axis are used to calculate aquifer transmissivity and storage coefficient. Data plots and calculations by the recovery method are shown in Figs. 4-21 through 4-26.

Residual-Drawdown Method

The residual-drawdown method is a similar method of analysis to the recovery method. Residual drawdown (s'), which is the difference between the recovering water level and the static water level, is used instead of calculating recovery. Another difference is that for the time axis of the plot, the ratio of t/t' is used, where t is time since pumping started and t' is time since pumping stopped. This ratio results in a dimensionless number. Transmissivity is calculated based on the slope of the best-fit straight line through the residual-drawdown data, although



4-33

Figure 4-19
OBSERVATION WELLS NO. 1, 2, AND 3 — WALTON METHOD
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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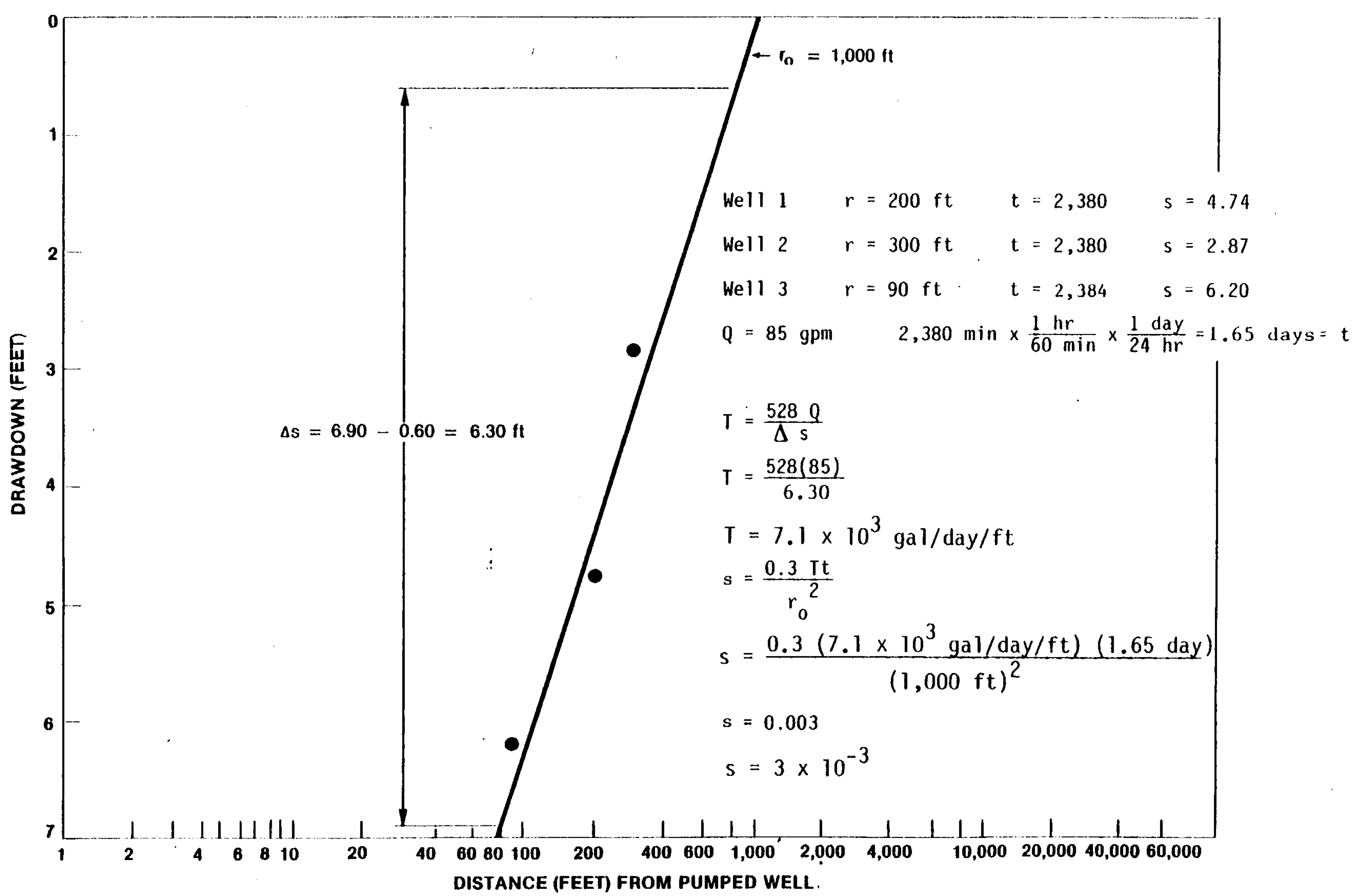

Figure 4-20
DISTANCE DRAWDOWN — END OF TEST
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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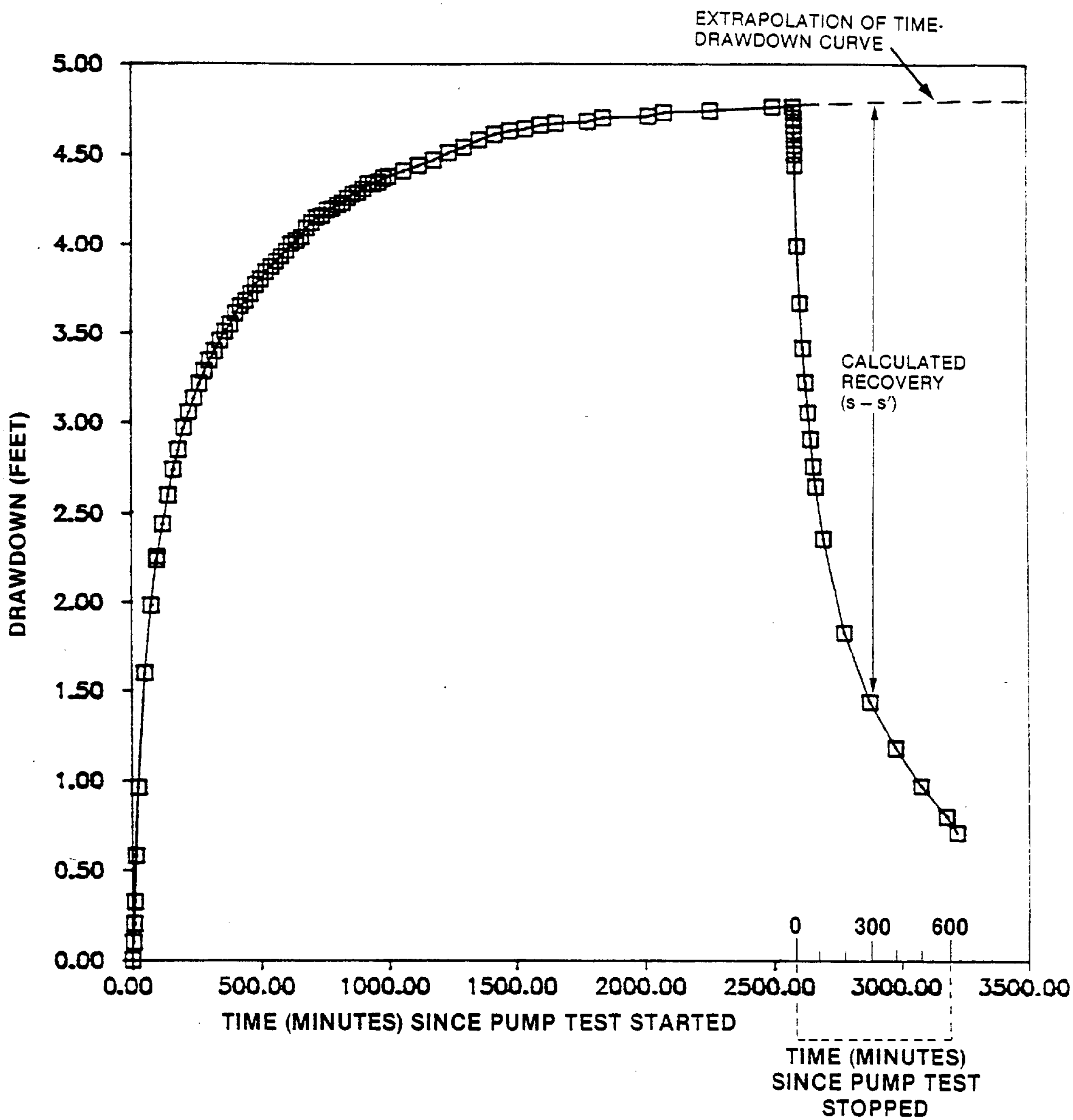

Figure 4-21
DRAWDOWN-RECOVERY — WELL NO. 1
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE. 1987.

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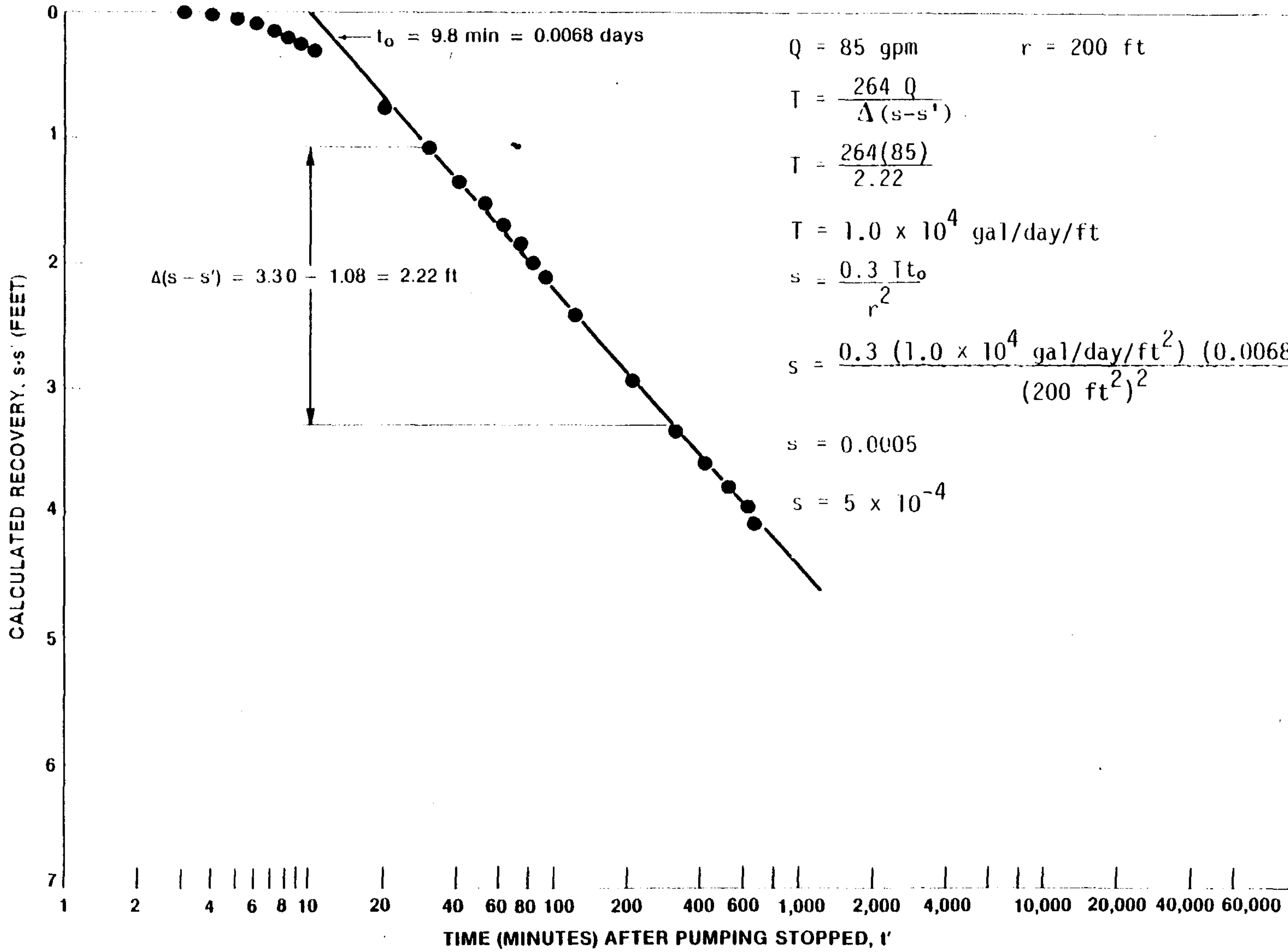
MARINE CORPS BASE
CAMP LEJEUNE



Q = 85 gpm r = 200 ft

$$T = \frac{264\ Q}{\Delta(s-s')}$$

$$T = \frac{264(85)}{2.22}$$

$$T = 1.0 \times 10^4 \text{ gal/day/ft}$$

$$S = \frac{0.3\ Tt_o}{r^2}$$

$$S = \frac{0.3\ (1.0 \times 10^4 \text{ gal/day/ft}^2)\ (0.0068 \text{ day})}{(200 \text{ ft}^2)^2}$$

$$S = 0.0005$$

$$S = 5 \times 10^{-4}$$

Figure 4-22
RECOVERY METHOD — WELL NO. 1
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987

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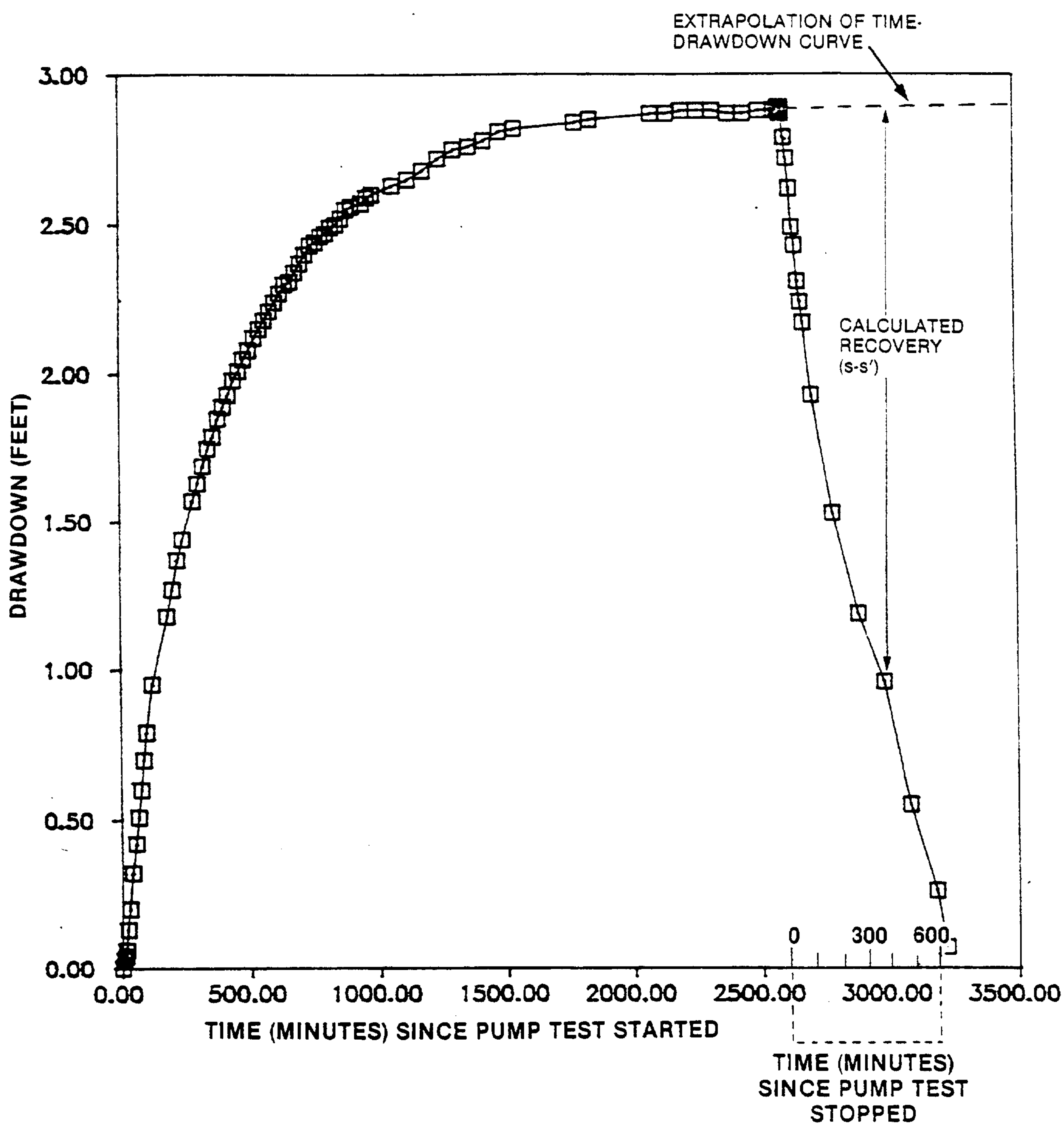

Figure 4-23
DRAWDOWN-RECOVERY — WELL NO. 2
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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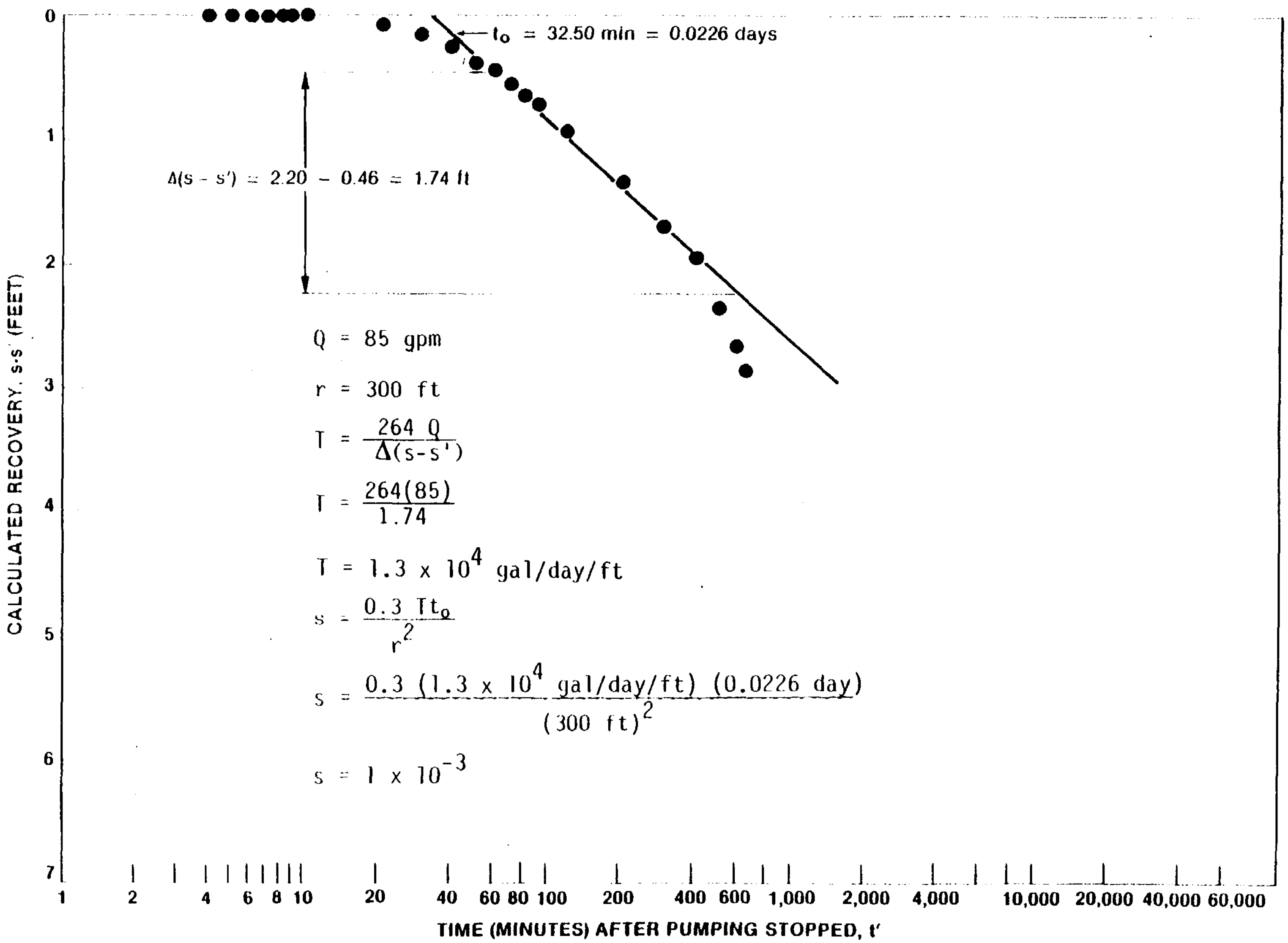

Figure 4-24
RECOVERY METHOD — WELL NO. 2
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987.

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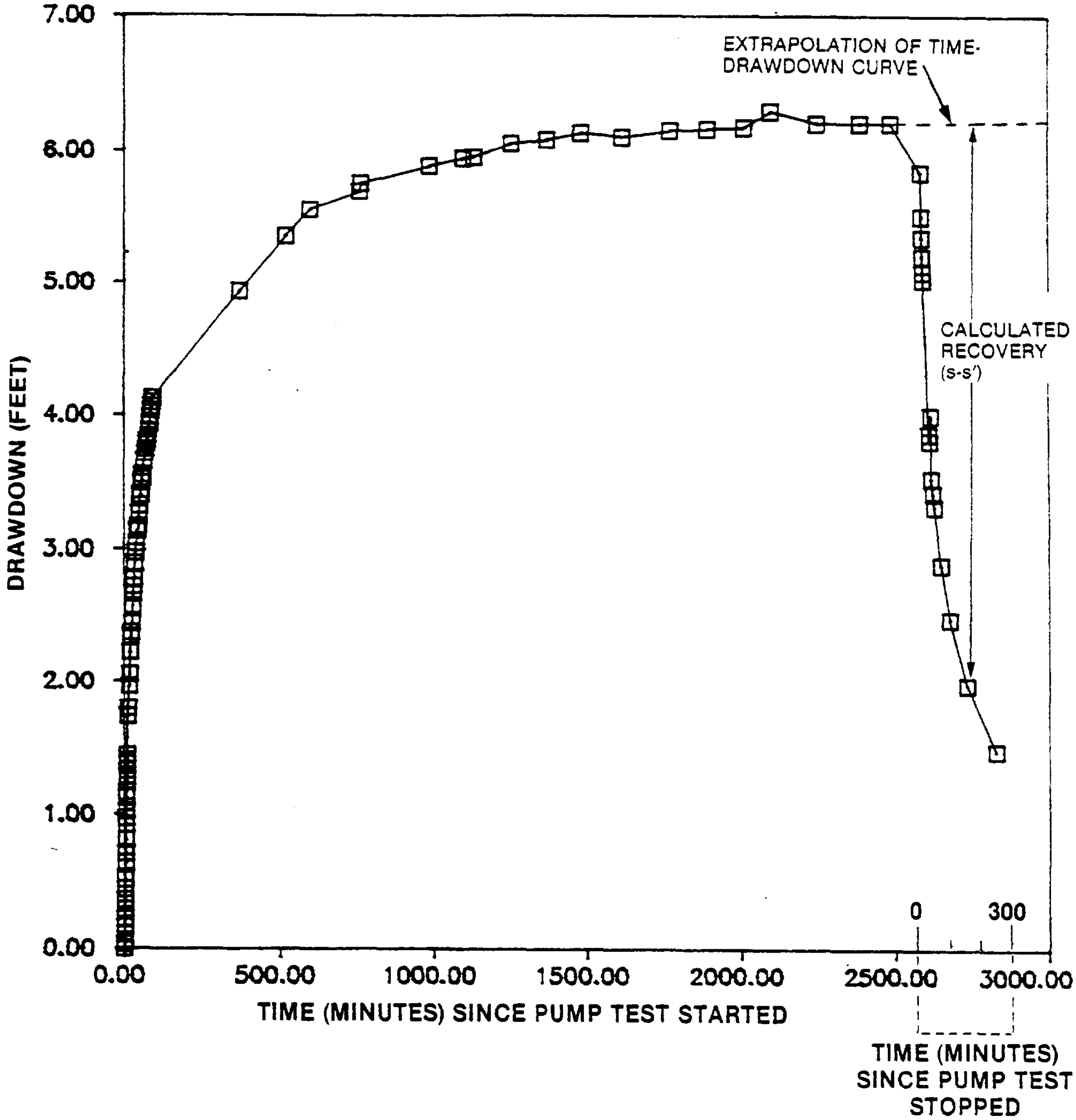

Figure 4-25
DRAWDOWN-RECOVERY — WELL NO. 3
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE. 1987.

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CAMP LEJEUNE

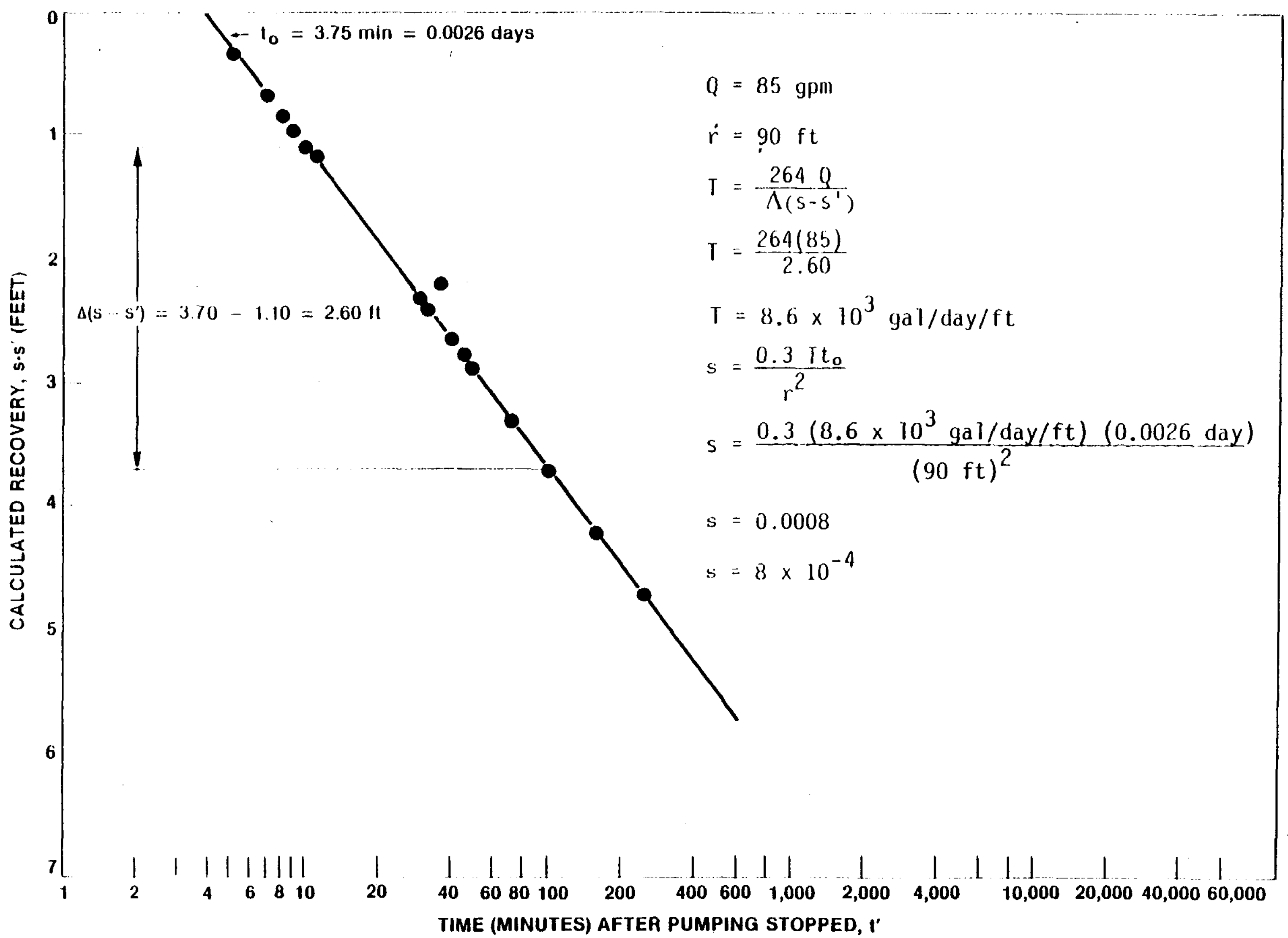

Figure 4-26
RECOVERY METHOD — WELL NO. 3
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987

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storage coefficient cannot be calculated by this method because of the dimensionless-time axis.

The point on the residual-drawdown plot where the straight line intercepts the zero drawdown axis can be used for a qualitative evaluation of aquifer characteristics. In theory, the rate of aquifer recovery should be identical to the rate of aquifer drawdown, if the pumping rate was constant throughout the test. In this situation, the residual-drawdown plot should be a straight line which intercepts the zero-drawdown axis at $t/t' = 1$. If the straight-line intercept with the zero axis occurs at a t/t' value of 2 or more, recharge to the aquifer is indicated. If the straight-line intercept still indicates a foot or more of drawdown in the aquifer at $t/t' = 1$, the aquifer is indicated to be limited in extent and not receiving recharge (Driscoll, 1986). The residual-drawdown method was utilized for all three observation wells. The data and results are plotted in Figs. 4-27 through 4-29.

4.3.3.4 Results of Pump Test Analyses

The results of the pump test analyses at Camp Lejeune for transmissivity and storage coefficient and leakage properties using various methods are all in agreement. The results indicate a consistency of values obtained for each well and for the aquifer.

Transmissivity

The values of transmissivity are shown in Table 4-2. Values of transmissivity average 9.6×10^3 gallons per day per foot (gpd/ft), ranging from a low of 6.1×10^3 gpd/ft in Well No. 3 to a high of 1.3×10^4 gpd/ft in Well No. 2. The values consistently show Well No. 3 has the lowest transmissivity and Well No. 2 has the highest, with Well No. 1 being closest to average.

Values of transmissivity will vary to some extent from well to well depending on the geologic materials surrounding the particular well. From the analyses results, Well No. 2 is apparently surrounded by more

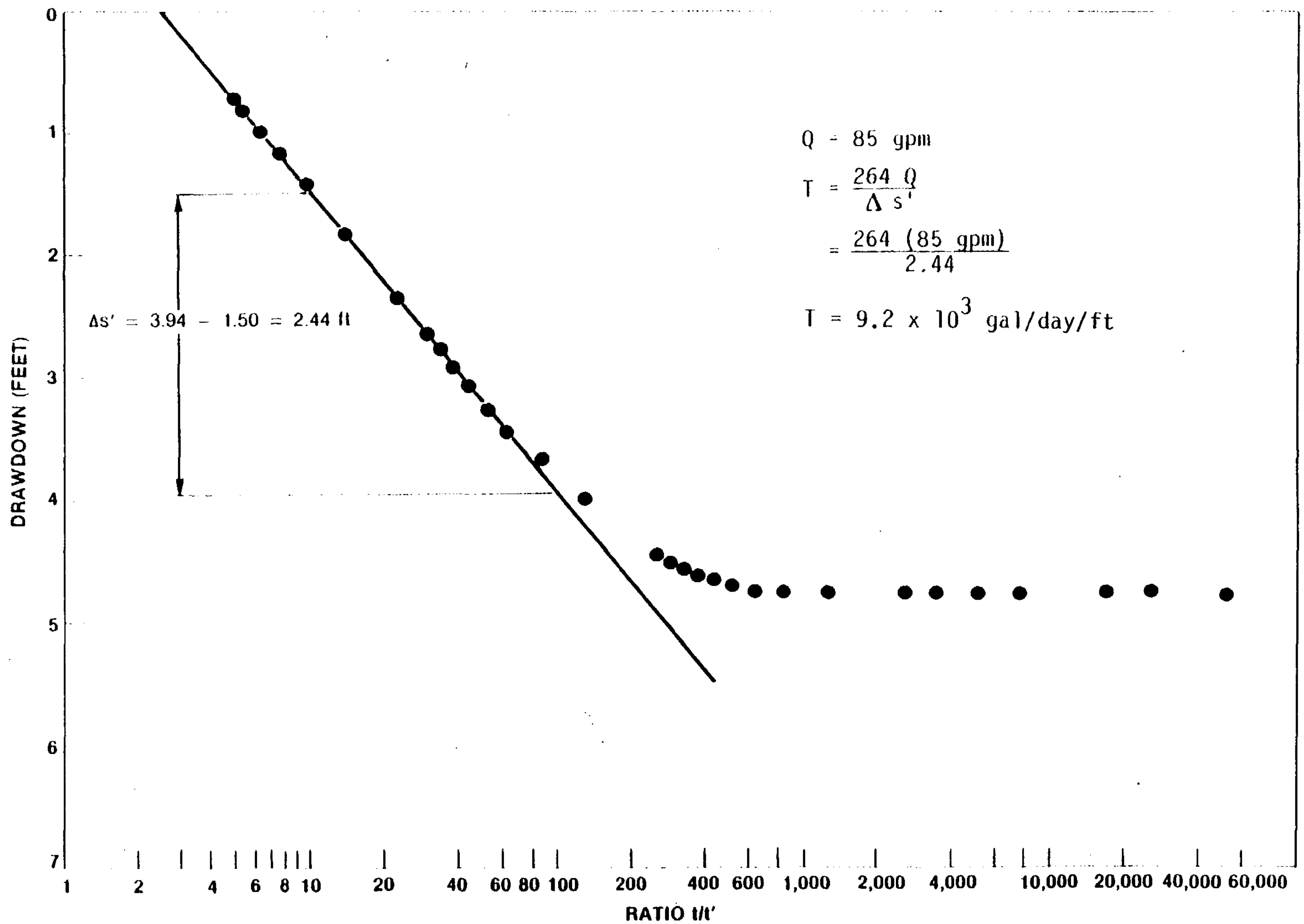

Figure 4-27
RESIDUAL DRAWDOWN — WELL NO. 1
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987

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MARINE CORPS BASE
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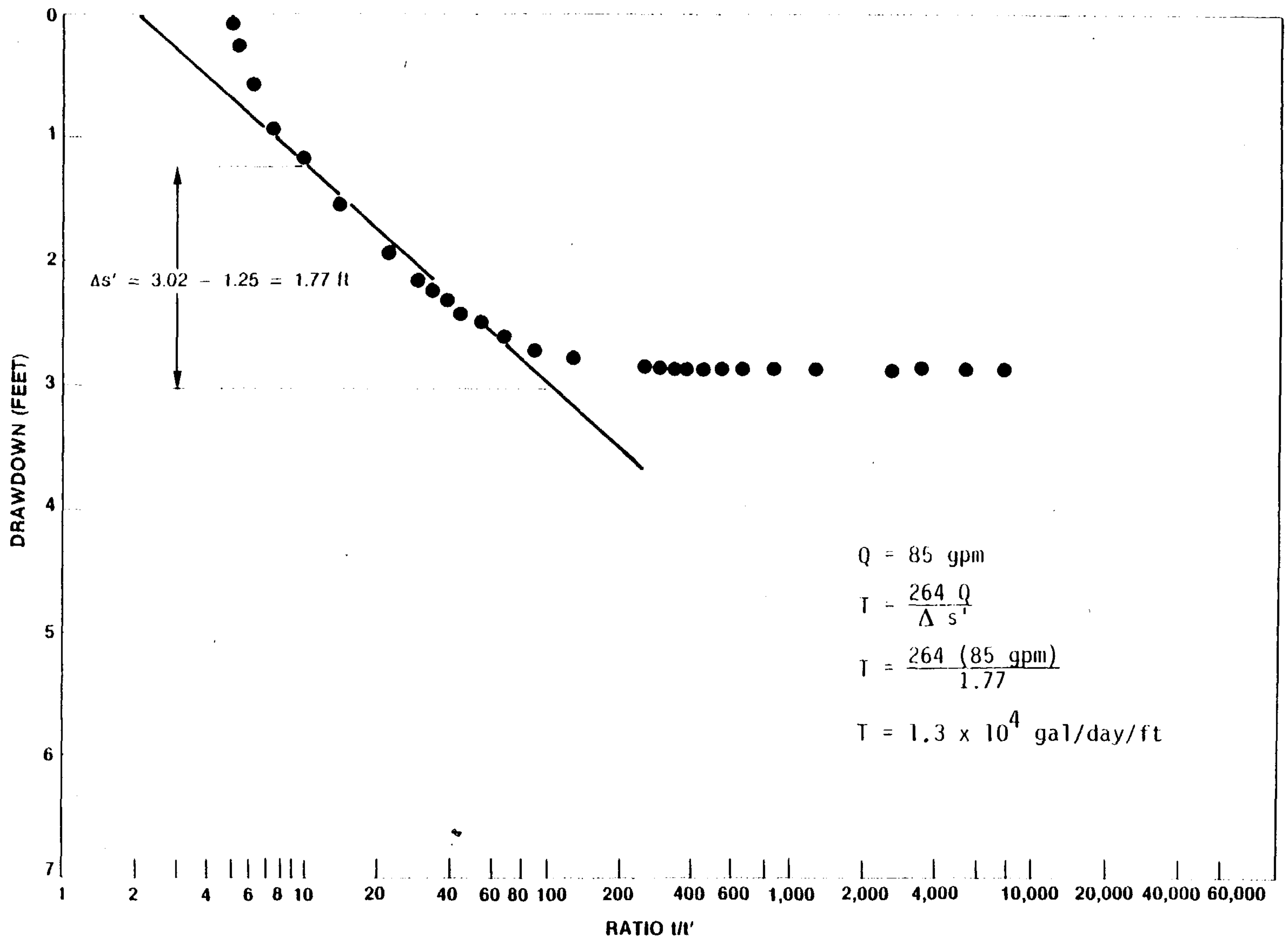

Figure 4-28
RESIDUAL DRAWDOWN — WELL 2
HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987

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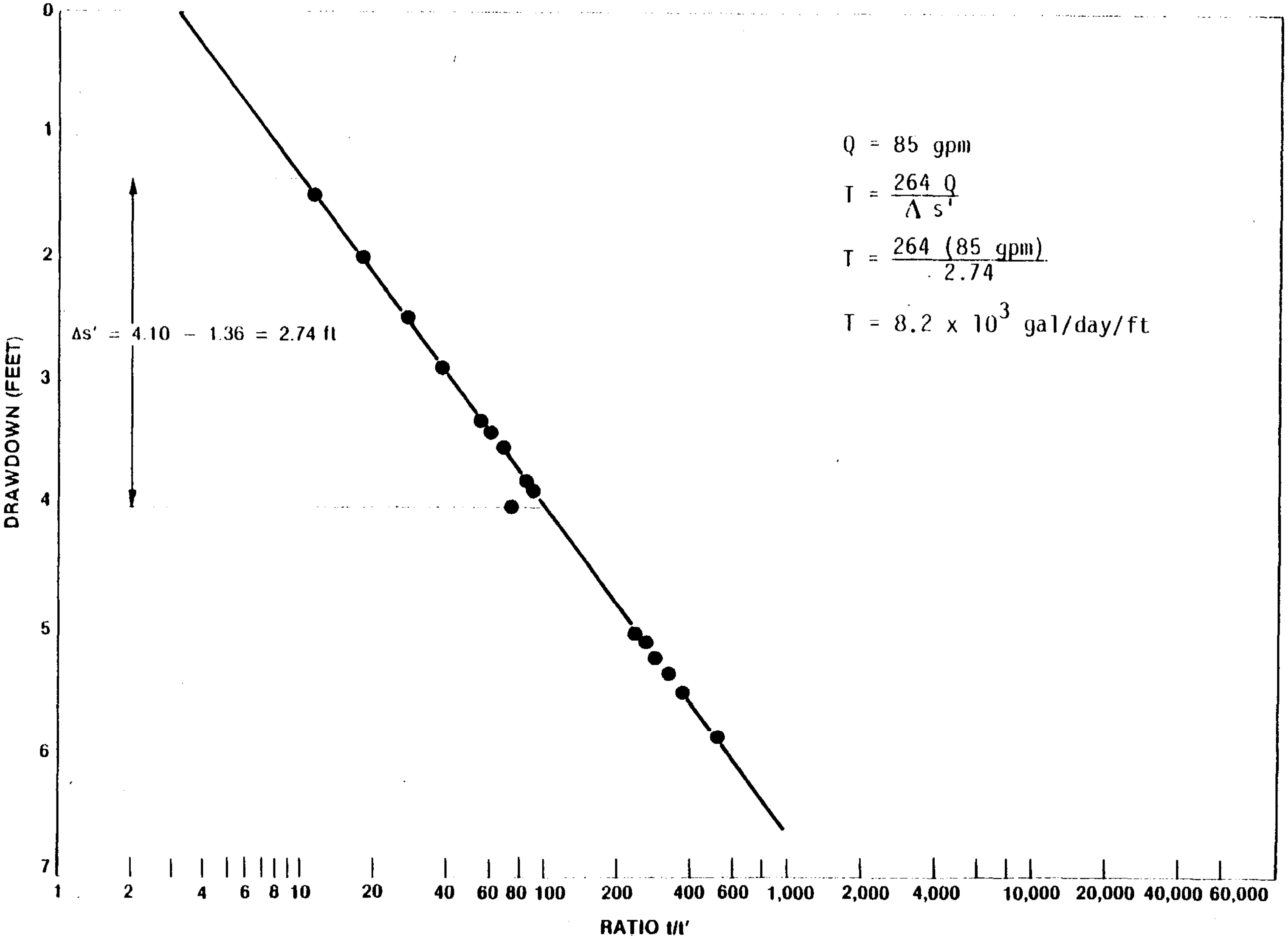

Figure 4-29
RESIDUAL DRAWDOWN — WELL 3
(HAND-COLLECTED DATA) HADNOT POINT INDUSTRIAL AREA

SOURCE: ESE, 1987

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MARINE CORPS BASE
CAMP LEJEUNE

Table 4-2. Transmissivity Comparison (gpd/ft*)

Method	Well No. 1	2	3
Theis	9.9×10^3	1.2×10^4	7.5×10^3
Hantush-Jacob	9.3×10^3	1.2×10^4	6.2×10^3
Walton	9.8×10^3	1.1×10^4	6.1×10^3
Recovery	1.0×10^4	1.3×10^4	8.6×10^3
Residual-Drawdown	9.2×10^3	1.3×10^4	8.2×10^3
Average	9.6×10^3	1.2×10^4	7.3×10^3
Overall Average T	9.6×10^3		
Distance-Drawdown Method (using all 3 wells)	7.1×10^3		

*Gallons per day per foot (gpd/ft).

Source: ESE, 1988.

permeable materials, and Well No. 3 by less permeable materials. The value obtained from Well No. 3 may be lower, since the well is only 90 ft deep and does not penetrate as much of the aquifer thickness as Wells No. 1 and 2. Potentially, the somewhat higher transmissivity zones are located deeper in the aquifer. The values for transmissivity obtained with the Hantush-Jacob method and the Walton method (methods specifically for leaky, semiconfined aquifers as are present at Camp Lejeune) are not significantly different from values obtained by the other methods, except for Well No. 3. At Well No. 3, the two leaky-aquifer methods give values lower than the other methods. These lower values will be explained in the section of this report which considers the effects of leakage.

Transmissivity determined by the distance-drawdown method, using drawdown data from all three wells at the end of the pump test, was 7.1×10^3 gpd/ft. This value is lower than the average values from the other methods but in the range of values obtained from Well No. 3. The data from Well No. 3 may be controlling the slope of the line which determines this value, thus resulting in a lower-than-average value for transmissivity.

Personal communication with Rick Shiver of the North Carolina Department of Natural Resources (August 1987) indicates transmissivity of the sand and limestone aquifer in the vicinity of Camp Lejeune ranges from approximately 7,500 to 15,000 gpd/ft. The range of values obtained by the various methods of analysis by ESE is within this range of typical transmissivity values and is therefore considered to be representative of the potable aquifer at HPIA.

Storage Coefficient

Values for the storage coefficient obtained from the various methods are shown in Table 4-3. Similar to transmissivity, the values are in agreement for all wells and for the aquifer. The values average 8×10^{-4} and range from 5×10^{-4} in Well No. 1 to 1×10^{-3} in Well No. 2, with Well No. 3 equal to the average. These values are all in a range

Table 4-3. Storage Coefficient Comparison

Method	Well No. 1	Well No. 2	Well No. 3
Theis	6×10^{-4}	1×10^{-3}	9×10^{-4}
Hantush-Jacob	6×10^{-4}	1×10^{-3}	8×10^{-4}
Walton	6×10^{-4}	1×10^{-3}	8×10^{-4}
Recovery	5×10^{-4}	1×10^{-3}	8×10^{-4}
Residual-Drawdown	--	--	--
Average	6×10^{-4}	1×10^{-3}	8×10^{-4}
Overall Average	8×10^{-4}		
Distance-Drawdown (using all 3 wells)	3×10^{-3}		

Source: ESE, 1988.

characteristic of storage coefficients of confined aquifers, suggesting that the sand and limestone aquifer in the northern portion of HPIA acts as a confined aquifer. This is not inconsistent with the regional literature that suggests the sand and limestone aquifer is semi-confined, but subject to some variability. The higher values from Well No. 2 may indicate a slightly less-confined situation near Well No. 2 trending to semiconfined conditions. The value of storage coefficient obtained by the distance-drawdown method is 3×10^{-3}, a value higher than average (indicating a trend to more semiconfined conditions than the other methods of analysis).

The value of storage coefficients presented in the IAS (NEESA, 1983) range from 2.6×10^{-3} to 7.4×10^{-5} on a regional scale for the limestone and sand aquifer. All of the values obtained by ESE are in this range, indicating that the aquifer at the pump test site is typical of the aquifer as a whole.

Leakage Characteristics

The leakage characteristics of the semiconfining layer are dependent on the hydraulic conductivity and thickness of the layer. The value of the semiconfining layer hydraulic conductivity can be determined from the pump test analysis methods of Hantush-Jacob (1955) and Walton (1962). These methods are used to determine aquifer parameters based on the best match with a family of type curves. Each curve has a different value, known as the $\frac{r}{B}$ value. The $\frac{r}{B}$ value is equal to the following based on Hantush and Jacob (1955):

$$\frac{r}{B} = \frac{r}{T/k'/b'}$$

where: r = Radius to observation well from pumping well (ft)
T = Transmissivity [square feet per day (ft^2/day)]
k' = Hydraulic conductivity of semiconfining layer [feet per day (ft/day)]
b' = Thickness of semiconfining layer (ft)

The family of type curves presented by Walton (1962) has $\frac{r}{B}$ values ranging from 0 (the Theis curve) to 6.0. The larger the $\frac{r}{B}$ value, the greater the amount of leakage into the aquifer. If the value of $\frac{r}{B}$ and transmissivity are known, the value $\frac{k'}{b'}$, known as leakance, can be calculated based on the $\frac{r}{B}$ relationship stated above. For the Camp Lejeune analysis, the thickness of the semiconfining layer (b') was assumed to be 17 ft; hydraulic conductivity was calculated based on this thickness.

The values of $\frac{r}{B}$ selected for the analyses are shown in Table 4-4. The values ranged from 5.0×10^{-2} to 1.7×10^{-1}. These numbers are rather small but are greater than 0, indicating that some leakage to the aquifer is occurring. The smallest number chosen by the computer match is 0.0093 by the Hantush-Jacob (1955) method for Well No. 2. The type-curve match, plotted over the data points in Fig. 4-18 does not closely match the data. It is the analyst's opinion that the computer match is inappropriate. With the Walton (1962) method, a better choice of type-curve matches was chosen. The Hantush-Jacob (1955) match for Well No. 2 is considered to be too low an $\frac{r}{B}$ value, and thus calculations of leakage and hydraulic conductivity based on this $\frac{r}{B}$ value are not used in the "average" calculations. The calculated values are presented to show the variation with other values.

Table 4-5 shows a comparison of the calculated values of leakance $\frac{k'}{b'}$. The unit of leakance is day^{-1}, and the values range from 8.2×10^{-5}/day to 3.0×10^{-3}/day and average 1.1×10^{-3}/day.

Table 4-6 shows the values of semiconfining-layer hydraulic conductivity based on an assumed average thickness of the confining layer of 17 ft. The values range from 1.4×10^{-3} ft/day to 5.1×10^{-2} ft/day, averaging 3.5×10^{-3} ft/day. In centimeters per second (cm/sec), a unit more often associated with permeability, the values of hydraulic conductivity range from 4.9×10^{-7} cm/sec to 1.8×10^{-5} cm/sec, averaging 1.6×10^{-6} cm/sec. These values indicate the clayey interval is not completely confining but more likely a semiconfining layer. Generally, clays with permeabilities

Table 4-4. Comparison of $\frac{r}{B}$ Values

Method	Well No. 1	2	3
Hantush-Jacob	9.0×10^{-2}	9.3×10^{-3}*	1.7×10^{-1}
Walton	5.0×10^{-2}	1.5×10^{-1}	1.5×10^{-1}

*$\frac{r}{B}$ value is inappropriate.

Source: ESE, 1987.

Table 4-5. Leakance Comparison (day^{-1})

Method	Well No. 1	Well No. 2	Well No. 3
Hantush-Jacob	2.5×10^{-4}	1.6×10^{-6}*	3.0×10^{-3}
Walton	8.2×10^{-5}	3.7×10^{-4}	2.3×10^{-3}
Average	1.7×10^{-4}	3.7×10^{-4}	2.7×10^{-3}
Overall Average	1.1×10^{-3}		

*Value not used in average calculation.

Source: ESE, 1987.

Table 4-6. Semiconfining Bed Hydraulic Conductivity Comparison (ft/day)

Method	Well No. 1	Well No. 2	Well No. 3
Hantush-Jacob	4.3×10^{-3}	2.7×10^{-5}*	5.1×10^{-2}
Walton	1.4×10^{-3}	6.4×10^{-3}	3.9×10^{-2}
Average	2.9×10^{-3}	6.4×10^{-3}	4.5×10^{-3}
Overall Average	4.6×10^{-3}		

*Value not used in average calculation.

Source: ESE, 1987.

of 10^{-8}cm/sec are recommended to function as landfill liners. Permeabilities in the range of 10^{-4}, 10^{-5}, and 10^{-6} cm/sec are characteristic of silty sands to silty clays. Permeabilities of 10^{-3} cm/sec or above are characteristic of silty sand to clean sand and gravel (Freeze and Cherry, 1979). The values associated with the clay layer at Camp Lejeune are indicative of a silty sand to silty clay and clay-type material.

The highest values of leakance and semiconfining-layer hydraulic conductivity occur at Well No. 3. This indicates somewhat more leaky conditions in the vicinity of Well No. 3 as compared to Wells No. 1 and 2. As the semiconfining layer is more permeable at the site of Well No. 3, the values of transmissivity for Well No. 3 obtained by the leaky-aquifer methods (Hantush-Jacob and Walton) (Figs. 4-18 and 4-19) are better estimates of transmissivity of the aquifer at that point than by the methods for confined aquifers.

In Well No. 3, the value of drawdown, as observed, is interpreted by the confined-aquifer analyses as reflecting properties of the aquifer. A higher transmissivity will result in less drawdown. With the semiconfined aquifer methods, the value of drawdown and the shape of the curve indicating a steady level of drawdown are interpreted as resulting from leakage into the aquifer. The lower values of drawdown result from the effects of this leakage and not from a more transmissive aquifer. The values of transmissivity calculated in this manner are lower than if the aquifer is assumed to be confined, but provide a more accurate representation of the aquifer conditions. Because of the greater amount of leakage into the aquifer at Well No. 3 than at Wells No. 1 or 2, the values of transmissivity calculated for Well No. 3 by the confined aquifer methods are overestimates of transmissivity at that location. The confined methods for Wells No. 1 and 2 do not overestimate transmissivity in comparison to the leaky method values, nor are the leakance and semiconfining-layer hydraulic conductivity values as high as is observed from the Well No. 3 analysis. The aquifer is apparently more confined, or less leaky, in the vicinity of Wells No. 1 and 2.

Other indications that the aquifer is semiconfined were given by the residual-drawdown method. The intercept of the straight line through the data points for all three wells intercepted the zero-drawdown axis at t/t' of 2 or greater. This position of the line, with respect to the zero-drawdown axis, suggests the aquifer is receiving recharge as the water levels recover in a shorter time than was taken to draw them down. Well No. 3 plots farthest from the origin, at a t/t' value of 3, indicating again more recharge is occurring at Well No. 3 than the other wells, and the aquifer is less confined at this location.

Well Efficiency

The pumping well efficiency was evaluated using specific-capacity data from the well. The specific capacity theoretically available from the well was estimated using empirical relationships based on the Jacob equation (Driscoll, 1986). The specific capacity, or amount of discharge per foot of drawdown (Q/S), available from the semiconfined aquifer at Camp Lejeune was estimated to be 4.88 gallons per minute per foot (gpm/ft). The specific capacity of the well actually observed during the pump test was 1.5 gpm/ft. The efficiency of the well is evaluated based on the following relationship:

$$\text{Well Efficiency \%} = \frac{\text{Actual Q/S}}{\text{Theoretical Q/S}} \times 100$$

The efficiency of pumped Well No. 642 at Camp Lejeune is approximately 31 percent. This value indicates the well is not efficient. The low efficiency indicates the well may be in need of cleaning and redevelopment in order to produce water efficiently.

4.3.3.5 Pump Test Conclusions

The pump test was successful in terms of evaluating the various aquifer parameters. The overall average transmissivity for the limestone aquifer was determined to be 9.6×10^3 gpd/ft. The overall average storage coefficient was estimated to be 8×10^{-4}. Some variation between wells was observed (as would be expected) in the variable geologic material present at HPIA, but the aquifer appears to be more transmissive at greater depths (100 to 200 ft). The values obtained by the analyses are in agreement with previously developed values for the wells in the limestone aquifer in the region.

The analyses indicate the limestone aquifer is semiconfined and is receiving recharge through a clayey layer overlying the aquifer near the surface. The hydraulic conductivity of this layer was estimated to be an average of 4.6×10^{-3} ft/day (1.6×10^{-6} cm/sec). This value of hydraulic conductivity is typical of silty sands and silty clays, material which would act more as a semiconfining layer and not a complete confining layer. The semiconfining layer exhibits the greatest leakage in the vicinity of Well No. 3.

The efficiency of the pumped Well No. 642 was evaluated. The well was found to be 31-percent efficient. This is not an efficient well. Cleaning and redevelopment of the well may increase its efficiency.

4.4 CONTAMINANT STATUS

4.4.1 Shallow Aquifer

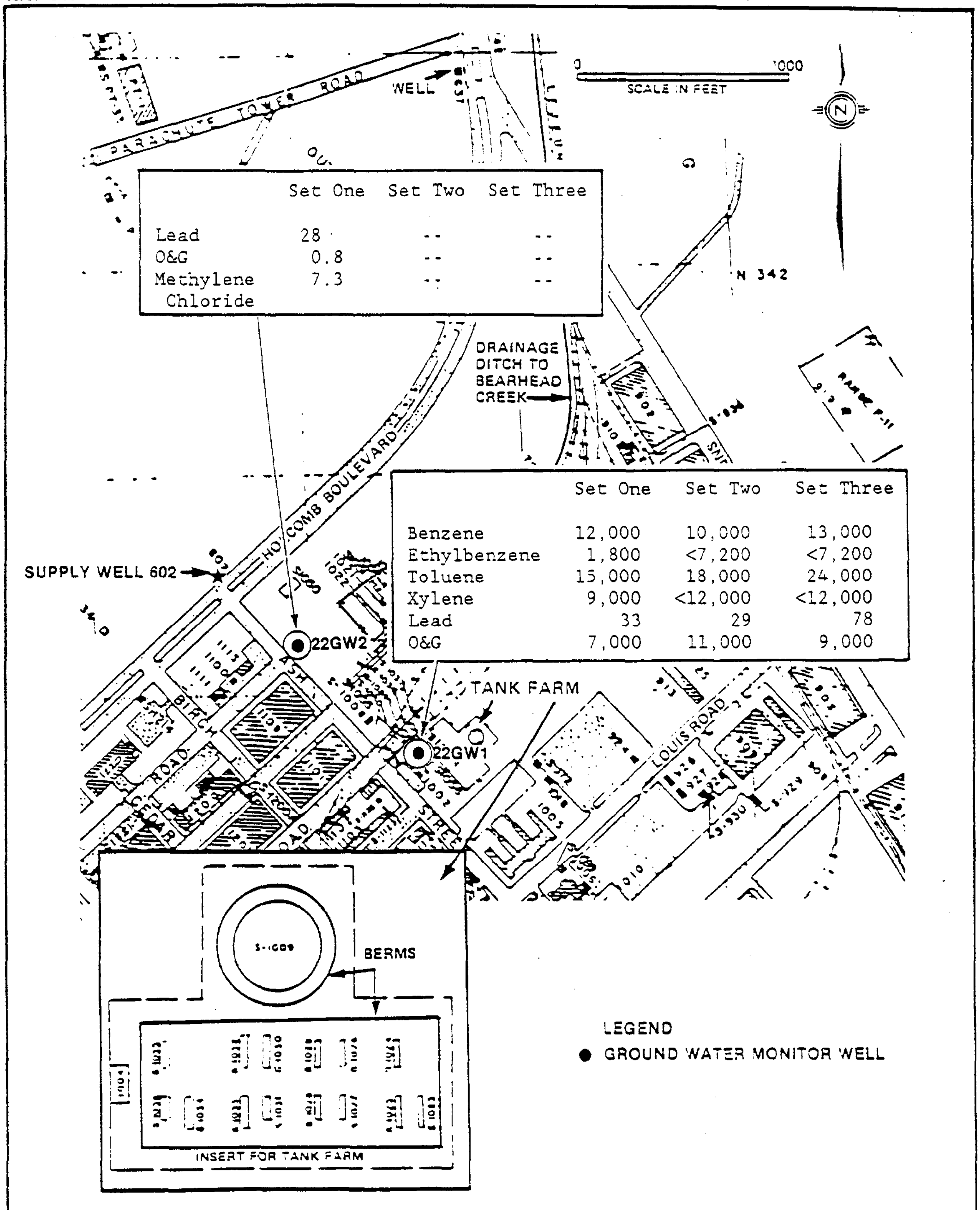
Three sets of groundwater samples were obtained from each of the shallow monitor wells installed at HPIA (January 9-20, 1987; March 8-12, 1987; May 27-29, 1987). The existing monitor wells at Site 22 were also sampled three times. For ease of presentation, all wells surrounding specific features/structures are discussed as a group related to that feature/structure. All chemical data for these wells are presented in Apps. G, H, and I.

4.4.1.1 Hadnot Point Fuel Tank Farm (Site 22)

In the Set One data (Fig. 4-30), Well 22GW1, located next to the fuel tanks, was found to contain elevated levels of O&G, benzene, ethylbenzene, toluene, and xylene. All of these compounds are related to documented fuel leaks at the facility. Well 22GW2, located to the west of the facility, was found to contain only O&G and methylene chloride, suggesting that the contaminant plume in the shallow aquifer does not extend from the tanks to this well site. The levels of lead in the Set One data for 22GW1 were above the method detection limit (MDL), but below the Maximum Contaminant Level (MCL) of 50 micrograms per liter (mg/L).

Well 22GW1 was found to contain elevated levels of benzene, toluene, and O&G in the Set Two sampling effort. The levels are similar to those in the Set One data; however, the Set One data had also identified elevated levels of ethylbenzene and xylene. It is probable that these compounds were present in the Set Two samples, but the dilution required to quantify the largest peak in the chromatograph (toluene) reduced several other peaks to less than the post-dilution detection limit. The level of lead in the Set Two data is not of concern. No target analytes were identified in the Set Two data from Well 22GW2, located to the west of the facility.

In the Set Three data, Well 22GW1 was found to contain elevated levels of benzene, toluene, lead, and O&G. The levels of VOCs are generally similar to those in the Set One and Set Two data; however, the Set One data had identified elevated levels of ethylbenzene and xylene. As described for the Set Two data, it is probable that these compounds were present in the Set Three samples, but the dilution required to quantify the largest peak in the chromatograph (toluene) reduced several other peaks to less than the post-dilution detection limit. The levels of lead in both the Set One and Set Two data were not of concern; lead concentration in the Set Three data (78 ug/L) is greater than the MCL of 50 ug/L. Set Three samples from Well 22GW2 did not contain detectable quantities of any of the target analytes. Batch-specific analytical



	Set One	Set Two	Set Three
Lead	28	--	--
O&G	0.8	--	--
Methylene Chloride	7.3	--	--

	Set One	Set Two	Set Three
Benzene	12,000	10,000	13,000
Ethylbenzene	1,800	<7,200	<7,200
Toluene	15,000	18,000	24,000
Xylene	9,000	<12,000	<12,000
Lead	33	29	78
O&G	7,000	11,000	9,000

Figure 4-30
CONTAMINANT DISTRIBUTION (ug/L) —
HADNOT POINT INDUSTRIAL AREA TANK FARM
SOURCES: Water and Air Research, Inc., 1983.
ESE, 1987.

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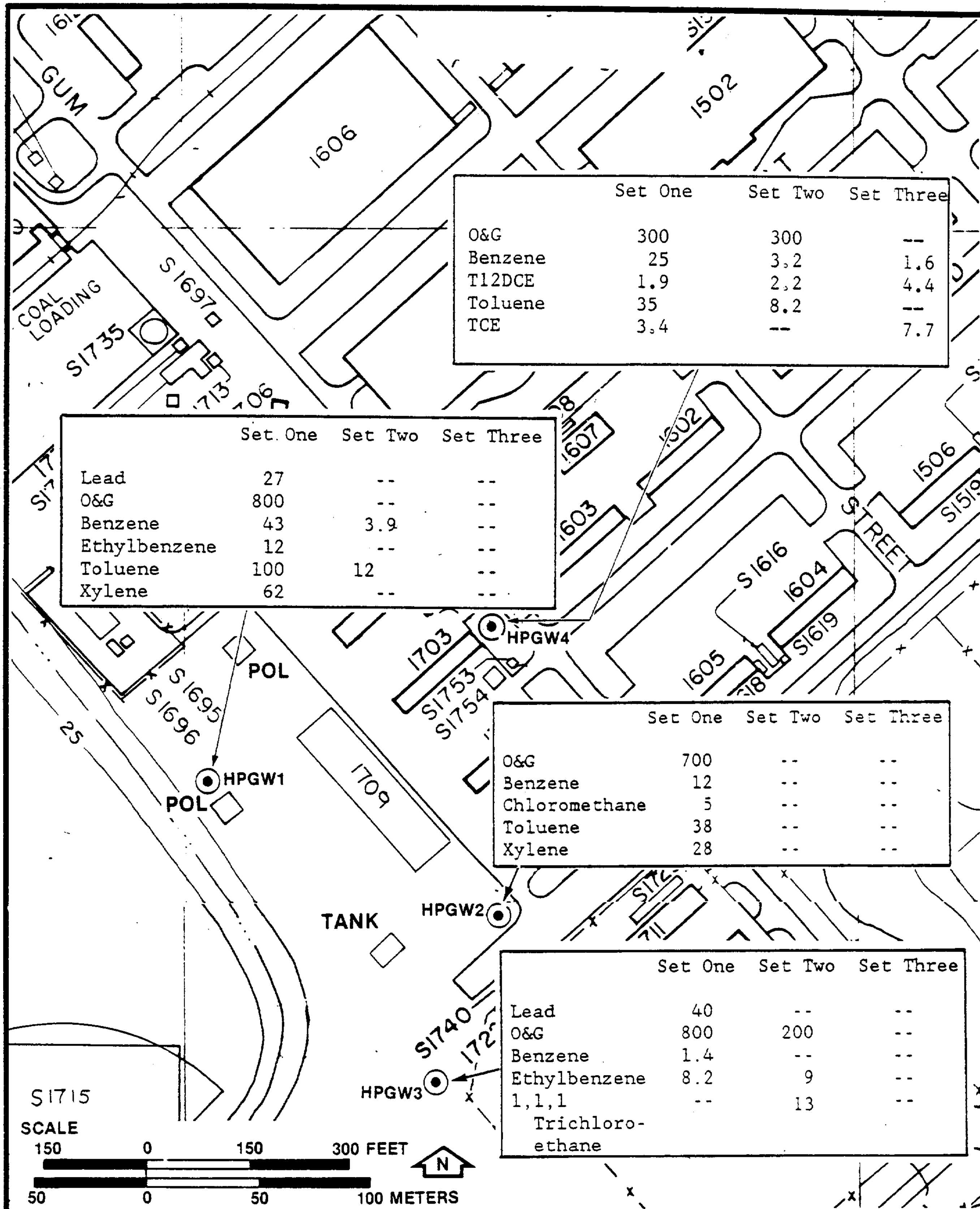
conditions resulted in an MDL of 49.2 ug/L for lead in the Set Three samples. This MDL is higher than for previous data sets, but is still less than the MCL.

4.4.1.2 Bldgs. 1709 and 1710

The soil gas data for this area, presented in Sec. 4.2, showed an area of maximum TCE contamination in the vicinity of well HPGW1 (see Fig. 4-31). TCE was not detected in the vicinity of wells HPGW2 through HPGW4 during the soil gas investigation; however, other unidentified compounds were present which caused the detection limit for TCE to increase because of the required dilution of the samples prior to analysis. TCE was, however, detected only in the Set One water samples from HPGW4 (3.4 ug/L), suggesting that the TCE detected in the soil gas near HPGW1 may be present in the soil matrix only. Additionally, the TCE in HPGW4 may be related to Bldg. 1601. Trace levels of two additional solvent compounds were detected in two other wells (5.0 ug/L chloromethane--HPGW2, 1.9 ug/L T12DCE--HPGW4) in this area. The compounds which caused interference with the detection of TCE in the soil gas appear to be related to spills and/or leaks of fuels. O&G, benzene, ethylbenzene, toluene, and xylene were detected in most of the four wells in this area. Well HPGW2 is located immediately adjacent to Water Supply Well 608 (closed) and suggests that the contaminants detected in Water Supply Well 608 (TCE and T12DCE) are not from contamination of the shallow aquifer in the vicinity of the well.

The suite of detected VOCs in the Set Two data were similar to those detected in the Set One data. In most cases, however, the Set Two levels were lower than the Set One levels. Lead concentrations in both data sets are not of concern. None of the detected analytes in the Set Two data were above applicable action limits; however, this is not a permanent condition, as the Set One data indicate that benzene in wells HPGW1, HPGW2, and HPGW4 periodically exceeds the MCL of 5 ug/L and chloromethane in HPGW2 periodically exceeds the Water Quality Criterion, adjusted for drinking water only, of 0.19 ug/L (10^{-6} risk level).



	Set One	Set Two	Set Three
O&G	300	300	--
Benzene	25	3.2	1.6
T12DCE	1.9	2.2	4.4
Toluene	35	8.2	--
TCE	3.4	--	7.7

	Set One	Set Two	Set Three
Lead	27	--	--
O&G	800	--	--
Benzene	43	3.9	--
Ethylbenzene	12	--	--
Toluene	100	12	--
Xylene	62	--	--

	Set One	Set Two	Set Three
O&G	700	--	--
Benzene	12	--	--
Chloromethane	5	--	--
Toluene	38	--	--
Xylene	28	--	--

	Set One	Set Two	Set Three
Lead	40	--	--
O&G	800	200	--
Benzene	1.4	--	--
Ethylbenzene	8.2	9	--
1,1,1 Trichloroethane	--	13	--

Figure 4-31
CONTAMINANT DISTRIBUTION (ug/L) — BLDGS. 1709 AND 1710

SOURCE: ESE, 1987.

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The distribution of contamination by VOCs at this site as indicated by the Set Three data was decreased relative to the Set Two data. VOCs were detected only in Well HPGW4. The levels of specific VOCs in this well have changed in an erratic fashion; benzene and toluene have decreased relative to Set Two, whereas T12DCE and TCE have increased. In addition, an unknown compound similar to methylethylketone (MEK) was detected for the first time. Of the detected analytes in the Set Three data, only TCE is above the applicable water quality standard/guideline (proposed MCL of 5 ug/L). However, this is not a permanent condition, as the Set One data indicate that several other compounds periodically exceed the applicable standards/guidelines.

4.4.1.3 Bldg. 1613 (Exchange Service Station)

Three wells (HPGW5 through HPGW7) were installed around the station (Fig. 4-32) to monitor for the possibility of fuel leaks. O&G was the only target analyte detected in these wells, suggesting the station has released waste O&G from maintenance operations but that fuel leaks do not appear to have occurred.

Set Two data from wells HPGW5 through HPGW7 suggest that some petroleum hydrocarbons are present in the shallow groundwater, but that fuel leaks have not occurred. Lead concentration in both the Set One and Set Two data are not of concern.

No target analytes were detected in the Set Three data. This may be attributed to changes in groundwater levels as summer (i.e., dry season) conditions became prevalent at the site.

4.4.1.4 Bldgs. 1502, 1601, and 1602

During the soil gas investigation, very high levels of TCE were detected between Bldgs. 1502 and 1601, with lower levels detected between Bldgs. 1601 and 1602 (Sec. 4.2). As a result, four shallow monitor wells were installed (HPGW8 through 11) to characterize the groundwater quality

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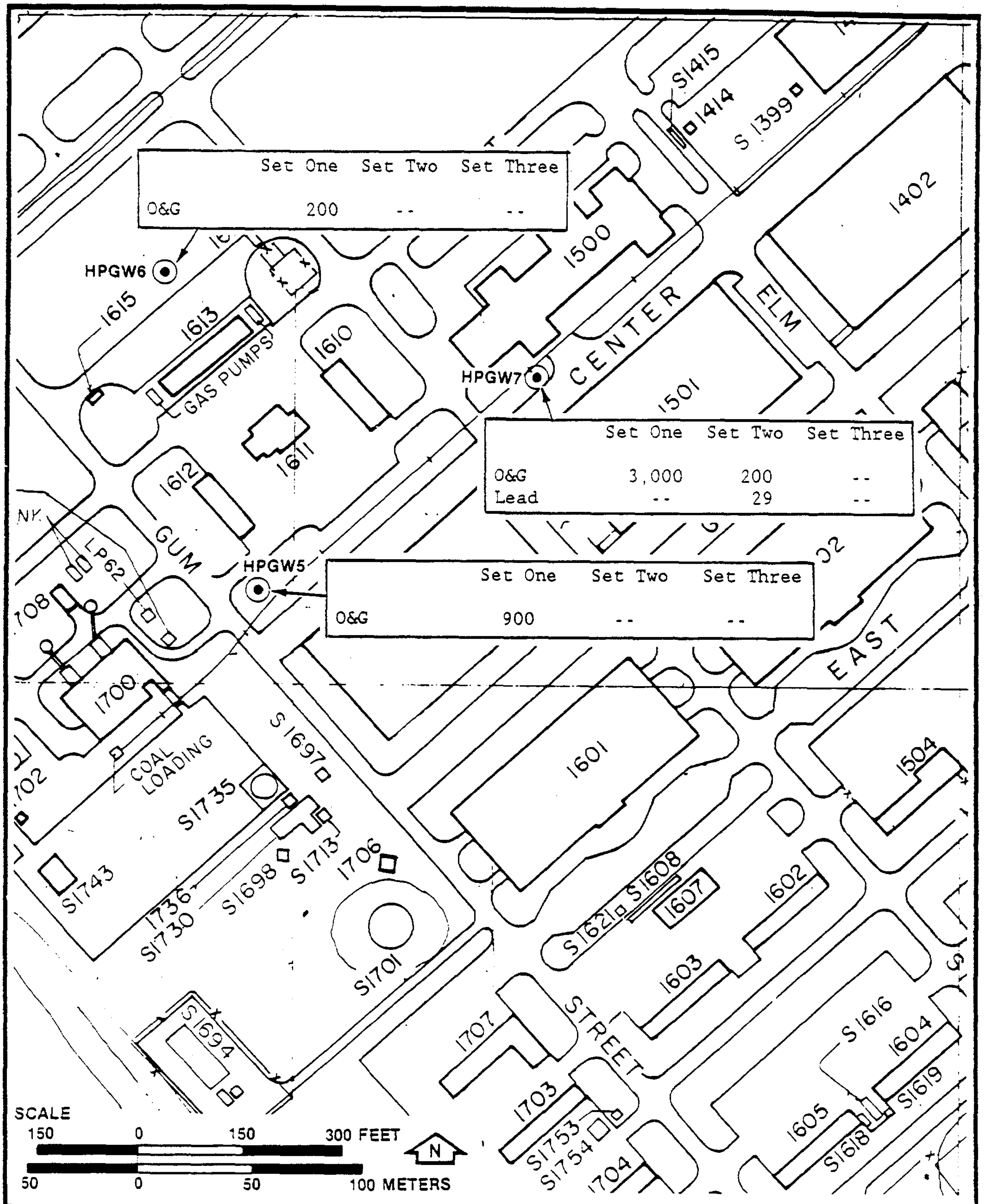

	Set One	Set Two	Set Three
O&G	200	--	--

	Set One	Set Two	Set Three
O&G	3,000	200	--
Lead	--	29	--

	Set One	Set Two	Set Three
O&G	900	--	--

Figure 4-32
CONTAMINANT DISTRIBUTION (ug/L) — BLDG. 1613

SOURCE: ESE. 1987.

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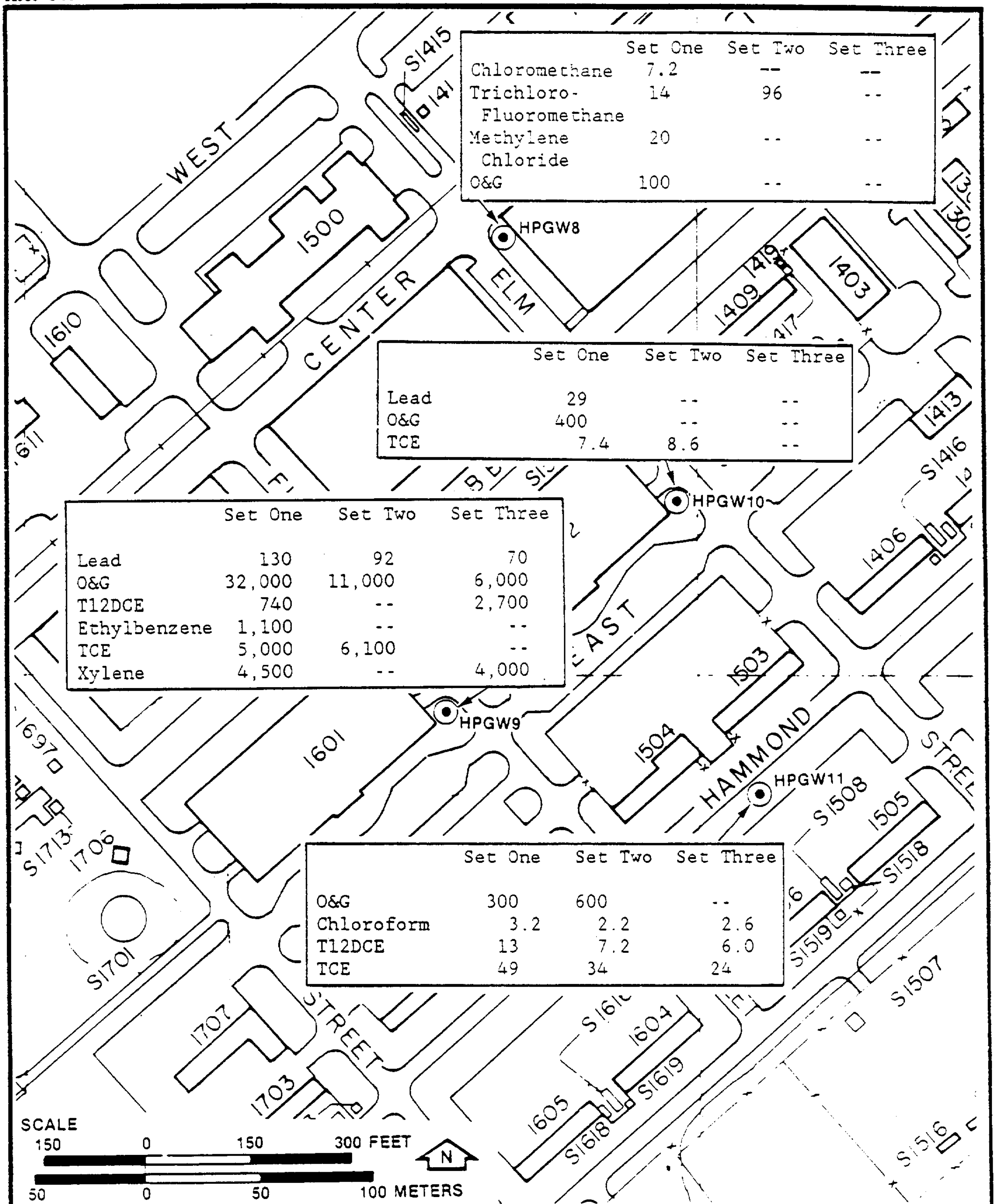
(Fig. 4-33). Well HPGW9, located at the center of the soil gas high, was found to contain high levels of O&G, T12DCE, ethylbenzene, TCE, and xylene in the Set One data. This suite of detected contaminants is consistent with the usage of this area as a vehicle maintenance facility. The remaining wells in this area were found to contain a similar suite of contaminants, although at lesser concentrations and with a somewhat sporadic distribution. In addition, levels of other volatile compounds such as chloroform, chloromethane, methylene chloride, and trichlorofluoromethane were detected on a sporadic basis in the other wells in this area.

The Set One data indicated a sporadic distribution of VOCs in this area. This pattern was verified by the Set Two data, with some variations attributable to time variation of chemical character. Well HPGW9, in the center of the soil gas hot spot, continued to be the most highly contaminated, with elevated levels of lead, O&G, and TCE. Other VOCs detected in Set One may have been present in Set Two, but were obscured by the strength of the TCE peak. The level of trichlorofluoromethane at well HPGW8 had increased with time, suggesting that pumping of the well during the presample purging was drawing a nearby zone of contamination toward the well. In both data sets, the concentration of lead at HPGW9 is greater than the MCL.

The Set One and Set Two data had indicated a sporadic distribution of VOCs in this area. With the Set Three data, a pattern may be delineated. Well HPGW9, in the center of the soil gas hot spot, was consistently the most highly contaminated, with elevated levels of lead, O&G, and VOCs. The specific VOCs present in each data set from this well varies, with T12DCE, and xylene present in the Set Three data. The levels of T12DCE and xylene are greater than the proposed recommended MCLs of 70 ug/L and 440 ug/L, respectively. Other VOCs detected in previous data sets may be present in Set Three, but were obscured by the strength of the T12DCE and xylene peaks. Of significance in the Set Three data was the lack of high-level contamination by TCE which was noted in the previous sets.



HPGW8:

	Set One	Set Two	Set Three
Chloromethane	7.2	--	--
Trichloro-Fluoromethane	14	96	--
Methylene Chloride	20	--	--
O&G	100	--	--

HPGW10:

	Set One	Set Two	Set Three
Lead	29	--	--
O&G	400	--	--
TCE	7.4	8.6	--

HPGW9:

	Set One	Set Two	Set Three
Lead	130	92	70
O&G	32,000	11,000	6,000
T12DCE	740	--	2,700
Ethylbenzene	1,100	--	--
TCE	5,000	6,100	--
Xylene	4,500	--	4,000

HPGW11:

	Set One	Set Two	Set Three
O&G	300	600	--
Chloroform	3.2	2.2	2.6
T12DCE	13	7.2	6.0
TCE	49	34	24

Figure 4-33
CONTAMINANT DISTRIBUTION (ug/L) — BLDGS. 1502, 1601, AND 1602

SOURCE: ESE. 1987

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The second most highly contaminated well was HPGW11. This well was the only one in Set Three to contain detectable quantities of TCE. The detected level of TCE is greater than the proposed MCL of 5 ug/L. Chloroform and T12DCE were detected at levels below the applicable action limits. No target analytes were detected in HPGW8 and HPGW10 in Set Three; these wells had previously contained sporadic low-level contamination by VOCs and O&G.

4.4.1.5 Bldg. 1202

The soil gas investigation identified the presence of high levels of TCE in the vicinity of Bldg. 1202, the Base Maintenance Shop. Four wells (HPGW15 through HPGW18) (Fig. 4-6) were installed to determine the extent of the groundwater contamination associated with the contamination in the soils. One target analyte (O&G) was detected in only one well (HPGW16) in the Set One data. In light of the soil gas data, these results were surprising. The TCE detected in the soil appears to be contained in the soil, possibly aided by the fact that most of the area around Bldg. 1202 is paved, preventing infiltration of rainfall and subsequent transport of TCE into the shallow groundwater. In addition, the soil gas has not been allowed to discharge to the atmosphere, possibly resulting in a concentration of organic vapors just below the pavement.

As in the Set One data, no VOCs were detected in wells HPGW15 through HPGW18 in the Set Two data. O&G and lead were the only two target analytes detected in the samples. The levels of O&G in the Set Two data may be greater than the organoleptic threshold. The lead concentrations were below the MCL in the Set One data, but were close to the MCL at wells HPGW15 and HPGW16 in the Set One data.

The two previous data sets did not identify the presence of any VOCs in the wells (HPGW15 through HPGW18) installed in the vicinity of this building. The Set Three data detected trichlorofluoromethane in Well HPGW15. O&G and lead were not detected in Set Three; both analytes had been detected in Set One and Set Two. Although lead was not detected in the Set Three data, the MDL was greater than the concentrations detected in previous samples, but less than the MCL.

4.4.1.6 Bldg. 1100

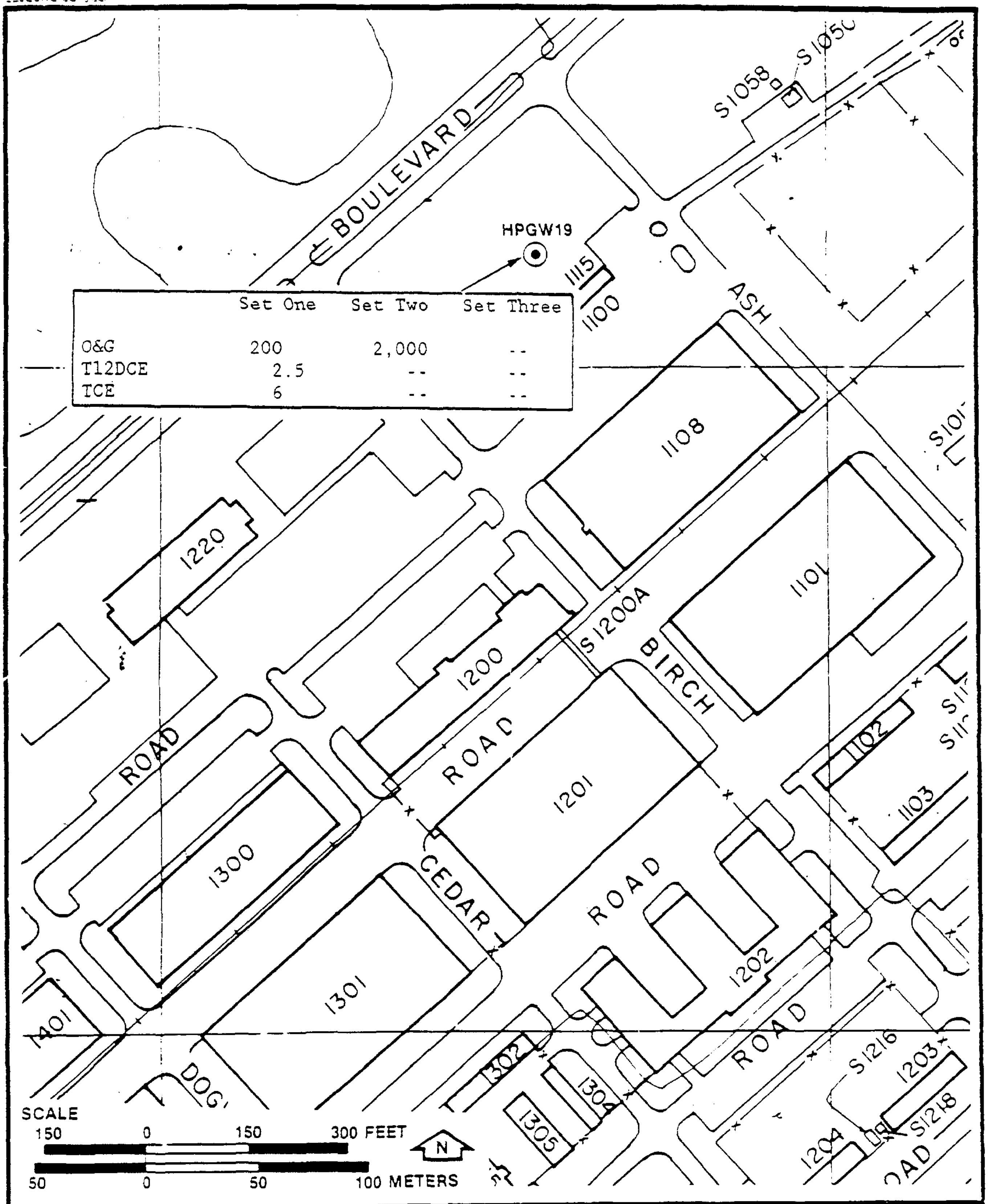
TCE was detected in this area during the soil gas investigation (Sec. 4.2). A single monitor well (HPGW19) was installed to sample and analyze the groundwater (Fig. 4-34). O&G, T12DCE, and TCE were detected in this well in the Set One data, consistent with past usage of this area as a service station conducting limited amounts of vehicle maintenance.

The detectable contamination at well HPGW19 was limited to O&G in the Set Two data. The low levels of T12DCE and TCE detected in the Set One data were reduced to less than the MDL at the time of the Set Two sampling.

No contamination was detected at well HPGW19 in the Set Three data. Previously, low levels of T12DCE and TCE (Set One) and O&G (Set Two) had been detected at this well. Physical conditions at the site, such as low rainfall, may have reduced contaminant levels to less than the MDL at the time of the Set Three sampling. This has been noted at several other monitor wells in HPIA.

4.4.1.7 Bldgs. 901, 902, and 913

Four wells (HPGW22 through HPGW25) were installed in the vicinity of Bldg. 901 (Fig. 4-35). The location of a TCE storage tank next to the building was identified during the records review; the area surrounded by the four wells was previously utilized for maintenance of heavy equipment. The soil gas investigation detected TCE in a single data point each at both Bldgs. 901 and 902. In the Set One data, all monitor wells detected O&G; T12DCE and TCE were detected in HPGW23 and HPGW24; and vinyl chloride, 1,1-dichloroethane (11DCA), and benzene were detected in HPGW24. These detected analytes are consistent with the use of TCE and the maintenance of equipment documented to have occurred in this area.



	Set One	Set Two	Set Three
O&G	200	2,000	--
T12DCE	2.5	--	--
TCE	6	--	--

Figure 4-34
CONTAMINANT DISTRIBUTION (ug/L) — BLDG. 1100

SOURCE: ESE, 1987.

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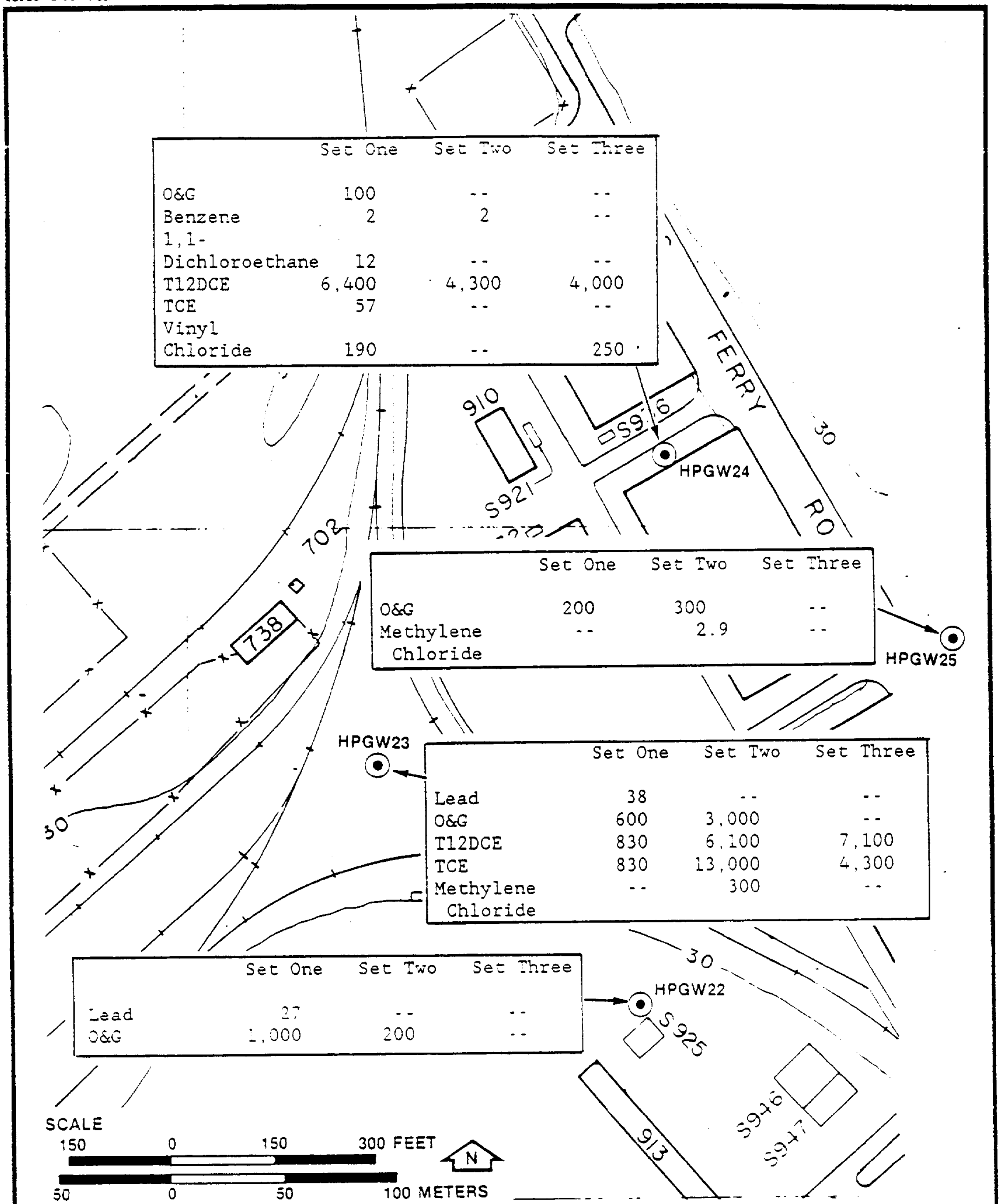

	Set One	Set Two	Set Three
O&G	100	--	--
Benzene	2	2	--
1,1-Dichloroethane	12	--	--
T12DCE	6,400	4,300	4,000
TCE	57	--	--
Vinyl Chloride	190	--	250

	Set One	Set Two	Set Three
O&G	200	300	--
Methylene Chloride	--	2.9	--

	Set One	Set Two	Set Three
Lead	38	--	--
O&G	600	3,000	--
T12DCE	830	6,100	7,100
TCE	830	13,000	4,300
Methylene Chloride	--	300	--

	Set One	Set Two	Set Three
Lead	27	--	--
O&G	1,000	200	--

Figure 4-35
CONTAMINANT DISTRIBUTION (ug/L) —
BLDGS. 901, 902, AND 903

SOURCE: ESE, 1987.

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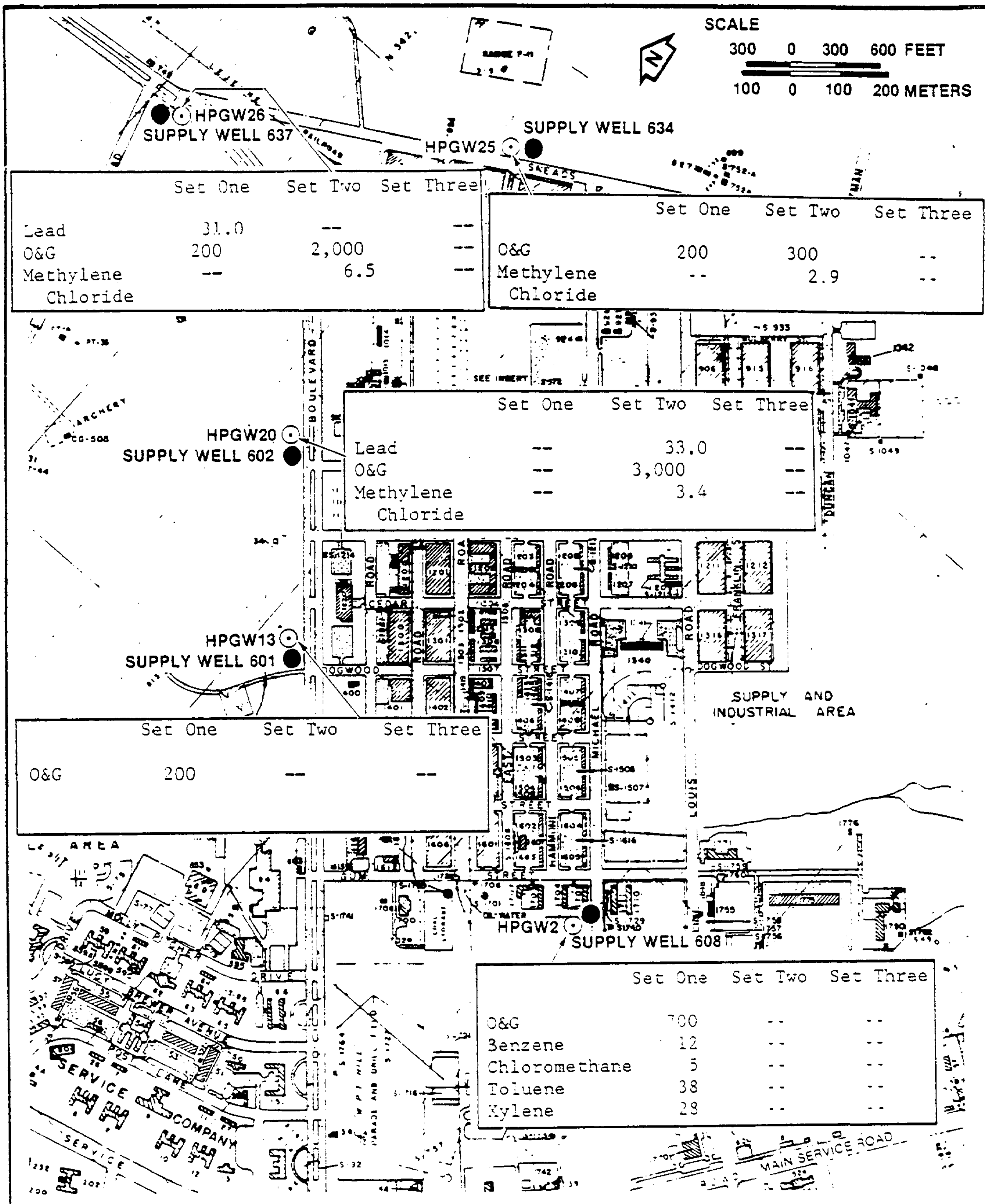
In the Set Two data, all wells were found to contain O&G at levels estimated (because of a prominent odor) to be greater than the organoleptic limit. Very high levels of T12DCE and TCE were identified in HPGW23 and HPGW24; these levels are greater than those detected in Set One, suggesting that the pre-sampling pumping of these wells was drawing a nearby zone of high contamination toward the wells. Methylene chloride was detected in HPGW23 and HPGW25 for the first time in the Set Two data. It is possible that other VOCs, at low levels, may be present in some of the samples but the required pre-analysis dilutions could have rendered them undetectable. The concentrations of lead detected by either data set are not of concern.

High levels of T12DCE and TCE were identified in Well HPGW23 in the Set Three data; these levels are less than those detected in Set Two, suggesting that migration of contamination toward the well as the result of presampling pumping has stabilized. TCE was detected in Well HPGW23 at a level less than half that for the Set Two samples. Vinyl chloride was detected in HPGW24, as it had been in the Set One samples. This target analyte was less than the MDL in the Set Two data. The required pre-analysis dilutions may have rendered other VOCs undetectable.

4.4.1.8 Well Pairs with Water Supply Wells

A shallow monitor well was installed next to each of five closed water supply wells in HPIA (Fig. 4-36). In the Set One data, Well HPGW2 (paired with Supply Well 608) was found to contain O&G, benzene, chloromethane, toluene, and xylene. This contamination identified in the shallow aquifer appears to be derived from waste fuel, whereas Supply Well 608 has been found to contain solvent-based VOCs. It appears that the two aquifer zones at this well pair are not well connected hydraulically because the types of contamination are dissimilar. The deep contamination may have migrated to the supply wells via flow in the deeper aquifer, augmented by the drawdown in the deep aquifer caused by the wells when they were active. An alternative transport mechanism is that the solvent-derived VOCs observed in the deeper aquifer have



HPGW26 / SUPPLY WELL 637

	Set One	Set Two	Set Three
Lead	31.0	--	--
O&G	200	2,000	--
Methylene Chloride	--	6.5	--

HPGW25 / SUPPLY WELL 634

	Set One	Set Two	Set Three
O&G	200	300	--
Methylene Chloride	--	2.9	--

HPGW20 / SUPPLY WELL 602

	Set One	Set Two	Set Three
Lead	--	33.0	--
O&G	--	3,000	--
Methylene Chloride	--	3.4	--

HPGW13 / SUPPLY WELL 601

	Set One	Set Two	Set Three
O&G	200	--	--

HPGW2 / SUPPLY WELL 608

	Set One	Set Two	Set Three
O&G	700	--	--
Benzene	12	--	--
Chloromethane	5	--	--
Toluene	38	--	--
Xylene	28	--	--

Figure 4-36
CONTAMINANT DISTRIBUTION — WELL PAIRS WITH WATER SUPPLY WELLS

SOURCE: Camp Lejeune, 1987.

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migrated downward, preferentially relative to the lighter fuel-derived contaminants observed in the shallow groundwater. At Wells HPGW13 (paired with 601), HPGW25 (paired with 634), and HPGW26 (paired with 637), O&G was the only detected target analyte, suggesting that the shallow aquifer at each of these deep wells is not the source of the detected contamination. Similarly, Well HPGW20 (paired with 602) did not contain detectable quantities of any of the target analytes.

The Set Two data indicate that the low levels of O&G identified in the Set One data for HPGW13 (with 601) were no longer detectable. No other target analytes were identified. The suite of detected contaminants in HPGW20 (with 602) increased by two (O&G and methylene chloride) in the Set Two data versus the Set One data. The O&G concentration is typical of that observed in the shallow aquifer throughout much of Camp Lejeune. The methylene chloride concentration is greater than the 10^{-6} human health risk level. The Set Two data for Well HPGW2 were discussed in the section of this report concerning Bldgs. 1709 and 1710. The Set Two data for Well HPGW25 (with 634) were discussed in the section of this report concerning Bldgs. 901, 902, and 913. Well HPGW26 (with 637) was found to contain detectable levels of O&G and methylene chloride. The level of O&G may be in excess of the organoleptic limit, and the level of methylene chloride is greater than the 10^{-6} risk level.

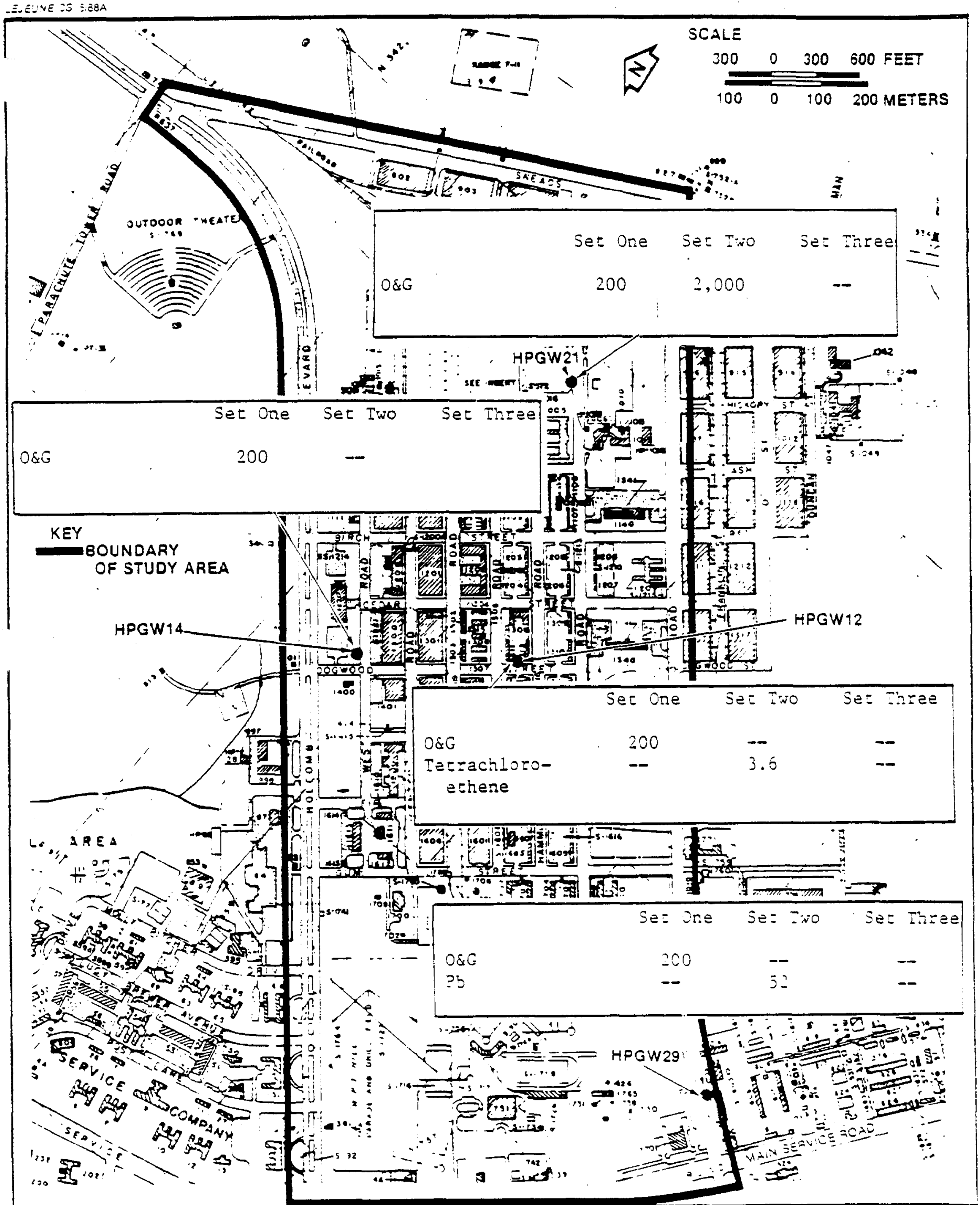
The Set Three data for HPGW13 (with 601) indicate that the low levels of O&G identified in the Set One data were no longer detectable. The Set Two data also did not identify detectable levels of O&G. No other target analytes were identified. No target analytes were detected in the Set Three samples from HPGW20 (with 601). Previous data sets had identified the presence of O&G, methylene chloride, and lead. The Set Three data for Well HPGW2, adjacent to Supply Well 608, were discussed in the section of this report concerning Bldgs. 1709 and 1710. The Set Three data for Well HPGW25, adjacent to Supply Well 634, were discussed in the section of this report concerning Bldgs. 901, 902, and 913. Well HPGW26, installed next to Supply Well 637, was not found to contain detectable levels of any of the target analytes. Previous data sets had identified the presence of O&G and methylene chloride.

4.4.1.9 Other Monitor Wells

Several monitor wells were installed to aid in the definition of the overall flow pattern(s) within the shallow aquifer within HPIA and/or to help define the downgradient limit of contaminant plumes thought to be present near specific source areas (Fig. 4-37). Well HPGW12, located approximately midway between suspected source areas at Bldgs. 1202 and 1501, was found to contain O&G only in the Set One data. In the Set Two data, only tetrachloroethene was detected. The 1-time detection of this VOC suggests that HPGW12 is located at the edge of a zone of low-level groundwater contamination. The location of the center of this zone of contamination is unclear. The groundwater contour map for the shallow aquifer (Fig. 4-15) indicates that HPGW12 is crossgradient of the VOC-contamination identified in the soil gas at Bldg. 1202, and is upgradient of the groundwater contamination identified at Bldg. 1601. No potential sources of VOC contamination were identified by the records search effort in areas upgradient of HPGW12 (northeast). It is possible that the presampling well purging may have drawn measurable amounts of contamination to HPGW12 from areas that, under natural conditions, would not flow to HPGW12. Well HPGW14, situated midway between suspected contaminant sources in the industrial area and Supply Well 601, was found to contain detectable levels of O&G only. Well HPGW21 was installed to the northwest of the fuel tanks at Site 22 and was found to contain only O&G in the Set One data. Well HPGW29 was installed next to Bldg. 1801, which was found to have a vehicle wash rack and a solvent storage shed associated with it. O&G was the only target analyte detected in the Set One data.

Well HPGW12 was not found to contain detectable levels of the target analytes in the Set Two data. Previously, O&G had been detected. No target analytes were detected in Well HPGW14 in the second set of samples. Previously, O&G had been detected. O&G was the only detected

LEJEUNE DS 5/88A



HPGW21

	Set One	Set Two	Set Three
O&G	200	2,000	--

HPGW14

	Set One	Set Two	Set Three
O&G	200	--	

HPGW12

	Set One	Set Two	Set Three
O&G	200	--	--
Tetrachloro-ethene	--	3.6	--

HPGW29

	Set One	Set Two	Set Three
O&G	200	--	--
Pb	--	52	--

Figure 4-37
CONTAMINANT DISTRIBUTION(ug/L)—
OTHER MONITOR WELLS
HADNOT POINT INDUSTRIAL AREA
SOURCE: Camp Lejeune, 1987.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

target analyte in Well HPGW21 in the Set Two data. The concentration of O&G may be greater than the organoleptic threshold. Well HPGW29 was found in the Set Two data to contain lead in concentrations greater than the MCL. In the Set One data, lead was below the MDL, but O&G was detected.

Well HPGW12 was not found to contain detectable levels of the target analytes in the Set Three data. No target analytes were detected in Well HPGW14 in the Set Three data. Previously, O&G had been detected in the Set One data. Well HPGW21 was not found to contain any target analytes. O&G had been detected in the Set One and Set Two samples. No target analytes were detected in the Set Three samples from Well HPGW29. In previous data sets, O&G had been detectable.

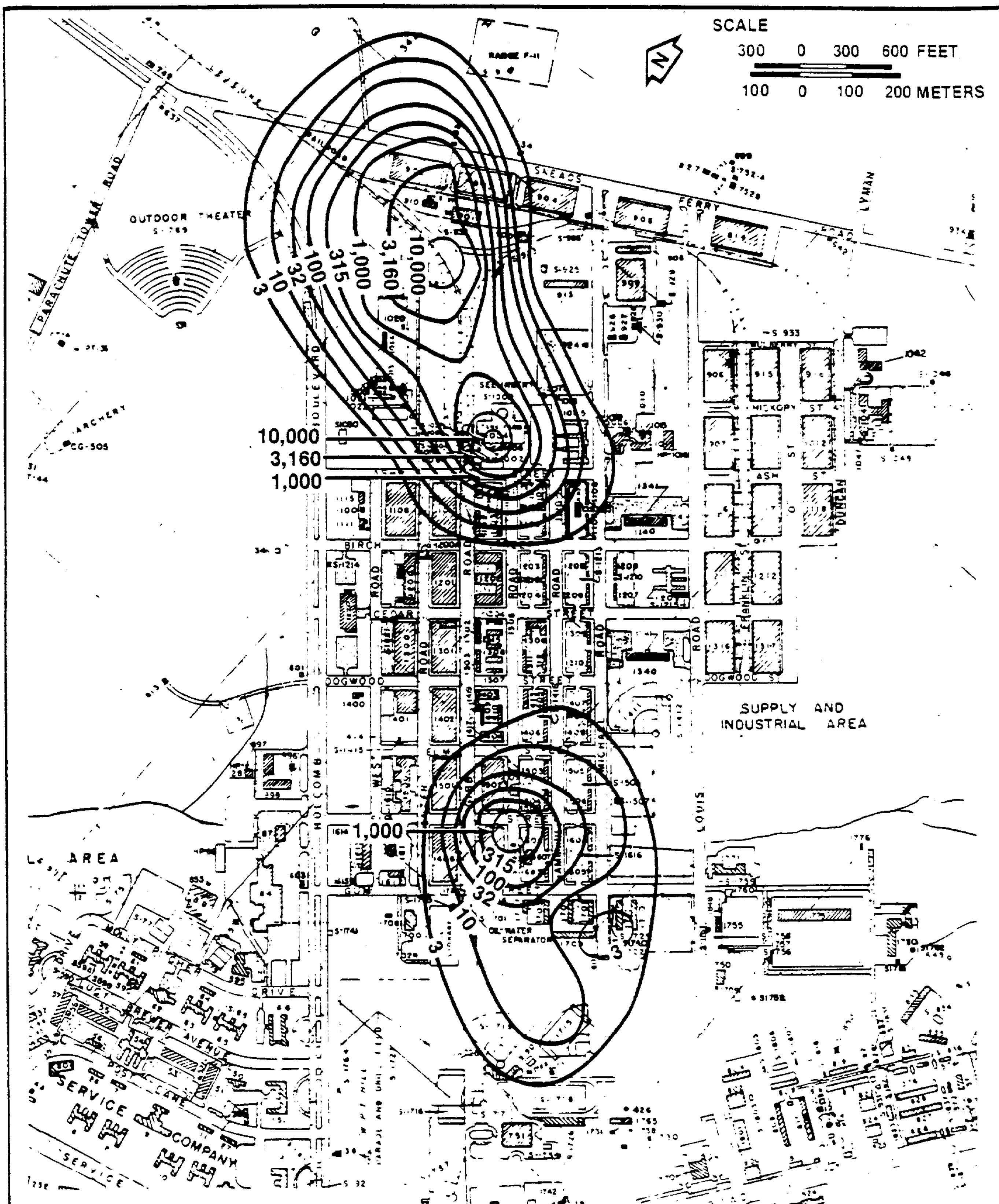
4.4.1.10 Summary of Shallow Aquifer Contaminant Status

The distribution of detected target analytes in the shallow aquifer can be contoured and identifies the presence of two nodes of contamination centered around the vehicle maintenance facility near Bldgs. 901 and 1601. This is shown clearly in Fig. 4-38. The TCE levels detected in the soil gas at Bldg. 1202 were not corroborated by the shallow groundwater geochemistry.

4.4.2 Deep Aquifer

After analysis of the data derived from the shallow well network, a need was recognized for groundwater quality data from deeper aquifer zones. This was specifically true for the area around Bldg. 1202, which has a history of solvent use, high values of TCE in the soil gas, but no VOCs in the shallow groundwater. Water quality data from deeper aquifer zones may identify the presence of VOCs which may have migrated downward as a result of their high density relative to water.

At each of three potential source areas, two additional monitor wells were installed: one well to a depth of approximately 75 ft and another to a depth of 150 ft. These well locations are noted in Fig. 4-6. The



NOTE: ALL VALUES ARE PARTS PER BILLION.

Figure 4-38
TOTAL VOLATILE ORGANIC COMPOUND ISOPLETH MAP — HADNOT POINT INDUSTRIAL AREA
SOURCE: ESE, 1988.

CONFIRMATION STUDY
MARINE CORPS BASE
CAMP LEJEUNE

northernmost cluster of wells (HPGW24, HPGW24-2, and HPGW24-3) is situated adjacent to the TCE tank next to Bldg. 901. The second cluster (HPGW17, HPGW17-2, and HPGW17-3) was installed adjacent to Bldg. 1202. The southernmost cluster (HPGW9, HOGW9-2, and HPGW9-3) was installed within the zone of contamination identified at Bldgs. 1502 and 1601. The 75-ft wells are identified by the -2 suffix, and the 150-ft wells with the -3 suffix.

Following installation and development of the six additional deep wells, one set of samples was obtained. The full data set for these wells is presented in App. J. Of all the target analytes, only MEK was detected and in only two of the 150-ft wells (HPGW9-3 and HPGW17-3). MEK was previously unidentified at HPIA, with the exception of the detection of an unknown compound similar to MEK at shallow well HPGW4.

The current database, therefore, consists of the following information:

1. Trace levels of VOC contamination detected in deep water supply wells surrounding HPIA, and
2. MEK in the deep aquifer beneath two of the suspected source areas within HPIA.

This database is insufficient to determine the overall contaminant status of the deep aquifer, the mechanism(s) by which VOC contamination has reached the affected deep water supply wells, and the size and types of treatment technology which would be required to remediate the groundwater contamination observed in the deep water supply wells. Speculation may suggest that the VOC concentrations observed in the two shallow zones of contamination may migrate horizontally to areas where the semi-confining bed separating the shallow and deep aquifer zones is more leaky and then migrating downward. This cannot be established with the current database.

5.0 SUMMARY OF SURVEY FINDINGS

5.1 RECORDS SEARCH

A number of potential source areas within HPIA were identified, for the most part associated with vehicle maintenance facilities. Three specific areas exhibited a higher probability of actually being the source of the observed contamination: (1) Bldgs. 901, 902, and 903; (2) Bldg. 1202; and (3) Bldgs. 1502 and 1601.

5.2 SOIL GAS INVESTIGATION

The soil gas investigation corroborated the records search efforts by verifying the presence of TCE at the three primary sites. Limited amounts of TCE contamination were detected at sites other than the three major ones.

5.3 GEOHYDROLOGY

The installation of the shallow monitor well network identified the presence of interlayered sands, silts, and clays in the shallow subsurface. This mixed sequence of materials appears to extend to a depth of approximately 100 ft at which point a more permeable unit of sand and limestone dominates the lithology. All potable groundwater at Camp Lejeune is obtained from this sand/limestone interval.

Groundwater flow in the shallow aquifer is toward the New River. In the vicinity of HPIA, the specific flow direction varies from southwest to south to southeast, depending upon which specific area is being considered. The average gradient is approximately 0.20 ft/ft.

Flow in the deeper aquifer zone(s) could not be definitively established by the current base, due to scarcity of data points. The deeper aquifer was found to have an average transmissivity of 9.6×10^3 gpd/ft and an average storage coefficient of 8.8×10^{-4}. The hydraulic conductivity of the semi-confining bed separating the shallow and deep aquifer zones was found to be approximately 4.6×10^{-3} ft/day. The overall average leakance of this semi-confining bed was determined to be 1.1 x 10^{-3} day^{-1}.

5.4 CONTAMINANT STATUS

Contamination within the shallow aquifer has been accurately established. Two nodes of VOC and petroleum hydrocarbon contamination were found to exist. The northern node consists of two separate sources of contamination--one centered near the maintenance facility associated with Bldg. 901, and another centered at the Hadnot Point Fuel Tank Farm (Site 22). Contaminant isopleth modeling suggests that these two source areas may have effectively coalesced into one larger node of contamination. The southern node is centered near the maintenance facility associated with Bldgs. 1601 and 1709. No shallow groundwater contamination was detected in the vicinity of the detected soil gas contamination at Bldg. 1202.

The contaminant status of the deep aquifer has not been clearly established by the current database. VOC contamination has been identified in the water supply wells adjacent to HPIA, indicating that the deep aquifer has been affected by contaminant sources. Deep monitor wells in the central area of the shallow contaminant zones have not identified contamination related to either that observed in the shallow zones, or that observed in the supply wells at the edge of HPIA.

REFERENCES

Cooper, H.H., Jr. and Jacob, C.E. 1946. A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History. Transactions, American Geophysical Union, Volume 27, Number 4, Washington, D.C.

Driscoll, F.G. 1986. Ground Water and Wells, Second Edition. Johnson Division, St. Paul, Minnesota.

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

Hantush, M.S. 1956. Analysis of Data from Pumping Tests in Leaky Aquifers. Transactions, American Geophysical Union, Volume 37, Number 6, Washington, DC.

Hantush, M.S. and Jacob, C.E. 1955. Non-Steady Radial Flow in an Infinite Leaky Aquifer and Non-Steady Green's Functions for an Infinite Strip of Leaky Aquifer. Transactions, American Geophysical Union, Volume 36, Number 1, Washington, DC.

Lohman, S.W. 1979. Ground-Water Hydraulics. U.S. Geological Survey Professional Paper 708. U.S. Government Printing Office, Washington, DC.

Shiver, Rick. August 1987. Personal Communication. North Carolina Department of Natural Resources, Wilmington, North Carolina.

Theis, C.V. 1935. The Relationship Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Ground Water Storage. Transactions, American Geophysical Union, Volume 16, Washington, DC.

Walton, W.C. 1962. Selected Analytical Methods for Well and Aquifer Evaluation. Illinois State Water Survey. Bulletin Number 49, Urbana, Illinois.

Water and Air Research, Inc. 1983. Initial Assessment Study of Marine Corps Base Camp, LeJeune. North Carolina. Gainesville, Florida.

Doc. No.: CLEJ-00258-1.02-05/01/88

CHARACTERIZATION STEP REPORT
FOR HADNOT POINT INDUSTRIAL AREA
APPENDICES
CONFIRMATION STUDY TO DETERMINE
EXISTENCE AND POSSIBLE MIGRATION
OF SPECIFIC CHEMICALS IN SITU

MARINE CORPS BASE
Camp Lejeune, North Carolina

Contract No. N62470-83-6106

Prepared for:

NAVAL FACILITIES ENGINEERING COMMAND
Atlantic Division

Prepared by:

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

May 1988

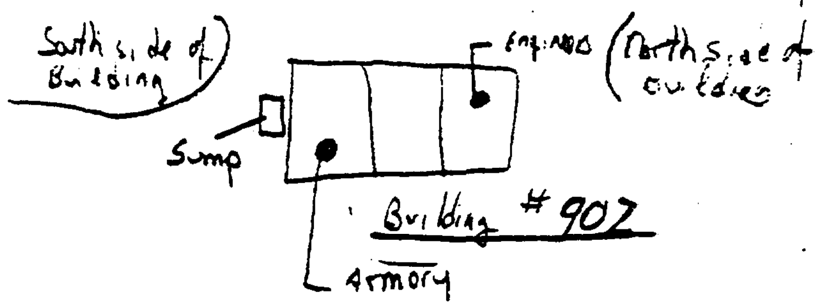
Doc No: CLEJ-00258-1.02-05/01/88

SITE Visits

10/8/86 FSSG

Buildings 901, 902, 905, 909, 908

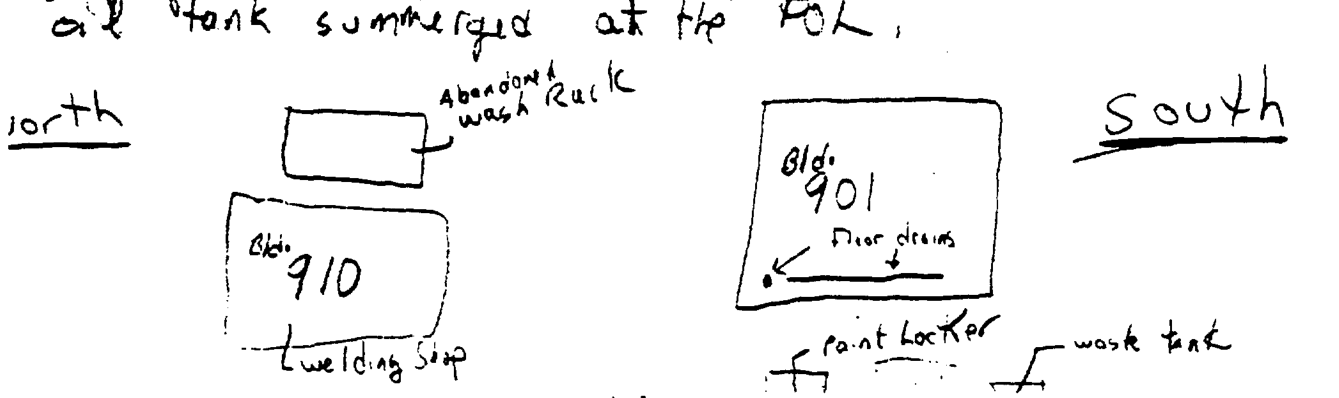
902 - unable to go inside to survey (no Identification and highly secured facility) The Building is devided into 3 Shops. There are 2 of concern for past chemical History: Engineer shop and Armory. The Grounds around the Building look natural, unstained and have heavy Equipment (trucks, artillery, ect..) stored on paved surface. There is a sump and POL area on the Grounds. The Armory uses Organics to Clean their weapons. Organics could have entered the sump



10/8/86 FSSG

901 officer incharge Master Sgt. Aurther

This Building is the tank Rebuild facility. There is long history of degreaser - Organic Solvent and lube - petrol oil usage here. The Working bay is cement with flour drains in spots. It appears there is a sump tank for waste material but there was no documentation. The POL Area houses Solvents and petroleum products (Both raw materials and waste materials) atop of the ground. The Grounds have Heavy Equipment scattered atop of Broken cement. There is at least 1 waste oil tank summerged at the POL.



SITE VISITS

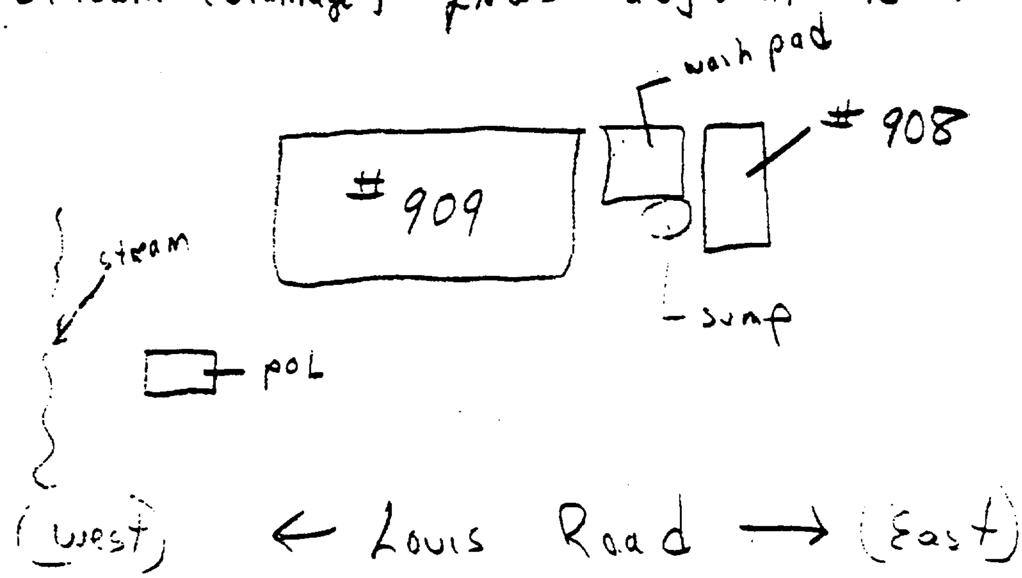
10/8/86 FSSG

905

This is a ware house. There is no sign of chemical usage nor past workshop activity.

908 This is a steel hut that stores paints and painting chemicals. There are large amounts of these substances here.

909 This is a large steel structure with 3 work shops. Of these only Engineers is using organics in their work. Past activities could now support much of the same. There are floor drains in the structure as well as a wash pad adjacent to the building. There is a POL area on grounds which currently contains waste and raw oils, solvents, Battery substances. The Ground adjacent to this POL is badly stained. There is little/no vegetation present. A small stream (drainage) flows adjacent to POL

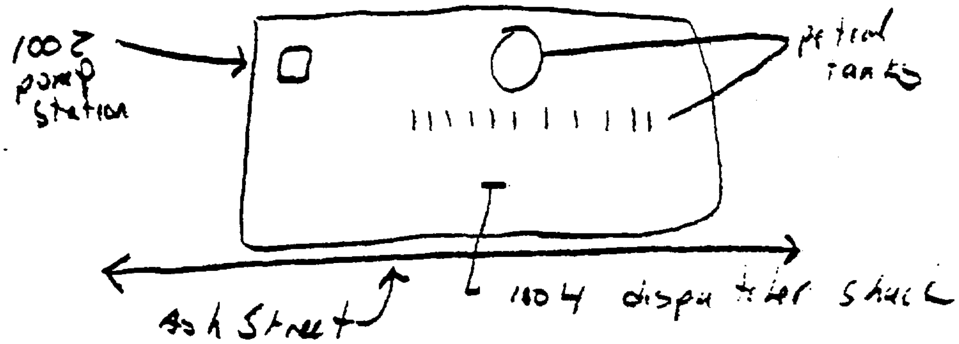


Site Visits

10/9/86 **AC/S Logistics**

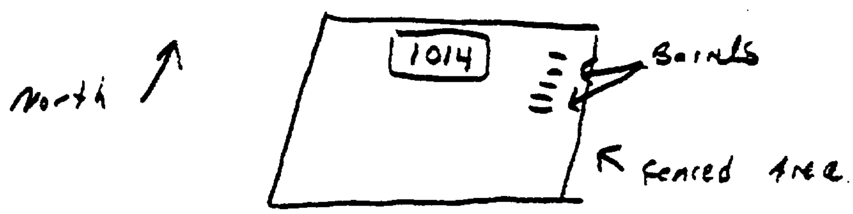
1002 - 1004

This is the fuel farm area for Camp Lejeune. There is evidence of gross spillage of Petrol all around the Area.



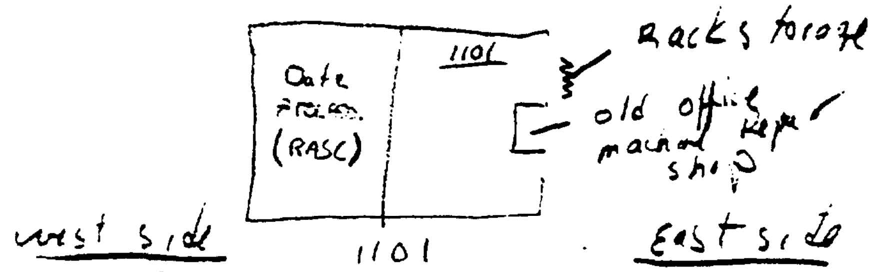
1014

Paint Locker. This has been the Camp paint supply Area for more than 20 years. Solvents have been stored and used here. Solvents-thinners are still stored in 55 gal drums outside Building on ground



1101

This building is standard Warehouse construction. ½ of the Building is data processing (office) and has been for 20 years. The other half is storage for furniture (Special services). There once was a typewriter (office machine) maintenance shop on the East Side. There were solvents used Here and stored on rack outside



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Site Visits

10/9/86 AC/S Logistics

1116 This is the command for AC/S Logistics and there are three functions opperating here. ① Subsistance, ② Food Services ③ 8th Engineers. Of these Engineers are the only ones of concern. They store Caustic and other organic detergents and Bio-decontaminating agents (for nuclear accidents?).

1200-1201

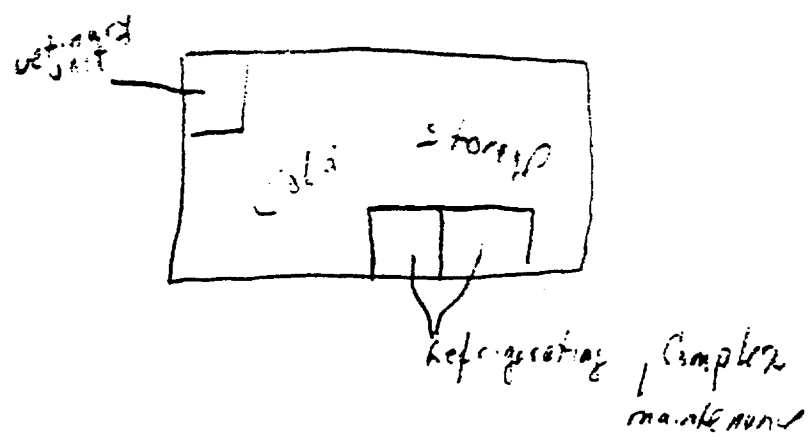
This are the commissary and storage warehouse facilities. There is no concern here. Has functioned for more than 20 years

1212

Warehouse and accounting complex. There is no concern here. All items are non hazardous

1300

This building is the Cold/Frozen storage warehouse for the Commissary. There is a Refrigeration Engineering shop in This Building. Maintenance here is done on machinery. Solvents - degreasing agents are stored and used. Floor drains noticed in work shop.



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10/9/86

Site Visits

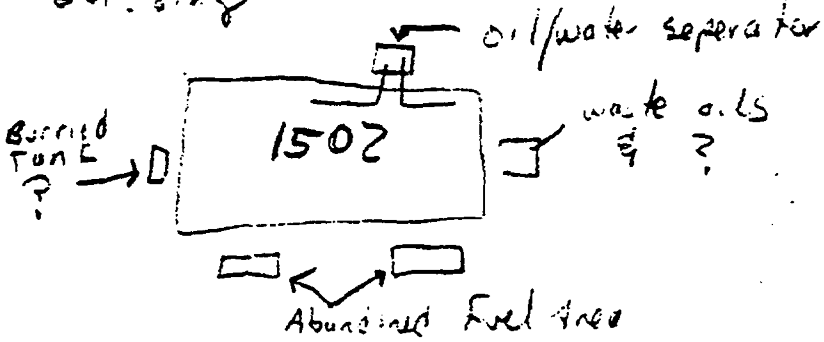
AGS Logistics

* Buildings 1301 - 1307 are not currently housing / using chemicals and historically have not.

* **1316** This is a warehouse for 90% and there is an office machine Repair shop in the building. There are solvents being used but no chemicals escape via operations. Contracted waste disposal.

1502

This is Base maintenance's motor Repair shop. There is heavy use of oils, fuels, solvents etc... The vehicles are worked on in house. Wastes are disposed of via waste tanks (burried). There are several abandoned fuel tanks in front of Building



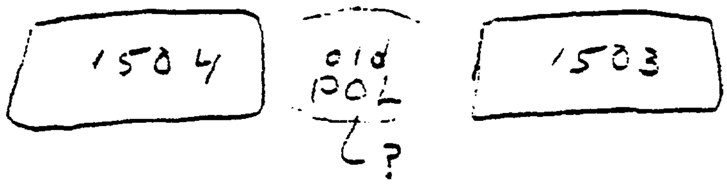
Leads

Spoke to a Robert Mills who worked in [illegible] shop 1960s at Building # 1404. He said there were large amounts of solvents dumped at that [illegible] and poured into sewer drains.

Site Visits

10/9/86
AC/S Logistics
1503 - 1504

This Building is a tire warehouse and inspection facility today, but was a vehicle Repair Shop in 50s and 60s. There is no evidence of Chemical usage or disposal area.



Support Bn

10/10/86
Support Bn.

Building # 1011 is a receiving - shipping warehouse, there are no chemicals used or stored today, in past ?

Buildings 1041, 1042 are Guard barracks and the brig Area respectively. There is a wood working shop, restaurant and laundry Area in the Brig, however, the chemicals used are not solvents.

Building 1044 is a guard shack 1209 is a mess hall and 1340 is a barracks building

1117
The building is a warehouse with an armory inside. There are solvents used here and have been last Ten years. The collection system is the 55 gal drum which is disposed of by the base. Working area kept well clean and contained with little solvent storage.

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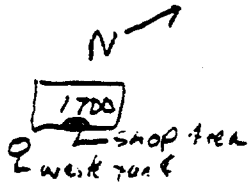
12/14/86
Mrs Marsicano

Site Visits

Base Maintenance

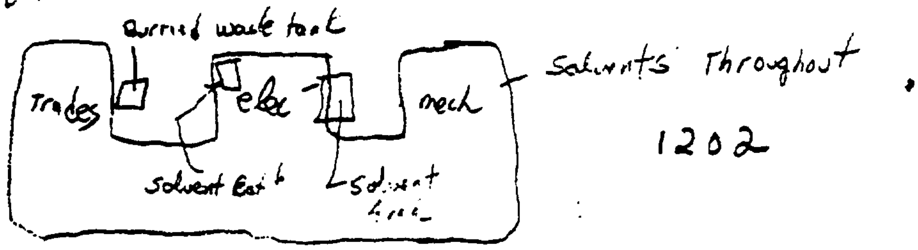


Bldg 1700

Dave Southerlan Escorted me Through the Area. The Complex of Buildings make up the Steam Generation / Heat Source for the Base. There is a machine Repair shop on the bottom level on South side. Solvents and waste solvents are used and stored (waste tank on SW side of Bldg 1700)

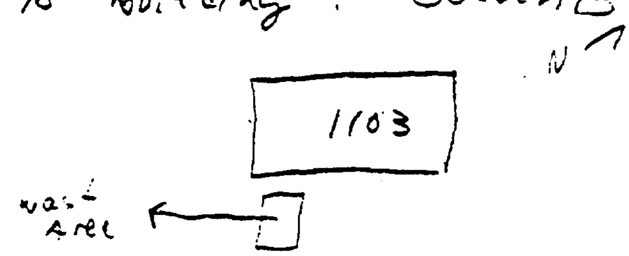
Bldg. 1203

This is maintenance's main bldg. There are three main shops that have maintained. Of these, Mechanics offers great concern along with Electrical. Both have history of TCE and other Solvents. Handling practices (Past/Present) support surface contamination. The third shop "Trades" has history of Solvents too. There have been Solvents used in the Paint operator there and there is a large solvent Bath in opperation.



Bldg # 1103

This is a Paint Storage Facility. There has been history of mixing there. A Bsp is in Area adjacent to Building. Solvents + Wastes present.



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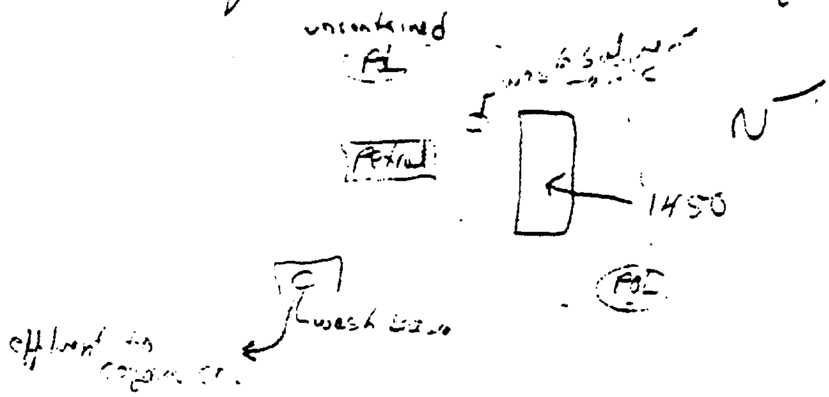
Thursday 10/16

Site Visits

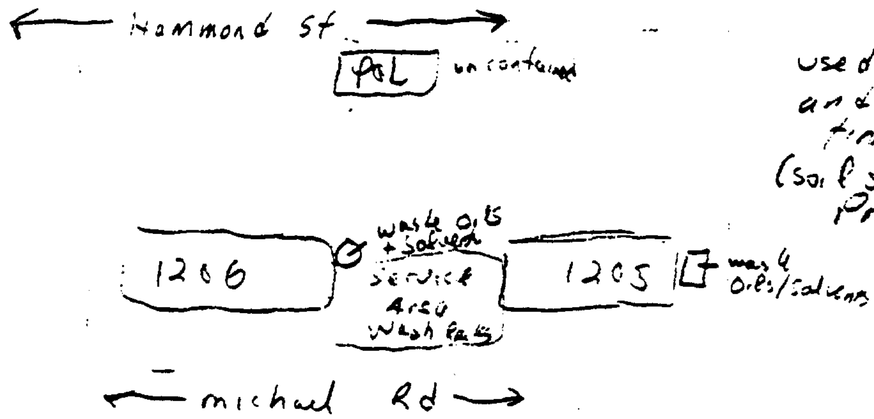
2nd Marine Division

Bldg 1450

This is a maintenance shop complex for Heavy Equipment, tanks, + Artillery. There are Paint lockers spread throughout grounds, also many POL Areas. There is maintenance facility in center of complex which use solvents. There is wash Basin without Oil-Water Separator. Petrol tanks for vehicles in center of facility lot.

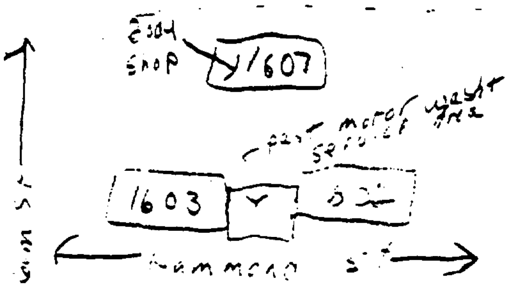


Bldg #1205 - 1206



These Buildings are used for vehicle service and have been for some time. There is evidence (soil stain) that handling practice were poor. Solvents used regularly.

Bldg 1602 - 1603

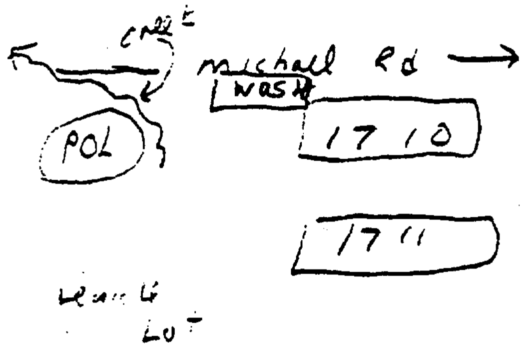


These Buildings are no longer using chemicals however in past maintenance of electrical equip. and vehicles was occuring. Note - Bldg 1607 area is currently and has history of solvent usage.

Site Visits

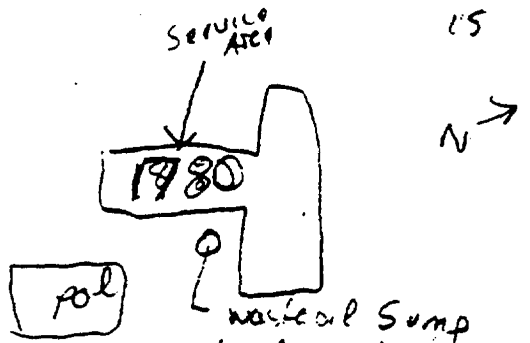
Thursday Oct 16
2nd Marine Division

1710 - 1711



These two Buildings have past + Present Solvent usage. Armory + Vehicle maintenance are of high concern. There is wash area for vehicles along with uncontrolled Pol Area adjacent to small creek

Bldg # 1780

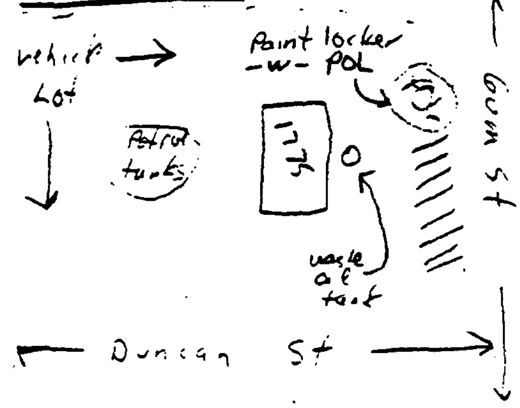


batterys, waste oils, solvents antifreeze in Pol.

This facility maintains heavy equipment. There is past + Present solvent activity. The POL area is badly maintained and uncontrol. There is presently a sump for waste oils

Note * - POl Area is as old as 1960

#1775



This Facility is maintenance Area for Heavy Equipment. There is Past/Present History of solvent use. The POL Area is Eas Z Spills. Wash area gets high use.

Note: Pol has many 55 gal drums of solvents oils ....

Dry Cleaning Types

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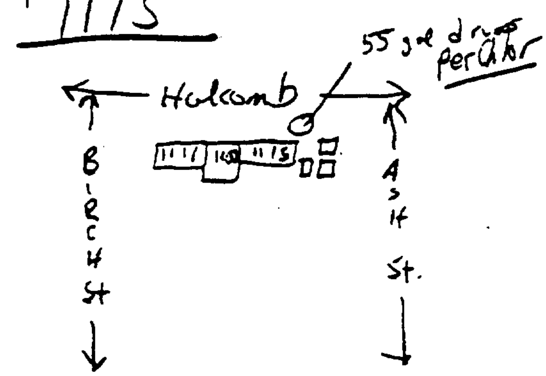
Thursday Oct. 16

Site Visits

2nd Mar. Division

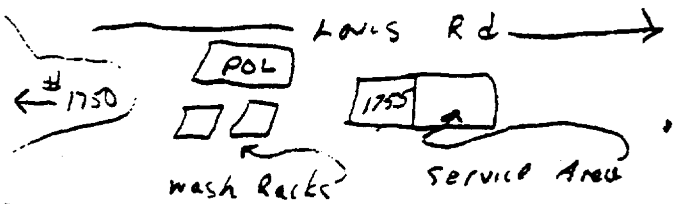
#1115



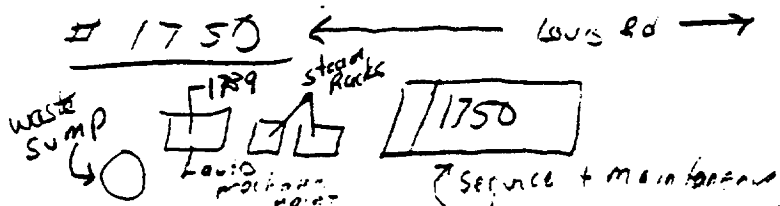
This Facility is a Photo Processing operation, there is use of Various Chemicals including Solvents

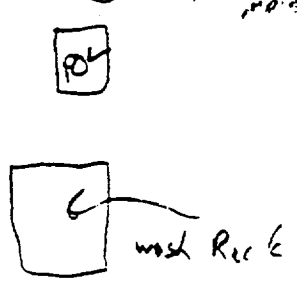
#1755

This Facility is a heavy equip. maintenance shop and small parts Repair. There was/is use of various solvents here. There is POL Area which is not contained. Wash pads are used regularly with Solvent. Note there have been petrol spills on grounds.



#1750





This Facility Services, maintains and Repairs heavy equipment. There is an extensive POL / steam - wash area. The POL is not contained. Past history of spills is known present spills is also acknowleged.

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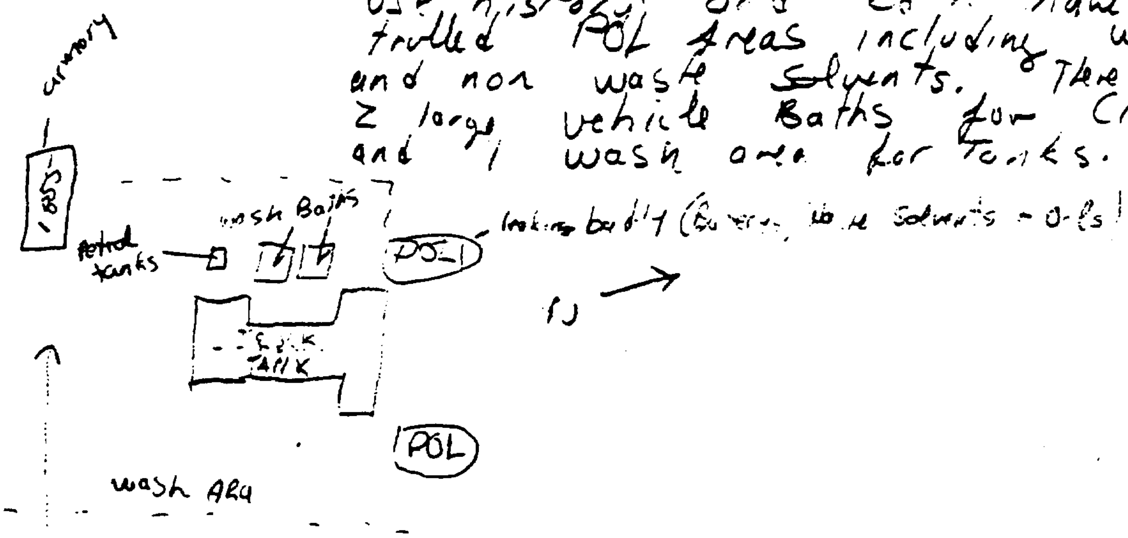
Thurs: Oct 16

Site Visits

2nd Mar Div

Bldg # 1854

This is a multi Purpose Facility. There are Several Heavy Equip. Maintenance Facilities one for trucks another for Tanks. Both have Present/Past Solvent use history and Both have uncontrolled POL Areas including waste and non waste ~~Solvents~~. There are also 2 large vehicle Baths for Cleaning and 1 wash area for Tanks.

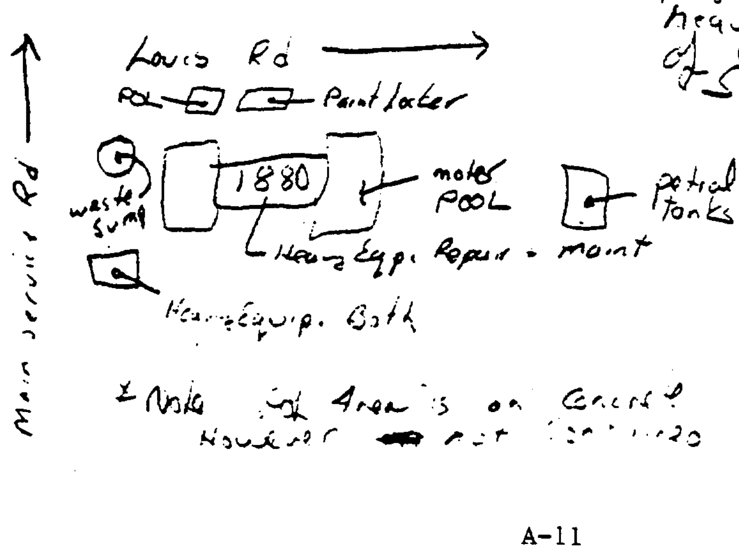


#1855

This Facility is an armory where solvents have and are being used, there are no Signs of contamination, solvents kept in facility little waste

1880

This Facility Repair + Services heavy equipment, large amount of Chemicals used including Solvents ect... There are several fuel tanks on ground



* Note Area is on Concrete However not contained

DOC NO: CLEJ-00258-1.02-05/01/88

Wednesday Oct 15

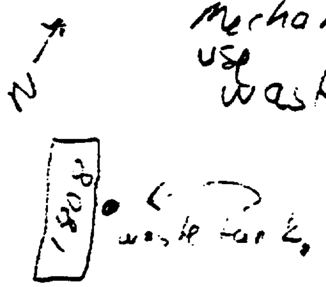
Site Visits

2nd Mar Div

#1804 This Building is storage + maintenance for Generators, small amounts of chemicals used to clean hardware + repair parts. Past was Vehicle Repair Shop (Solvent use likely)

#1802 This Building appears to be storage there is no sign of past chemical activity

#1808 This Building is used for storage currently there is no sign of chemical activity however in past there was Mechanic Shop for vehicles (Solvent use likely) also there is buried waste tank on east side.



#1810 → This Building is administrative offices currently, however, there use to be vehicle maintenance shops, solvent use then likely

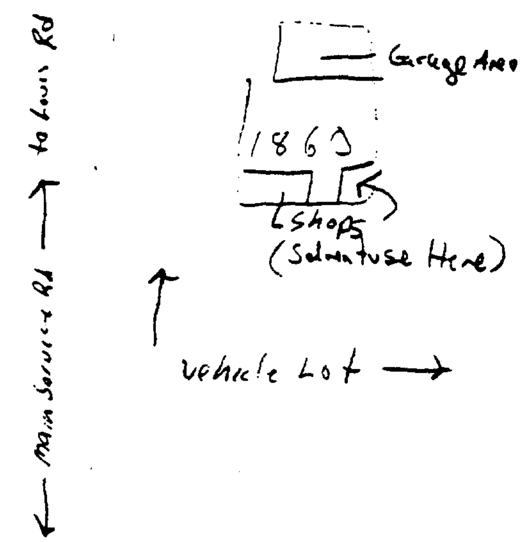
*NOTE intense wash network for vehicle East of above listings (1804-1810) There is now a sump system for waste collection however it is very new past practices run off onto ground.

Doc NO: CLEJ-00258-1.02-05/01/88

Oct 15   Site Visits

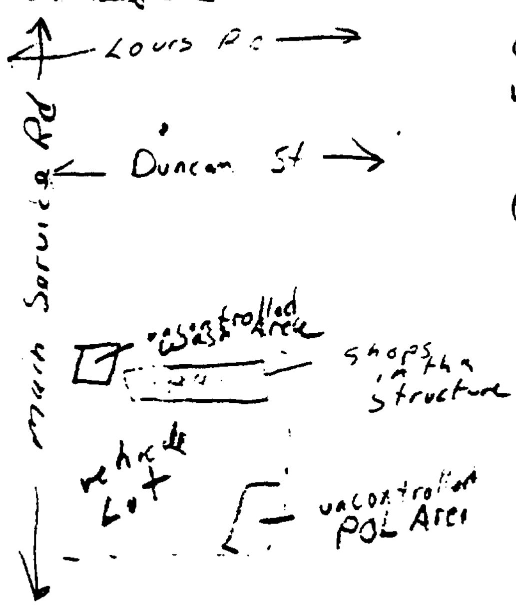
2nd Mar Div

Bldg # 1860



This Building is a multi purpose maintenance facility. Both electric Generators and Vehicles are stored + repaired. Solvent use is found in the garage and shop areas

Bldg # 1841



This is a heavy equipment and Artillery maintenance facility wide use of Solvents + degreasers there is a [illegible] maintained POL area with many vehicles on grounds

DOC NO: CLEJ-00258-1.02-05/01/88

oct 15

Site Visits

2nd Mar Div.

#1819 Did not inspect, particular facility out on float. Appears to have variety of mechanical activity There is no visible POL or other areas of chemical activity

DOC NO: CLEJ-00258-1.02-05/01/88

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
P.O. Box ESE
GAINESVILLE, FLORIDA 32602-3053
(904) 332-3318 TWX 810-825-6310

JOB Camp Lejeune - Record Search
SHEET NO. 1 OF 5
CALCULATED BY ______ DATE ______
~~CHECKED BY~~ ______ DATE 10/14/86
~~SCALE~~ Paul D. Conrad

Time	Notes / Activities
8:30 am.	Met w/ Bob Alexander to begin day. Organized Record Search investigation
	Met Elizabeth Betz (Camp Lejeune Lab) and assisted w/ Brad's lab set ups. (Unloaded supplies from ESE Blazer).
	Met w/ Mrs. Marsicano - Base Maintanance in Bldg. 1202. Rc'd. names of contacts for the various maintanance shops.

Inspected buildings:

Bldg. #	Desciption
1102	Paint Shops & Emergy. Maintanance • chemicals - paints, thinners, kerosene (used for brush cleaning) • interview determined that before ~1979, disposal occurred around the building (in yard) and in landfill. • 2 underground tanks dug up ~ 1984 or '85 ① Paintthinner ② Turpentine (made own, in tanks) • drummed kerosene & thinner presently stored on pallets. No visible releases. • Potential Poll'n Source
1304	Interviewed J. Privett • No storage of chemicals since he's been there (~1965)

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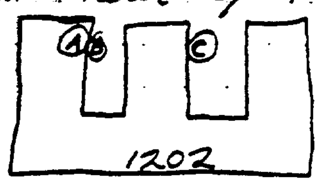
JOB
SHEET NO. 2 OF 5
CALCULATED BY DATE
CHECKED BY DATE 10/14/86
SCALE Paul D. Conrad

- Only chemical is occasional muriatic acid.
- Bldg contains masonry equip. & supplies.
- Release not probable

1202 Began tour w/ Mr. F. Windberey.



Ⓐ - Pentachlorophenol vat. (concrete for a long time)

Ⓑ - Underground tanks reported. Could've been removed. -?-

Ⓒ - Inspectors saw open containers, waste paint vats (spillage), thinner drums, ~~mercury contaminated waste drums~~, drums labelled mercury contaminated waste.

"Paint waterfall" (old unit) visited - dryed paint to landfill
- remaining liquid to drain

Met w/ Mr. Morton to inspect Electric Shop
- Chemicals used: drycleaning solvents, TCE for degreasing motors.
- floor drain in center wing
- Vat of solvent noted - disposal not necessary according to Morton, it evaporates. No visible releases noted.
- No info. avail. concerning past practices

Met w/ ~~Machine~~ Shop personnel.
- acids used, but little solvents.
- area used as machine shop for ~35 yrs.
- floor drain noted.

Bldg. 1202 is potential contamin source.

DOC NO: CLEJ-00258-1.02-05/01/88

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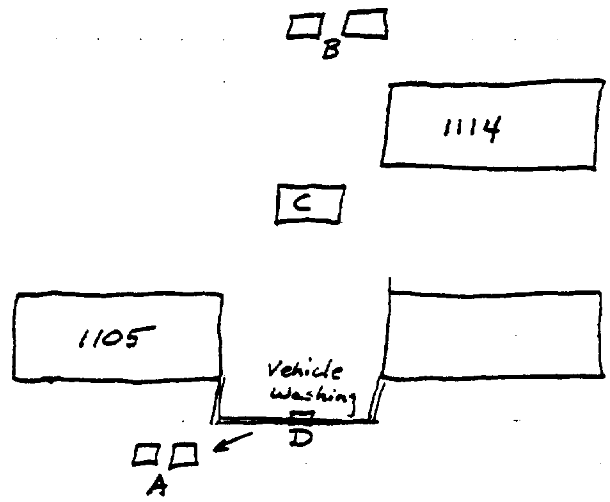
JOB
SHEET NO. 3 OF 5
CALCULATED BY DATE
CHECKED BY DATE 10/14/86
SCALE Paul D. Conrad

1105 Met w/ Phil Grugomus (sp?)



- 1105 used for equip. storage & offices
- vehicle washing - as noted above.
- "D" - sump and paint stg. bldg.
  "A" - oil/water seperator → oil seen in nearby ditch.
- Potential contam'n source → vehicle washing / area.

1114 See above Diag.
- Bldg. used to store landscaping mtrls (lime, seed, fertilizers, etc.) and small engine repair (mowers).
- Chemicals - above, solvent, used oil, etc.
- no floor drains
- "C" - tanks surrounded by low wall. Area drains thru wall, to lot. Leakage seen.
  - used oil tank
  - kerosene
  - diesal fuel
  - gas

  Wall in-place since ~ '81
- "B" - oil/water sep'r.. appears new. Only minor sheen seen on last chamber.
- Potential Contam'n. Source

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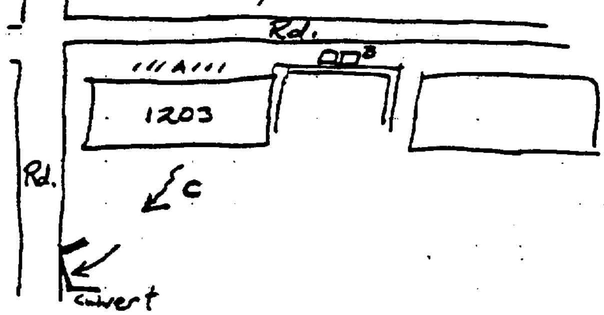
JOB
SHEET NO. 4 OF 5
CALCULATED BY DATE
CHECKED BY DATE 10/14/86
SCALE Paul D. Conrad

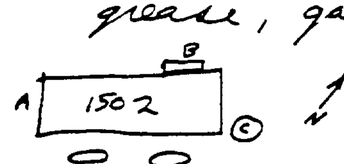
1203 ○ Met w/ Arthur Randalls (??)



- Bldg. used for tire changing, antifreeze changes, vehicle washing
- "A" - minor gnd. stains from fuel oil tanks
- "B" - visible soil contam'n & concrete staining ~~around~~ in oil/water seperator vacinity.
- "C" ~~ol~~ antifreeze dumped on lot. Drains under Rd.
- Potential source of Contam'n.
- 1203 also used by fire dept. No noticable contam'n sources.

1502 Met up w/ David Brentlinger and interviewed J. Ingram.

- Motor T - shop
- Chemicals - used oil, drycleaning solvents, grease, gasoline
-



- "A" - 500 gal. u-gnd. used oil tank. Highly stained gnd.

Doc. No: CLEJ-00258-1.02-05/01/88

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JOB
SHEET NO. 5 OF 5
CALCULATED BY DATE
CHECKED BY DATE 10/14/86
SCALE Paul D. Conrad

- "B" - seperator (oil/water)
- "C" - undergnd tanks - use not known
- "D" - undergnd gas tanks. No longer used. Age? (Pre ~1965).

- Bldg 1502 high potential of contam'n. source. Use of solvents indicates suspect for solvent contam'n.

- Briefly discussed Bldg. 1503 & 1504. Will be inspected on 10/15/86.

10-6-86

0800 - MEETING WITH COL. KIRIAKOPOULOS + DAVID BRENTLINGER TO DISCUSS SCOPE OF RECORD SEARCH + POSSIBILITY OF EXISTING DATA FOR BUILDING USAGE IN THE INDUSTRIAL AREA.

1000 - MEET WITH MRS DECKER AT PLANT ACCOUNT DEPT. WE RECIEVED FROM HER FACILITIES INVENTORY LISTING OF BUILDINGS + STRUCTURES DATING BACK TO 1957. RESEARCH INTO THESE WILL BE DONE TO CHECK INDIVIDUAL BUILDING DESIGNATIONS IN THE INDUSTRIAL AREA FOR POSSIBLE LEADS OF SOIL + OR GW CONTAMINATION SOURCES.

1400 - DRIVE THRU TOUR OF INDUSTRIAL AREA

10-7-86

CONTINUE RECORD SEARCH ALL DAY

10-8-86

1030 - MEETING WITH COL. KIRIAKOPOULOS TO DISCUSS BUILDINGS WE NEED TO SEE IN INDUSTRIAL AREA. WILL MEET TOP AT 1300 ~~FOR~~ AT BLDG 900 FOR START OF INSPECTION.

1300 - MEET TOP AT BLDG 900. HAVE TO CLEAR WITH MAJ. BANCROFT FOR INSPECTION.

1345 - TOP SGT. JONES IS ASSIGNED TO ESCORT US THROUGH HIS AREA FOR INSPECTION

1445 - BLDG 905 -

1500 - BLDG 909 - Vehicle Assembly. WASH ~~RACK~~ PAD BETWEEN 905 + 909 FLOWS INTO A SUMP BUT CAN ALSO FLOW TO STORM DRAIN. IF DEGREASERS WERE USED THIS CAN BE A POSSIBLE SOURCE.

S-946 + S947 - CONDEMNED WASH RACKS.

S-925

1515 - BLDG 901 - COM. VEH. MAINT. - OLD STOPPED UP FLOOR DRAIN IN SW CORNER OF BLDG. POSSIBLE PAST CLEANING AREA. OUTSIDE ON CONCRETE APRON IS EVIDENCE OF CLEANING BY STORM SEWER

BLDG 900 - OK

DOC NO: CLEJ-00258-1.02-05/01/88

10-8-86
1515 – Bldg 910 – Welding Shop.
S-921 – ABANDONED WASH RACK UNCONTROLLED DRAINAGE, POSSIBLE
1530 – Bldg 902 – EAST WALL FLOOR DRAINS HAVE BAD ODOR & POSSIBLY CONNECTED WITH S-936 which APPEARS TO BE AN old oil/WATER BAFFLE SEPARATOR. IF CLEANING SOLVENTS WERE USED IN PAST THIS could BE A SOURCE OF CONTAMINATION.

10-9-86

1341 – Bldg. 914 – Warehouse
1350 – Bldg. 907 – Warehouse
1400 – Bldg. 915 – PRESENT SOLVENT DRAIN FROM WASH ~~HOSE~~ LINE, BARE SPOT ON GROUND OUTSIDE OF Bldg. South SIDE.
1415 – Bldg. 916 – DRUM STORAGE OUTSIDE OF Bldg. South SIDE LEAKING KERO. DRUMS, WEST SIDE OIL+GAS DRUMS DAMAGED/OPEN TO WEATHER. DRUMS have BEEN THERE FOR A LONG TIME THEN WERE PUMPED OUT.
1430 – Bldg. 1211 – WAREHOUSE
1435 – Bldg. 1317 – WAREHOUSE
1440 – Bldg 1308 – LARGE BARE SPOT Surrounding Partially Buried Kero. Stg. TANK. North EAST CORNER OF Bldg
1450 – Bldg 1108 – WAREHOUSE
1530 – GAS LEAK IN Bldg. 905 AREA. NORTH INDUSTRIAL AREA EVACUATED

10-10-86

0830 – MEETING with MAJ. BANKROFT + Cpt. RIVERA TO UPDATE THEM with my progress.
0900 – Bldg 904 – WAREHOUSE
0905 – Bldg. 903 – WAREHOUSE
0950 – MEET WITH MSgT. Toher H&S Bn.
1010 – Bldg 913 – VEH MAINT. (HEAVY EQUIP) BATTERY ACID IN NE. CORNER OF Bldg, WEST SIDE oil CONTAMINATED SOIL IN BAGS STORED ON PALLETS OUTSIDE ON GROUND NEXT TO DRAINAGE DITCH ALSO USED OIL DRUMS SAME AS Soil BAGS, NORTH SIDE OLD KERO. DRUMS OPEN AND NEXT TO DRAINAGE DITCH.
Bldg S951 – EMPTY
S-946 – SIX WASH PITS WITH DRAIN TO STORM SEWER.

DOC NO: CLEJ-00258-1.02-05/01/88

10-10-86

1035 – Bldg 1309 } POL AREA BETWEEN Bldgs. Visible oil going
Bldg 1310 } INTO DITCH.
1047 – Bldg 1405 } WASH/GREASE RACK BETWEEN Bldgs. RECENT
Bldg 1406 } OIL/WATER SEP.(1983) & BERM AROUND PAD. RACK HAS
BEEN IN USE SINCE 1942. PAST PRACTICES MAY
HAVE BEEN TO DRAIN INTO EXISTING DITCH.

10-15-86

1315 – Bldg. 1601 – Floor drains Plugged. POL AREA HAS EVIDENCE
OF QUITE A FEW SPILLS. USE OF CHEMICAL CLEANERS
& DEGREASERS HIGHLY SUSPECTED.
1325 – Bldg. 1607 – MYSTERIOUS SUMP ON WEST & EAST SIDE OF Bldg. WEST
SUMP DRAINS FROM INSIDE Bldg. TO SEWER & IS FLOWING,
EAST SUMP IS FULL WITH OILY RESIDUE & DOES NOT APPEAR
TO BE FLOWING. WEST SIDE Bldg HAS A BOLTED SHUT
RECTANGULAR SUMP, UNKNOWN USE.
1345 – Bldg. 926 } KERO. TANK WITH BAD LEAK IN PAST. ~~OIL~~ CONTAMINATED
Bldg. 927 } SOIL REMOVED & SAND BAGS PLACED UNDER KERO. TANK.
Bldg. 928 } POL AREA HAS BAD DRAINAGE.
1355 – Bldg. 924 – LATRINE
1415 – Bldg. 1012 – North side Bldg HAS Leaky KERO. TANK, Ground CONTAMINATED.
1430 – Bldg. 1311 } – ELEC/COM SHOP
Bldg. 1312 }
1445 – Bldg. 1604 } – WASH/GREASE RACK BETWEEN Bldgs. OIL CONTAMINATED
Bldg. 1605 } DITCH Around #1604
1500 – Bldg. 1771 – ELEC. MAINT.
1520 – Bldg. 1828 – EAST SIDE Bldg WASTE OIL TANK HAS CONTAMINATED
SOIL AROUND IT.
1525 – Bldg. 1826 – Old GREASE RACK WITH DRAIN TO DITCH. WASTE oil TANK
AT GREASE RACK WITH SATURATED GROUND.
1530 – Bldg. 1827 – WAREHOUSE
1535 – Bldg. 1817 – CONCRETE PAD EAST OF Bldg. SEEMS TO HAVE BEEN
USED FOR WASHING, OIL TANK STORAGE NOW WITH SPILL AREA.
PAD DRAINS TO GROUND WITH SOIL CONTAMINATION SHOWING.
POL AREA WITH HEAVY SOIL CONTAMINATION, LARGE SUMP
WITH HEAVY OIL RESIDUE.
1540 – Bldg. 1820 – LATRINE
1545 – ~~Bldg~~ 1815 – EMPTY Bldg. NEARBY EAST DIESEL Pump & U/G TANKS South
SIDE
Bldg 1816 – EMPTY
Bldg 1819 – WAREHOUSE

DOC. NO: CLEJ-00258-1.02-05/01/88

10-16-86

0800 — Bldg. 1871 - Elec/Com
Bldg. 1872 - Elec/Com
0825 - Bldg. 1118 - Warehouse
0830 - Bldg. 906 - Warehouse
0845 - Contact Maj. Bancroft's office to notify of leaving FSSG Area.
0910 - Arive at Base Maintenance Bldg. 1202
0930 - Bldg. 1013 - Transformer storage
0940 - Bldg 1104 - Telephone Shop - Past use of wash pad without oil/water separator.
0945 - Bldg. 1141 - Utility Bldg. for Barracks
0950 - Bldg. 1204 - Base Tele. storehouse - wash pad between Bldgs with probable past use without oil/water separator.
0955 - Bldg. 1341 - Utility Bldg. for Barracks
1000 - Bldg. 1700 - Steam Plant - Coal All + oil storage spill Area
1005 - Bldg. 1708 - Steam Line House
1020 - Meeting with Mike Stern for Bldg. location info.
1315 - Bldg. 1005 - Admin.
1325 - Bldg. 1400 - Fire Station
1330 - Bldg. 1403 - MC Exchange
1340 - Bldg. 1117 - Warehouse
1345 - Bldg. 908 - Paint Shop - Thinner spills
1350 - Bldg. 1407 } wash pit between Bldgs. Probable past
Bldg. 1408 } oil spills.
1400 - Bldg. 1006 - Seems to be empty - Asbestos Abatement in progress.
1405 - Bldg. 1401 - Package Store
1410 - Bldg. 1010 - Food Director
1413 - Bldg. 1015 - Cold Storage
1417 - Bldg. 1207 } OLD MC EXCHANGE
Bldg. 1208 }
1420 - Bldg. 1220 - Rest.
1425 - Bldg. 1402 - Exchange Warehouse
1428 - Bldg. 1413 - Exchange Warehouse
1430 - Bldg. 1011 - Warehouse - North side of Bldg. POL + oil tank with soil contamination.
1440 - Bldg 1441 }
Bldg. 1442 } BRIG
Bldg. 1444 }
1445 - Bldg. 1209 - ~~B~~ Mess Hall
1450 - Bldg. 1340 - Barracks

DOC NO: CLEJ-00258-1.02-05/01/88

10-17-86

0830 - Bldg. 934 } C. S. Chamber
Bldg. 935 }
0835 - Bldg. 943 - Field Storehouse
0840 - Deliver 3 Soil Gas Samples.
0905 - Bldg. 1046 - Storehouse - Brig
0910 - Bldg. 1140 - Barracks
0920 - Bldg. 1057 - MC Exchange
Bldg. HP1016 - Admin.
0925 - Bldg. 1107 - Ceramic Shop } Pad Between } Hobby Shops
Bldg. 1106 - Wood Shop } Bldgs
Bldg. 1120 - Auto Shop
Bldg. S1124 -
0930 - Bldg. 1103 - Natural Resources - Old Grease Rack North end of Bldg.
0935 - Bldg. 1113 - Hobby Shop Body Shop
0940 - Bldg. 1100 } Printing Shop - Former Service Station. Pad Between
Bldg. 1111 } Bldgs Has Possible Contamination.
Bldg. 1115 }
0950 - Bldg. 1409 - Navy Patrol Boat Shop
Bldg. 1410 - Field Training Bldg
Bldg. 1419 - Navy Patrol Boat Shop

DOC. NO: CLEJ-00258-1.02-05/01/88

[redacted]

*Possible Source

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB Camp Lejeune 86601
SHEET NO. 1 OF 5
CALCULATED BY ______ DATE ______
CHECKED BY [illegible] DATE 10-7-86
SCALE ______

*Check Log Book

INDUSTRIAL AREA

2d Force-Service Support Group (Code #91)

900 [redacted] - INSTR REPAIR
901 - ORDNANCE SH 57-67, VEH MNT 67-72, CMBT ORG TL 72-74, Field MNT 74-86
902 - ORDNANCE WHSE 57-65, CONST EQ MNT + Sm. Arms 65-86
903 [redacted] - ORDNANCE WHSE 57-65, GEN. WHSE 65-86
904 [redacted] - ORDNANCE WHSE 57-65, GEN WHSE 65-86
905 [redacted] - Signal Supply WHSE - 57-65, GEN WHSE - ELEC MNT 65-72, SAME + BAT. HQ 72-86
906 [redacted] - QM WHSE 57-65, GEN WHSE 65-74, Disp/Sal/SC 74-79, GEN WHSE 79-86
907 [redacted] - QM WHSE 57-65, GEN WHSE 65-86
909 - STG Bldg 57-65, Prod FACS/other 65-67, MNT TANK AUTO 67-74, GEN WHSE + AUTO ORG TL 74-86
910 [redacted] - WHSE 57-65, ST COU ORG/other 65-67, CONST. EQ SHOP 67-44, WELDING 44-86
911 - Armory Bldg 57-65, MAINT FAC/other 65 - TORN DOWN, Rebuilt 85 HAZ FLAM STHSE
/ 913 - WHSE 57-65, CMBT VEH MNT 65-76, Field MNT 76-86
.14 [redacted] WHSE 57-86
X 915 - WHSE 57-86
X 916 - WHSE 57-76, WHSE + ARMORY 76-86
924 [redacted] - LATRINE 60-86
926 - Admin 65-67, GEN. WHSE 67-86
927 - Admin 65-67, GEN WHSE 67-86
928 - AUTO VEH MNT 65-67, Admin 67-72, BAT. HQ 72-76, STGE/O/SPOT MC 76-84
1012 - WHSE 57-86
1108 [redacted] - WHSE 57-86
1118 [redacted] - WHSE 57-86
1211 [redacted] - WHSE 57-86
X 1308 - Storage 57-65, Admin. 65-66, Admin + GEN STG 66-86
/ 1309 - STORAGE 57-67, GEN. WHSE 67-86
/ 1310 - Equip. STG 57-65, AUTO VEH MNT 65-86
1311 [redacted] - Repair SHOP 57-65, ELEC MNT + STG 65-67, GEN WHSE 67-86
1312 [redacted] - REPAIR SHOP 57-65, ELEC MNT + STG 65-67, GEN. WHSE 67-86
1377 [redacted] - WHSE 57-86
/ 1405 - Repair Shop 57-65, Com VEH MNT 65-68, Com. VEH MNT + WHSE 68-72, Com VEH MNT + Paint 72-
/ 1406 - MT Repair 57-65, Auto VEH MNT 65-86

Doc. No: CLEJ-00258-1.02-05/01/88

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB Camp Lejeune 866601
SHEET NO. 2 OF 5
CALCULATED BY ____ DATE ____
CHECKED BY [signature] DATE 10-7-86
SCALE ____

INDUSTRIAL AREA

HQTRS Bn, MCB (code # 25)

900 [redacted] - SEE #91
1000 [redacted] - OFFICE Bldg - Pub Wks 57-86
1046 [redacted] -
1400 [redacted] - FIRE HSE 57-86
1403 [redacted] - MC Xchg & WHSE 57-86

DEFENSE PROP DISPOSAL OFFICE (code #61)

906 [redacted] - SEE #91
1117 [redacted] - WHSE 57-73, WHSE & ARMORY 73-86

BASE MOTOR T (code # 50)

904 - CENTRAL PAINT SHOP 57-70, COM. VEH MNT 70-
1407 - MT OFFICES 57-72, GEN WHSE 72-86
1408 - EQUIP. STG 57-68, GEN WHSE 68-86

AC/S, Logistics (code # 60)

915 - SEE # 91
1002 - FILLING STATION 57-86
1004 - PUMP STATION 57-72, PIPE 72-86
1014 - STGE 57-65 & ST COV ORG/OTH 65-70, GEN WHSE
1101 - IBM 57-59, GEN WHSE 59-72, GEN. WHSE & DATA PROC 72-86
1110 [redacted] - WHSE 57-86
1200 [redacted] - COMMISSARY 57-86
1201 [redacted] - WHSE 57-86
1212 [redacted] - WHSE 57-86
1300 [redacted] - Cold STGE 57-86
1301 [redacted] - WHSE 57-86
1302 [redacted] - Lumber STGE 57-65, ST COV org/oth 65-70, GEN WHSE 70-76, PW SHOPS EXCHNG 76-86
03 [redacted] - Lumber STGE 57-65, ST COV org/oth 65-70, GEN WHSE 70-76, GEN STOR SHED 76-86
1305 [redacted] - Lumber STGE 57-65, ST COV ORG/oth 65-70, GEN WHSE 70-76, GEN STOR SHED 76-86
1306 [redacted] - " " " GEN STOR SHED 76-86

[redacted] SAME AS 1306 BUT GEN WHSE 76-86
[redacted] Lumber KILN 57-65, Prod PROC 65-67, ST COV org
[redacted] WHSE 57-86
[redacted] SCALE HOUSE 57-86

Doc No: CLEJ-00258-1.02-05/01/88

JOB	Camp Lejeune 86601
SHEET NO.	3 OF 5
CALCULATED BY	DATE
CHECKED BY	JWH DATE 12-7-86
SCALE	

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
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INDUSTRIAL AREA

AC/S TRAINING (code #31)

919 - TRNG BLDG 65-74, RANGE BLDG 74-86
934 [redacted] - APPL INSTR BLDG 70-
935 [redacted] - " 70-
943 [redacted] - GEN STG SHED 70-86
1404 [redacted] - OFFICE EQUIP REPAIR 57-86
1407 [redacted] - STG. DECON BLDG 57-65, ST COU ORG/OTH 65-68, GEN. WHSE 68-74, ADMIN 74-86
1410 [redacted] - FURN REPAIR 57-67, PW MAINT 67-74, ADMIN 74
1919 [redacted] - HAZ FLAM STOR HSE 77-86

BASE MAINTENANCE (code #30)

939 - PAV/GR EQP SHED 65-86
940 - " 70-86
946 - " 77-86
1013 - STG BLDG 57-65, ST COU ORG/OTH 65-70, GEN WHSE 70-86
1102 - EQUIP STG 57-65, ST COU ORG/OTH 65-70, PW MAINT 70-86
1104 - " 57-65, ST COU ORG/OTH 65-70, TELE EX 70-73, PW STG 73-86
1105 - " 57-65, PW MAINT 65-72, G SPT EQUIP 72-86
1114 - " 57-65, ST COU ORG/OTH 65-70, PW MAINT 70-72, G SPT EQUIP 72-86
1127 [redacted] - HAZ FLAM STOR 79-86
1141 [redacted] - MTS UTL PLT 76-86
1202 - CAMP MAINT 57-65, PW MAINT 65-86
1203 - EQUIP STG 57-59, MT OPER 59-65, ST COU ORG/OTH 65-72, VEH HOLD SHED 72-86
1204 - " 57-65, ST COU ORG/OTH 65-68, GEN WHSE 68-70, PW MAINT 70-86
1300 [redacted] - SEE #60
1304 [redacted] - LUMBER STG 57-65, ST COU ORG/OTH 65-70, PW MAINT 70-86
1341 [redacted] - MTS UTL PLT 77-86

SPECIAL SERVICES (code #18)

997 - LATRINE 74-86
1106 - HOBBY SHOP 57-86
1107 - " 57-86
1113 [redacted] - EQUIP STG 57-65, PW MAINT 65-66, HOBBY SHOP 66-86

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SCALE

INDUSTRIAL AREA

Cmd Club Management Sys (code #71)

1006 [redacted] Cafe 57-86
1401 [redacted] Bakery 57-72, Gen Whse 72-86

Marine Corps Exchange (code #41)

1006 [redacted] - See #71
1010 [redacted] - Barracks 57-59, STGE 59-65, ST COU ORG/STH 65-
1015 [redacted] - Cold STGE 59-65, Cafe 65-86
1207 [redacted] - Service Club 57-65, Xchg 65-86
1220 [redacted] Rest 79-86
1409 [redacted] - Whse 57-86
13 [redacted] MC Xchg 57-86

Support Bn, MCB (code #10)

-1011 - Whse 57-86
1040 [redacted] - DISP 69-86
1042 [redacted] - UPEH 74-86
1044 [redacted] - SENTRY 82-86
1117 [redacted] - WHSE 57-
1209 [redacted] - Mess 57-65, Substnce Bldg 65-86
- 1318 ACD/GEN INS BLDG 67-86
1340 [redacted]

Naval Hospital (code #16)

1041 [redacted] SEE #10
1300 [redacted] SEE #60

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SCALE

INDUSTRIAL AREA

Reserve Support Unit, MCB (code #40)

1111 - MC Xchg 57-65, ST (oU ORG/OTH 65-86
1403 [redacted] - MC Xchg 57-67, Thrift Sh 67-86

2d Marine Division (code #90)

1115 [redacted] - MCX Service STA 57-65, Admin 65-72, DATA PROC 72-76, Printing Plant 76-86
1140 [redacted] - Admin 76-86
1205 - MT Repair 57-86
1206 - " 57-86
1208 [redacted] - MC Xchg 57-65, Admin 65-86
1301 [redacted] - See #60
1450 - AUTO ORGTL SH 81-86
1451 - HAZ FLAM STHSE 81-86

AC/S, Man Power (code #13)

1403 [redacted] - See #40

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SCALE

0833 - Bldg - 934 } C.S Chamber
Bldg. - 935

0835 - Bldg. - 943 - Field Store House

0840 - Deliver 3 ~~AA~~ Soil GAS SAMPLES

0905 - Bldg - 1046 - STORE HOUSE BLG

0910 - Bldg 1140 - BARRACKS

0920 - Bldg 1057 - MC EXCHANGE
Bldg HP1016 - Admin

0925 - Bldg 1107 } - CERAMIC SHOP } PAD BETWEEN Shops: Oil change from vet
Bldg 1106 - Wood SHOP ← Soil CONTAMINATION NORTH GATE.
Bldg 1120 } Hobby Shops.
Bldg S1124

0930 - [redacted] - P.T. Resc - OLD GREASE RACK NORTH END

0935 - Bldg 1113 - Hobby Shop - Body Shop

0940 - Bldg 1100 }
Bldg. 1111 } Printing Shop - P.T Between Bldgs Possible Oil contamination
Bldg 1115

0950 - Bldg 1409 - NAVY PATROL BOAT Shop
Bldg 1410 - Field Training
Bldg 1419 - NAVY BOAT SHOP

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JOB Record Search Survey [illegible] 4
SHEET NO. 01 OF 04
CALCULATED BY David Breitlinger DATE 10/7/86
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SCALE ________

RECORD SEARCH

2nd Marine Division

	1703	Auto ORGTL Shop
1702	[redacted]	Scale House
	1704	Gen STG A/G ORG
	1705	GEN STG A/G ORG
	1706	Misc. Shelter Pipe
	1707	Elec /Com / MNT SH
	1709	G/SPT EQ Bld. / STGE/O/STOR
	1710	GEN STG A/G ORG
	1711	Auto ORGTL Shop
1739	[redacted]	Auto ORGTL Shop
	1750	Auto ORGTL Shop
	1755	Auto ORGTL Shop
	1757	HAZ FLAM. STHE
1760	[redacted]	Dispatcher Shack
	1775	Auto ORGTL Shop
	1780	Auto ORGTL Shop
1802	[redacted]	GEN/ STG A/G ORG
	1804	Auto ORGTL Shop
	1808	Auto ORGTL Shop
	1810	Wood Wk. Shop
1819	[redacted]	Auto ORGTL Shop
	1841	Auto ORGTL Shop
	1849	HAZ FLAM STHSE
	1854	Auto ORGTL Shop
	1855	GEN STG A/G/ ORG
	1860	Elec / Com / MNT SH
1870	[redacted]	GEN STG A/G/ORG
	1880	CBAT VEH MNT SHP
	1883	HAZ FLAM STHSE
	1884	GEN STRG SHED

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JOB Record Search Survey
SHEET NO. 02 OF 04
CALCULATED BY David Brentlinger DATE 10/7/86
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SCALE ______

Record Search

2nd Marine Division

1602 [redacted] Elec-Com / Fld MNT Shop
1603 [redacted] Elec -Com MNT Shop
1505 Auto ORGTL Shop
1506 Auto ORGTL Shop
1450 Auto ORGTL Shop
1451 HAZ FLAM STHSE

2nd Force Service Support Group

1771 [redacted] Elec Com MNT SH
1815 Auto ORGTL Shop
16 [redacted] HAZ Flam STHSE
1817 Auto ORGTL Shop
1819 [redacted] Auto ORGTL Shop
1820 [redacted] Latrine / Dispsry
1826 Auto ORGTL Shop
1827 Auto ORGTL Shop
1828 Auto ORGTL Shop
X 1851 GEN STG 40GODEG
1871 [redacted] ADMIN / GEN STG 4/6 / ORG
1872 [redacted] GEN STG 4/6/ORG
1601 CO/BTTRY HDQRTS / Fld MNT SH
1602 [redacted] Elec / Com MNT SH
1604 Auto ORGTL Shop
1605 Auto ORGTL Shop
1607 VEH Hold Shed
X 1405 Elec / Com MNT SH
X 1406 Elec / COM MNT SH

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JOB: Record Search Survey
SHEET NO. 03 OF 64
CALCULATED BY: David Breedlove DATE: 10/7/86
CHECKED BY: DATE:
SCALE:

Record Search

Base Maintenance

1700 Heat Plant
1708 [redacted] Heat Plant
1736 [redacted] Shelter Misc. Pipe
1769 HAZ FLAM STHSE
1509 PW Maint. ISS SH

AC/S Logistics

1702 [redacted] Scale House
1706 [redacted] Shelter, Misc. Pipe
1500 [redacted] Laundry
1501 [redacted] Exch CTY WHSE
1503 [redacted] (Tire) Warehouse

Special Services

1730 HAZ FLAM STHSE
1731 HAZ FLAM STHSE
1737 GEN STG SH
1738 HAZ FLAM STHSE
1765 Spec Service MNT

Marine Corps Exchange

1610 Exch Service Station
1611 Exch Service Station
1612 Exch Service Station

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JOB Record Search Survey
SHEET NO. 04 OF 04
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SCALE ______

Record Search

Marine Corps Exchange

1615 Filling Station
1614 Filling Station
1613 Filling Station
1501 [redacted] EXCH CENT WHSE

Support Bn MCB

1501 [redacted] GEN STG 4/6/ORG

Base Motor Transport

1502 Auto VEH MNT / GEN WHSE

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JOB Camp Lejeune 86601
SHEET NO. 1 OF 7
CALCULATED BY [signature] DATE
CHECKED BY DATE 10-6-86
SCALE

INDUSTRIAL AREA Building List

BLDG.	Building Designation	Prog. Adm	Cons. Date
900	Admin. Office	91	1948
	Dispensary	91	
	Chaplain	25	
901	Admin Office	91	1948
	Fld Maint Shop	91	
902	Auto Veh. Mnt. Shop	91	1948
	Field Mnt. Shop	91	
	Small Arms Shop	91	
	CO/BTRY HDQTRS	91	
903	WHSE SMU	91	1948
904	WHSE SMU	91	1948
905	BN SQDRN HDQTRS	91	1947
	GEN STG A/G/ORG		
	ELEC/COM MNT SH		
	ARMORY		
	SPEC SER ISS OF	91	1947
906	MTIS Building	61	1948
907	GEN STG A/G/ORG	91	1948
908	Auto Veh Mnt Shop	50	1949
909	Auto OSGTI Shop	91	1949
	GEN STG A/G/ORG	91	1949
	A/G/SPT EQP SHOP	91	1949
910	Welding Shop	91	1950
911	HAZ FLAM STHSE	91	1985
913	Fld Maint. Shop	91	1952
914	REG/GROUP HDQ	91	1953
	GEN STG A/G/ORG	91	1953
915	GEN STG A/C ORG	91	1953
	GEN WHSE MC	60	1953
916	WHSE SMU	91	1953
	ARMORY	91	1953
919	Range Building	31	1947
924	LATRINE	91	1960

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JOB CAMP LEJEUNE 86601
SHEET NO. 2 OF 7
CALCULATED BY
DATE
CHECKED BY [illegible]
DATE 10-6-86
SCALE

BLDG	Building Designation	Prog. Ad.	Cons. [illegible]
926	GEN STG A/G/ORG	91	1947
927	GEN STG A/G/ORG	91	1947
924	ACAD INSTR BLDG.	91	1947
934	ADMIN OFFICE	31	1969
935	APPL INSTR BLDG.	31	1969
	ACAD INSTR BLDG.	31	1969
	GEN STG A/G/ORG	31	1969
939	PAV/GR EQP SHED	30	1965
940	PAV/GR EQP SHED	30	1970
943	GEN STRG SHED	31	1970
960	PAV/GR EQP SHED	30	1977
997	Public Toilet	18	1978
1002	Filling STA BLD	60	1942
1004	SHLTR MISC. PIPE	60	1942
1005	Admin OFFICE	25	1943
1006	EM Club E1-E3	71	1943
	EXCH INSTL WHSE.	81	1943
1010	EXCH Admin FAC	81	1948
1011	Admin OFFICE	10	1953
	GEN STG A/G/ORG	10	1953
1012	GEN STG A/G/ORG	91	1953
	WHSE SMU	91	1953
1013	PW SHOPS EXPEND	30	1949
1014	PW SHOPS EXPEND	60	1953
1015	EXCH CTRL SUPT	81	1955
1041	DISPENSARY	16	1973
	CORR FAC	10	1969
1042	UPEH E5	10	1974
	UPEH E6-E9	10	1974
	UPEH E1-E4	10	1974
1044	SENTRY HOUSE	10	1982
1046	GEN STG A/G/ORG	25	1981
1100	PRINTING PLANT	90	1943

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SCALE

BLDG	Building Designation	Prog. Admin	Cons. Date
1101	DATA PROC CENTER	60	1942
	ADMIN OFFICE	60	1942
	COMM CENTER	60	1942
	GEN STG A/G/ORG	60	1942
1102	PW SHOPS EXPEND	30	1943
1103	HOBBY SHOP-AUTO	30	1943
	ADMIN OFFICE	30	1943
	PW SHOPS EXPEND	30	1943
	Public Works Shop	30	1943
1104	Public Works Shop	30	1942
	PW SHOPS EXPEND	30	1942
	Admin OFFICE	30	1942
1105	Admin OFFICE	30	1942
	Lunch/Locker Rm	30	1942
	PAV/GR EQP SHED	30	1942
1106	Hobby SHOP	18	1942
1107	Hobby SHOP	18	1942
1108	BN SQDRN HDQTRS	91	1943
	WHSE SMU	91	1943
1111	AUTO ORG/L SHOP	40	1945
	GEN STG A/G/ORG	40	1945
1113	Hobby Shop-Auto	18	1946
1114	PAV/GR EQP SHED	30	1946
1115	PRINTING PLANT	90	1949
1116	GEN WHSE MC	60	1953
	Admin OFFICE	60	1953
1117	GEN STG A/G/ORG	10	1953
	ARMORY	10	1953
	MTIS Building	61	1953
1118	GEN STG A/G/ORG	91	1953
1120	Hobby SHOP-AUTO	18	1956
1127	HAZ FLAM STHSE	30	1979
1140	Admin OFFICE	90	1976
	UEPH E1-E4	90	1976

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JOB Camp Lejeune 46601
SHEET NO. 4 OF 7
CALCULATED BY ______ DATE ______
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SCALE ______

BLDG	Building Designation	Prog. Admin	Cons Date
1141	MTS UTL PLT BLD	30	1976
1200	COMMISSARY	60	1942
1201	GEN WHSE MC	60	1942
1202	Public Works Shop	30	1942
	Lunch/Locker Room	30	1942
	EXCH SNACK STND	30	1942
	ADMIN OFFICE	30	1942
	PW MAINT ISS SHOP	30	1942
1203	PW MAINT ISS SHOP	30	1942
	Admin OFFICE	30	1942
1204	PW SHOPS EXPEND	30	1942
1205	AUTO ORGTL SHOP	90	1952
1206	AUTO ORGTL SHOP	90	1942
1207	ADMIN OFFICE	81	1942
1208	ADMIN OFFICE	90	1943
1209	EM DINING FAC	10	1943
1211	ADMIN OFFICE	91	1953
	WHSE SMU	91	1953
1212	GEN STG A/G/ORG	60	1953
1220	RESTAURANT	41	1979
1300	Cold STGE WHSE	60	1942
	MIS UTL PLT BLD	30	1942
	LABORATORY	16	1942
1301	GEN WHSE MC	60	1942
	ADMIN OFFICE	90	1942
1302	PW SHOPS EXPEND	60	1943
1303	GEN STRG SHED	60	1943
1304	ADMIN OFFICE	30	1943
	PW SHOPS EXPEND	30	1943
1305	GEN STRG SHED	60	1943
1306	GEN STRG SHED	60	1943
1307	GEN STG A/G/ORG	60	1943
1308	GEN STG A/G/ORG	91	1942
	ADMIN OFFICE	91	1942

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BLDG	Building Designation	Prog. Admin.	Cons. Date
1309	GEN STG A/G/ORG	91	1942
1310	AUTO ORGTL SHOP	91	1942
1311	GEN STG A/G/ORG	91	1943
1312	GEN STG A/G/ORG	91	1942
1315	GEN STG A/G/ORG	60	1944
1316	GEN STG A/G/ORG	60	1953
1317	GEN STG A/G/ORG	91	1953
1318	GEN STG A/G/ORG	10	1958
1340	UEPH E1-E4	10	1977
	UEPH E5	10	1977
	UEPH E6-E9	10	1977
	Admin OFFICE	10	1977
1341	MIS UTL PLT BLD	30	1977
1400	FIRE STATION	25	1942
1401	PACKAGE STORE	71	1942
	LAUNDRY	71	1942
	APPL INSTR Bldg.	71	1942
	GEN STG A/G/ORG	71	1942
1402	EXCH CNTRL WHSE	81	1942
	LUNCH/LOCKER Rm	81	1942
1403	Admin OFFICE	40	1942
	THRIFT SHOP	25	1942
	ACAD INSTR BLDG	13	1942
	GEN STG A/G/ORG	40	1942
1404	RANGE OPER CTR	31	1952
	OFF EQ/AP REP/S	31	1952
1405	ELEC/COM MNT SHOP	91	1942
1406	ELEC/COM MNT SHOP	91	1942
1407	Admin OFFICE	50	1942
	Lunch/locker Room	50	1942
1408	VEH HOLD SHED	50	1943
	GEN STG A/G/ORG	50	1943
1409	BOAT SHOP	31	1944
1410	GEN STG A/G/ORG	31	1943
	RANGE OPER CTR	31	1943

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CALCULATED BY ______ DATE ______

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SCALE ______

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BLDG	Building DESIGNATION	Prog. Admin	CONST. DATE
1413	EXCH INSTL WHSE	81	1952
1414	SCALE HOUSE	60	1953
1419	HAZ FLAM STHSE	31	1977
1450	AUTO ORGTL SHOP	90	1981
1451	HAZ FLAM STHSE	90	1981

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DATE 10-6-86
SCALE

Admin. Code	1	2	3	4	5	6	TOTAL	
91	28	4	2	4	7	Ø	31 ~~45~~	2d Force Service Support Group
25	1	2	Ø	Ø	2	Ø	5	HQTRS Bn, MCB
61	1	Ø	1	Ø	Ø	Ø	2	Defense Prop Disposal Off
50	1	Ø	Ø	Ø	4	Ø	5	Base Motor T
60	1	3	6	9	2	1	22	AC/S, Logistics
31	1	5	Ø	Ø	5	1	12	AC/S Training
30	Ø	4	13	12	1	Ø	30	Base Maintenance
14	Ø	1	3	Ø	Ø	Ø	4	Special Services
71	Ø	1	Ø	Ø	4	Ø	5	Cmd Club Management Sys
81	Ø	3	Ø	2	2	1	8	Marine Corps Exchange
10	Ø	7	2	1	5	Ø	15	Support Bn, MCB
16	Ø	1	Ø	1	Ø	Ø	2	Naval Hospital
40	Ø	Ø	2	Ø	2	Ø	4	Reserve Support Unit, MCB
90	Ø	Ø	3	4	Ø	2	9	2d Marine Division
13	Ø	Ø	Ø	Ø	1	Ø	1	AC/S, Manpower
	~~Total Est. Industrial Area~~						169	

3
14
25
18
23
21
5
110

Note: Program Administration codes on pages A-35 through A-40 are listed in the table on this page (A-41), and represent the administrative responsibility, within Camp Lejeune for the buildings investigated during the Records Search effort.

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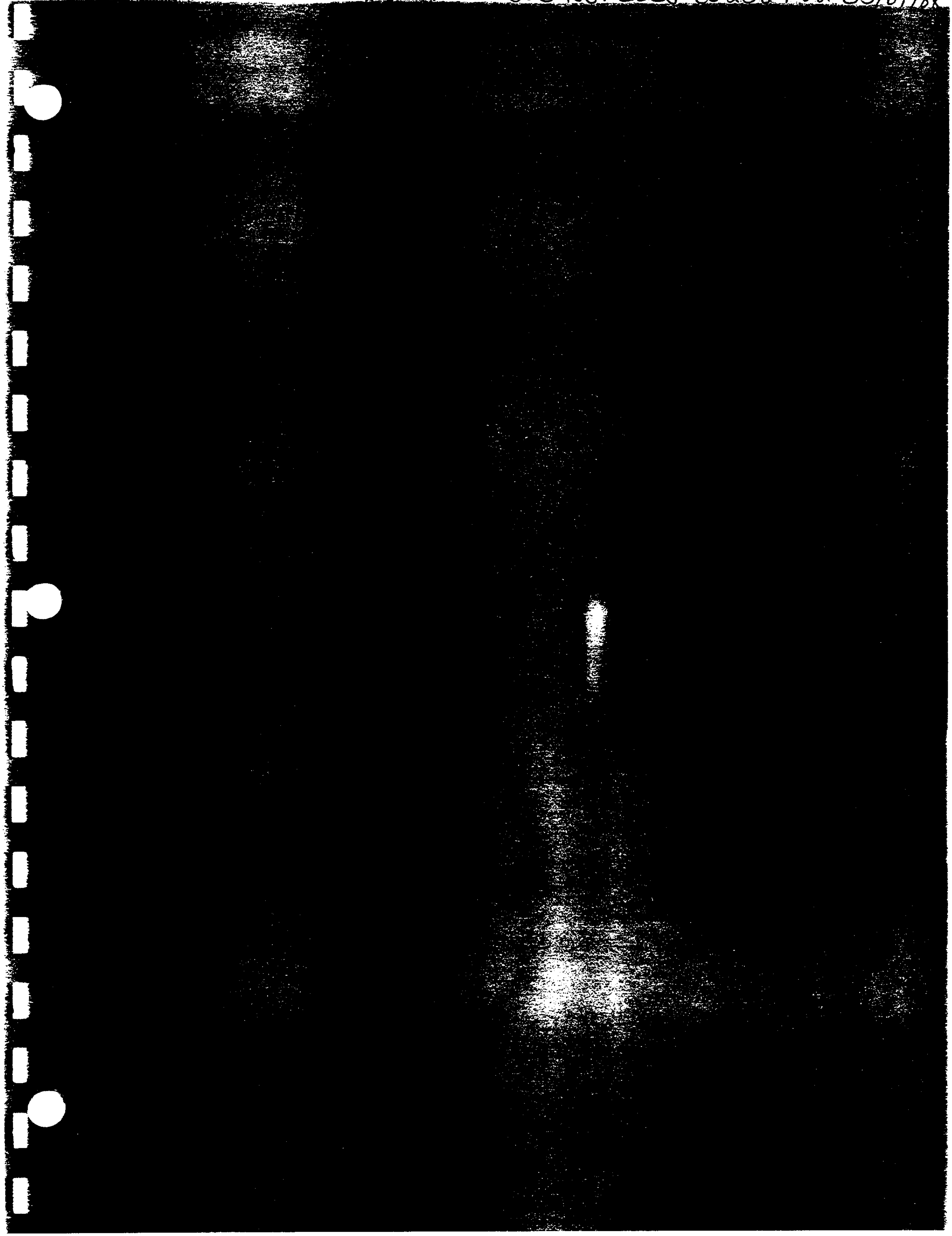

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Table B-1. Soil Gas Data For Building 1202.

Sample ID	TCE* (nl/l)+
1202-1	<10
1202-2	53
1202-3	<10
1202-4	<10
1202-5	<10
1202-6	<10
1202-7	<10
1202-8	<10
1202-9	<10
1202-10	1760
1202-11	8200
1202-12	37
1202-13	24000
1202-14	64
1202-15	36
1202-16	15
1202-17	14700
1202-18	13200
1202-19	36770
1202-20	116

Note: * TCE = Trichloroethene
+ nl/l = nanoliter per liter (parts per billion)

Source: ESE, 1987.

Table B-2. Soil Gas Data For Building 1601.

Sample ID	TCE* (ng/l)+
1601-1	<10
1601-2	10
1601-3	41400
1601-4	18130
1601-5	79
1601-6	33
1601-7	43
1601-8	43
1601-9	10
1601-10	<10
1601-11	<10
1601-12	2630
1601-13	10
1601-14	<10
1601-15	<10
1601-16	7440
1601-17	703000
1601-18	68000
1601-19	22450
1601-20	20

Note: * TCE = Trichloroethene
+ nl/l = nanoliter per liter (parts per billion)

Source: ESE, 1987.

Table B-3. Soil Gas Data For Buildings 1502 and 1602.

Sample ID	TCE* (nl/l)+
1502-1	16
1502-2	33
1502-3	13
1502-4	16
1502-5	30
1502-6	<10
1502-7	10
1502-8	13
1502-9	14
1502-10	15
1502-11	<10
1602-1	29
1602-2	10
1602-3	53

Note: * TCE = Trichloroethene
+ nl/l = nanoliter per liter (parts per billion)

Source: ESE, 1987.

Table B-4. Soil Gas Data For Buildings 1300 and 1100.

Sample ID	TCE* (nl/l)+
1300-1	295
1300-2	<10
1100-1	<10
1100-2	<10
1100-3	10
1100-4	<10
1100-5	152
1100-6	<10
1100-7	<10
1100-8	<10
1100-9	<1000
1100-10	<2000

Note: * TCE = Trichloroethene
+ nl/l = nanoliter per liter (parts per billion)

Source: ESE, 1987.

Table B-5. Soil Gas Data For Building 915.

Sample ID	TCE* (nl/l)+
915-1	<10
915-2	<10
915-3	<10
915-4	<10

Note: * TCE = Trichloroethene
+ nl/l = nanoliter per liter (parts per billion)

Source: ESE, 1987.

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Table B-6. Soil Gas Data For Buildings 1709 and 1710.

Sample ID	TCE* (nl/l)+
1709-1	<10
1709-2	35
1709-3	53000
1709-4	<10
1709-5	<10
1709-6	<10
1709-7	<100
1709-8	<10
1709-9	<1000
1709-10	<10
1709-11	<10
1709-12	<10
1709-13	<10
1709-14	<10
1709-15	<10
1710-1	<10
1710-2	<1000
1710-3	<10
1710-4	<10
1710-5	<1000
1710-6	<1000
1710-7	<100000

Note: * TCE - Trichloroethene
+ nl/l - nanoliter per liter (parts per billion)

Source: ESE, 1987.

Table B-7. Soil Gas Data For Buildings 1300, 1302, 1101, and 1102.

Sample ID	TCE* (nl/l)+
1300-1	295
1300-2	<10
1300-3	<10
1300-4	<10
1300-5	<10
1300-6	<10
1300-7	46
1300-8	404
1302-1	<10
1302-2	1250
1302-3	<10
1302-4	25
1101-1	<10
1101-2	<10
1101-3	<10
1102-1	442
1102-2	<10
1102-3	<10
1102-4	800

Note: * TCE = Trichloroethene
+ nl/l = nanoliter per liter (parts per billion)

Source: ESE, 1987.

Table B-8. Soil Gas Data For Storage Lot 201.

Sample ID	TCE* (nl/l)+
201-1	<10
201-2	<10
201-3	<10
201-4	<10
201-5	<10
201-6	<10
201-7	<10
201-8	<10
201-9	250
201-10	<10
201-11	<10
201-12	<10
201-13	<10
201-14	<10
201-15	<10
201-16	<10
201-17	<10
201-18	<10
201-19	<10
201-20	<10
201-21	<10
201-22	<10
201-23	<10
201-24	<10
201-25	<10
201-26	<10
201-27	<10
201-28	<10
201-29	<10
201-30	<10
201-31	<10
201-32	<10
201-33	<10
201-34	<10
201-35	<10
201-36	<10
201-37	<10
201-38	13

Note: * TCE = Trichloroethene
+ nl/l = nanoliter per liter (parts per billion)

Source: ESE, 1987.

DOC NO: CLEJ-00258-1.02-05/01/88

DOC NO: CLEJ-00258-1.02-05/01/88

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB GAS SAMPLING BUILDING 1202

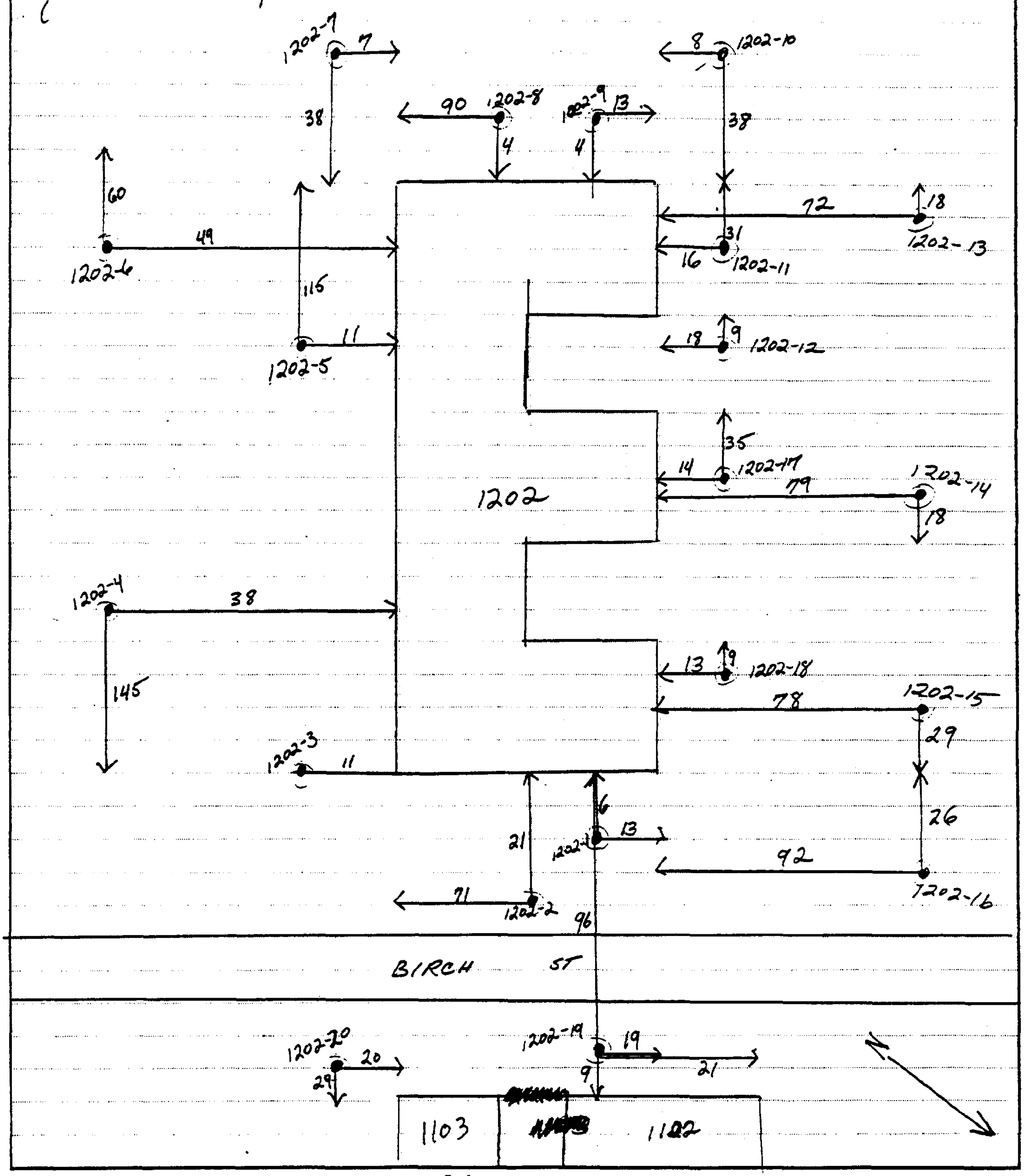
SHEET NO. ____ OF ____

CALCULATED BY M. SMAR DATE 12/20/86

CHECKED BY ____ DATE ____

SCALE NOT TO SCALE

NOT TO SCALE (MEASUREMENTS TO NEAREST FOOT)



Doc No: CLEJ-00256-1.02-05/01/88

JOB

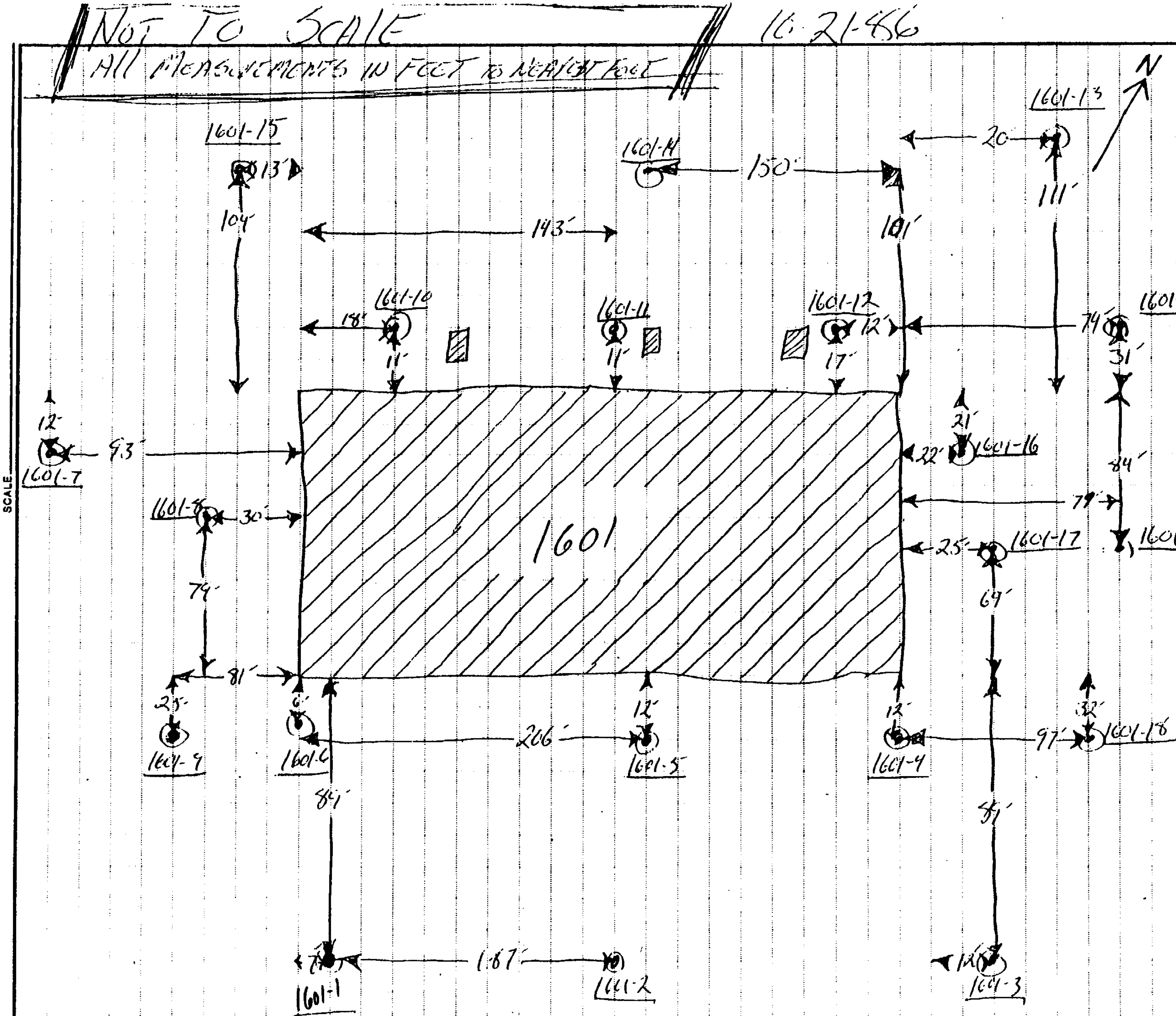
SHEET NO. OF

CALCULATED BY DATE 10/21/86

CHECKED BY DATE

SCALE

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

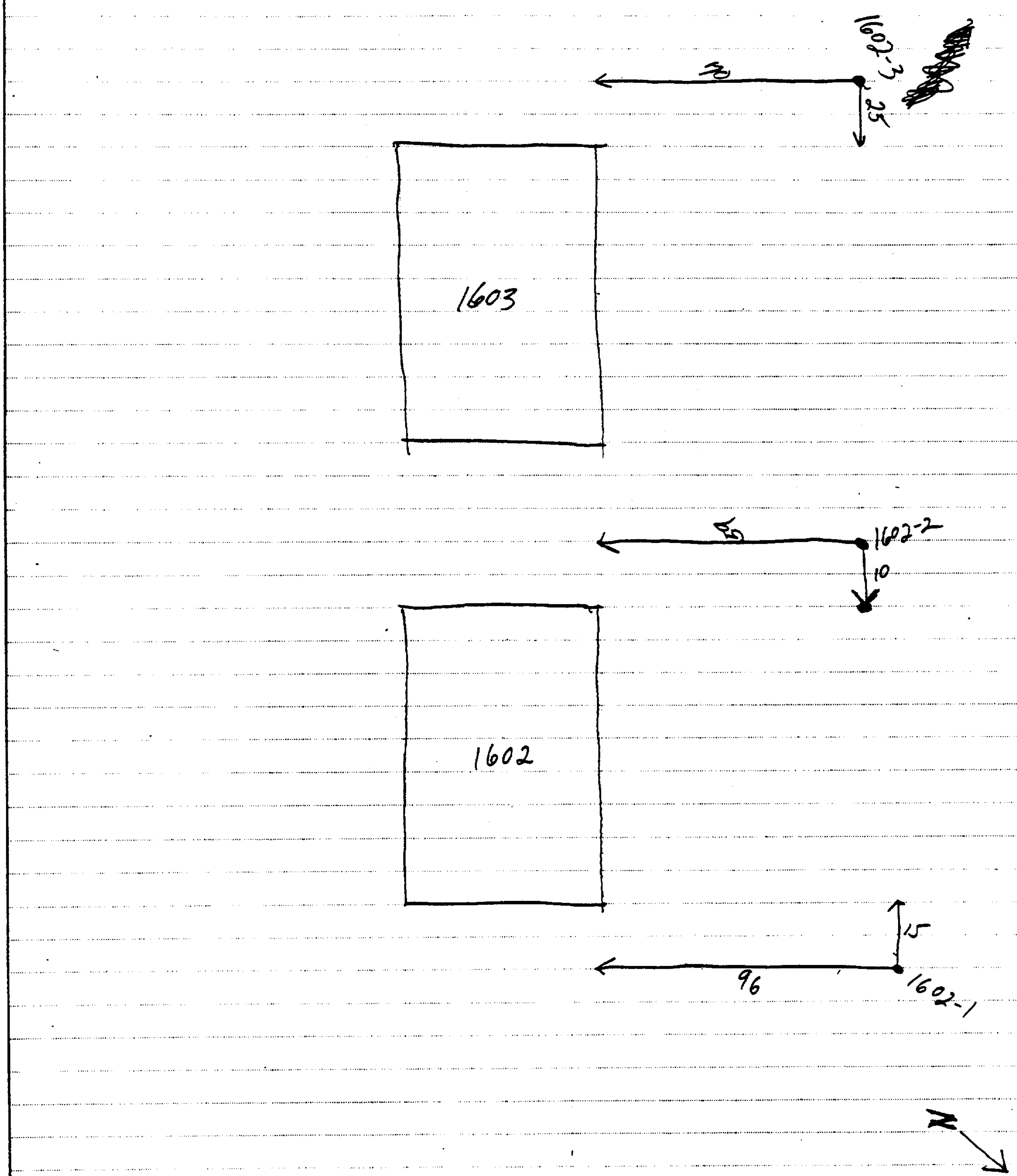


C-2

DOC NO: CLEJ-00258-1.02-05/01/88

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

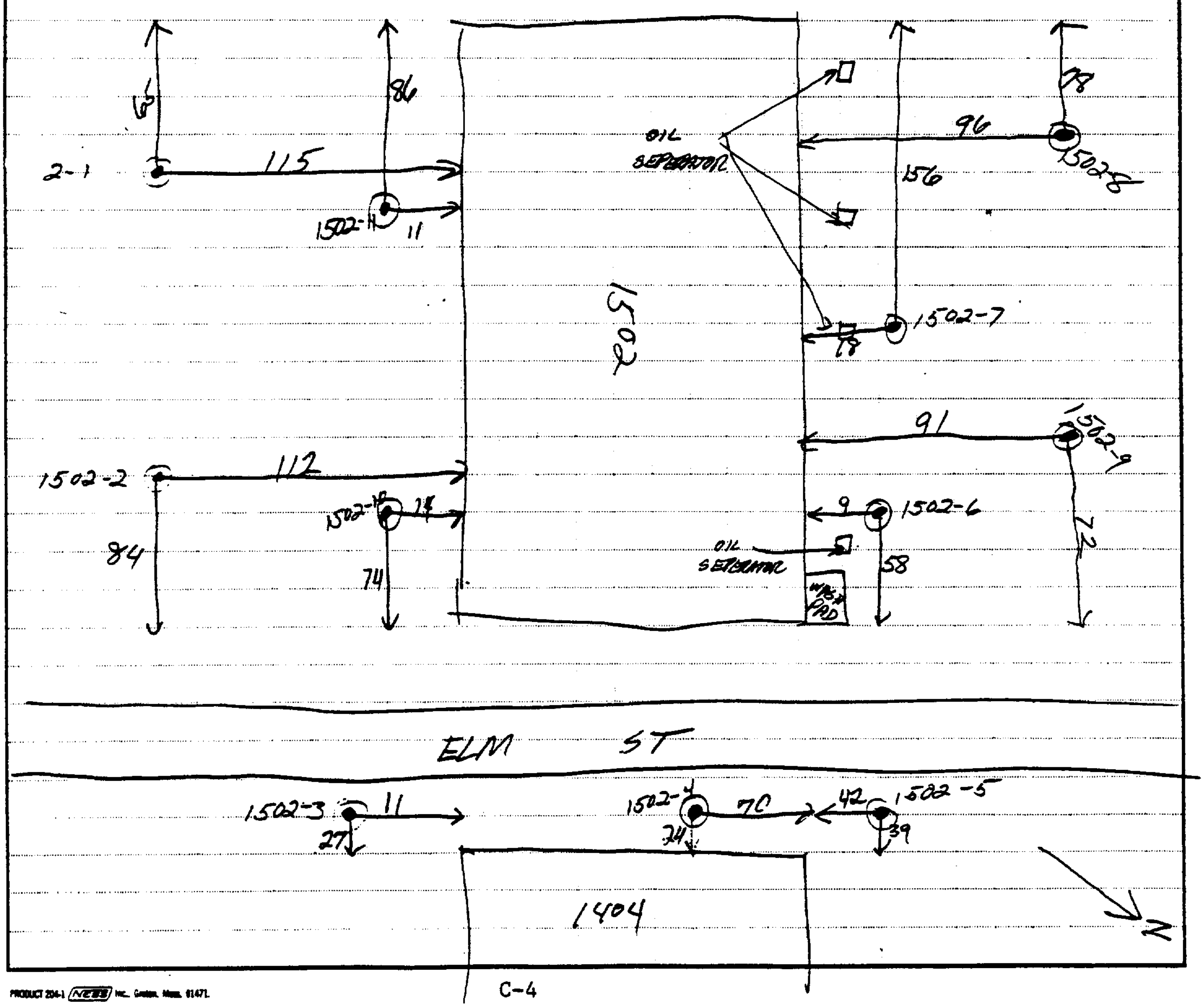
JOB ____
SHEET NO. ____ OF ____
CALCULATED BY M. SMAR DATE 10/22/66
CHECKED BY ____ DATE ____
SCALE ____



DOC NO: CLEJ-00258.1.02-05/01/88

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

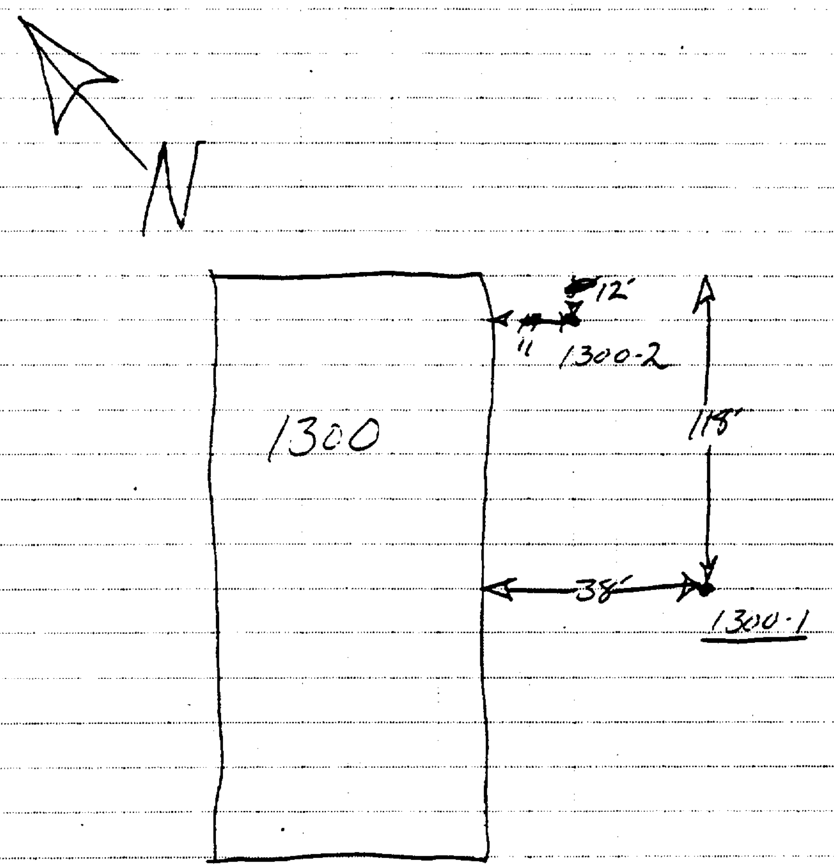
JOB
SHEET NO. OF
CALCULATED BY M. SMAR DATE 10/22/88
CHECKED BY DATE
SCALE



DOC NO: CLEJ-00258-1.02-05/01/88

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB 118 38
SHEET NO. ____ OF ____
CALCULATED BY ____ DATE 10/27/86
CHECKED BY ____ DATE ____
SCALE ____

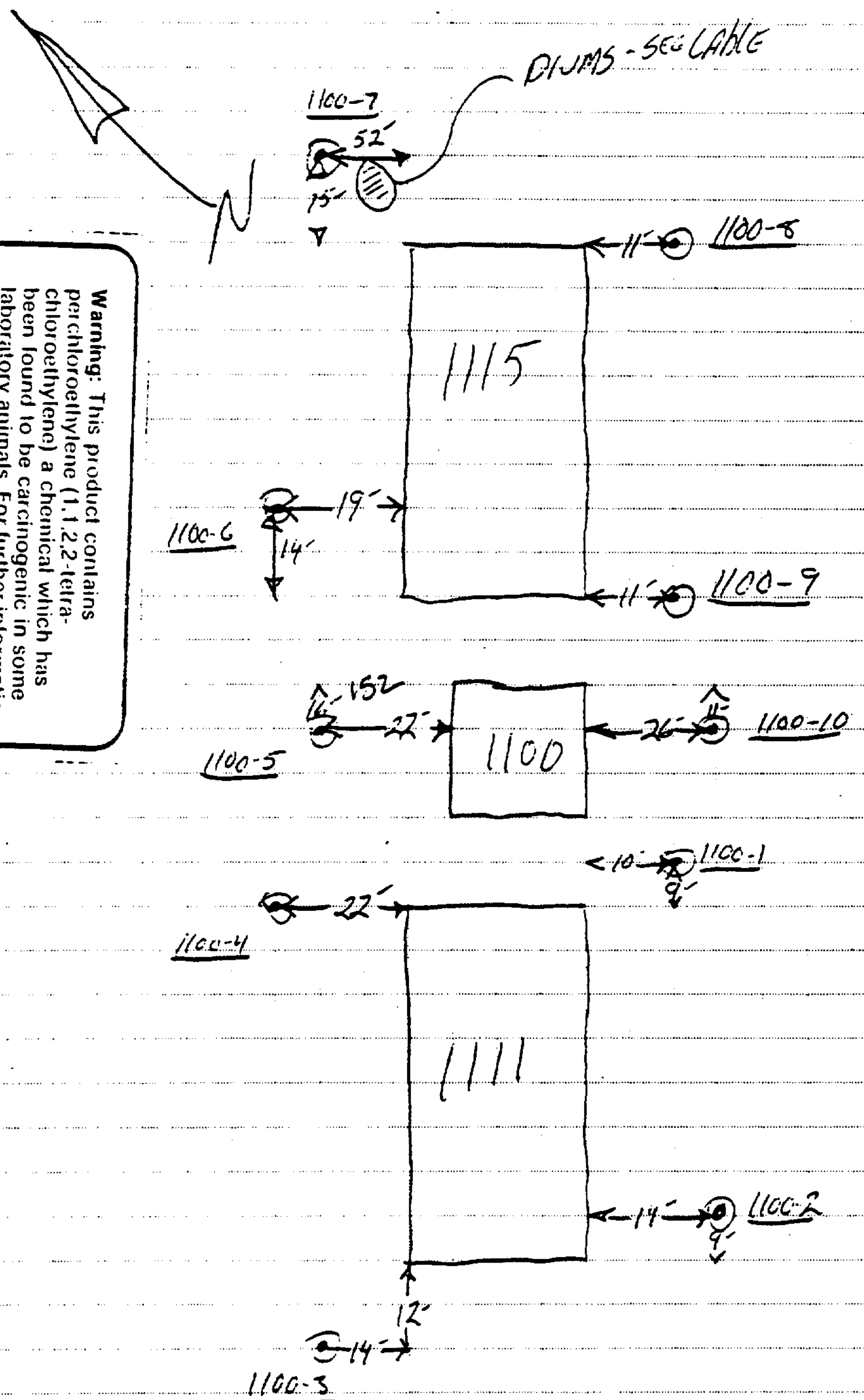


PRODUCT 204-1 NEBS Inc., Groton, Mass. 01471.

DOC NO: CLEJ - 00258 - 1.02 - 05/01/88

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB
SHEET NO. OF
CALCULATED BY M. [illegible] DATE 10/23/86
CHECKED BY DATE
SCALE



Doc. No! CLEJ-00258-1.02-05/01/88

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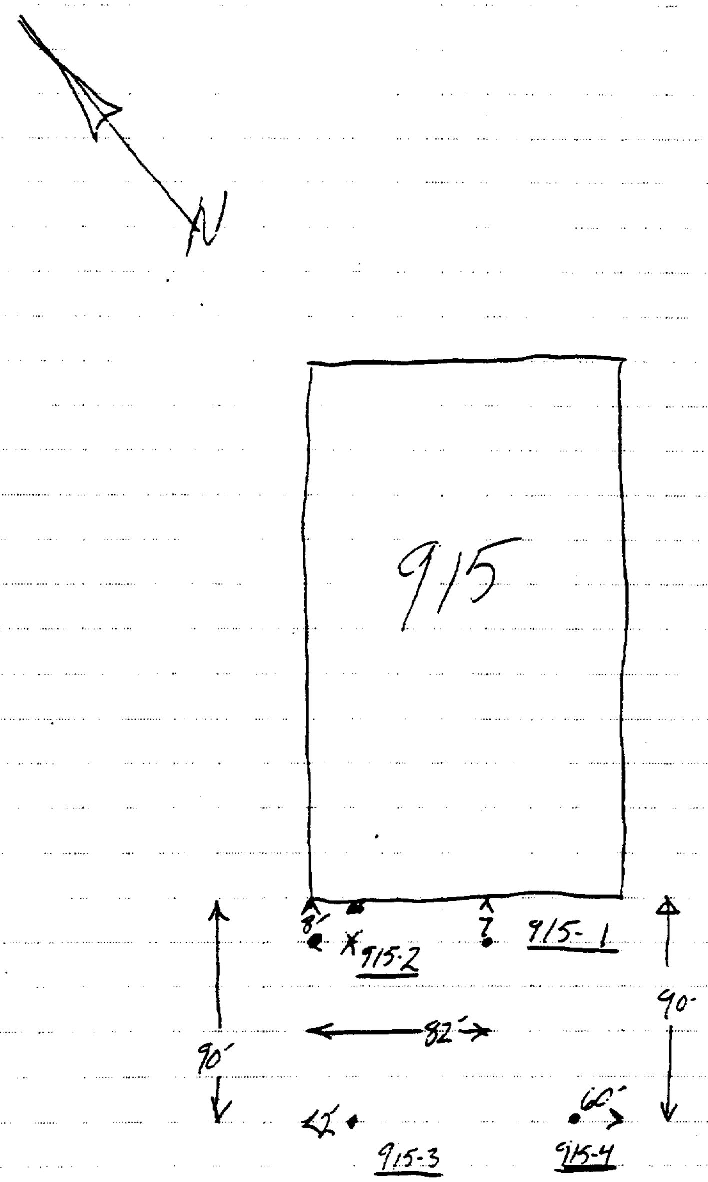
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB
SHEET NO. OF
CALCULATED BY M. GMAR DATE 10/23/86
CHECKED BY DATE
SCALE



PRODUCT 204-1 NEBS Inc. Groton, Mass. 01471.

Doc No: CLEJ-00258-1.02-05/01/88

ESE
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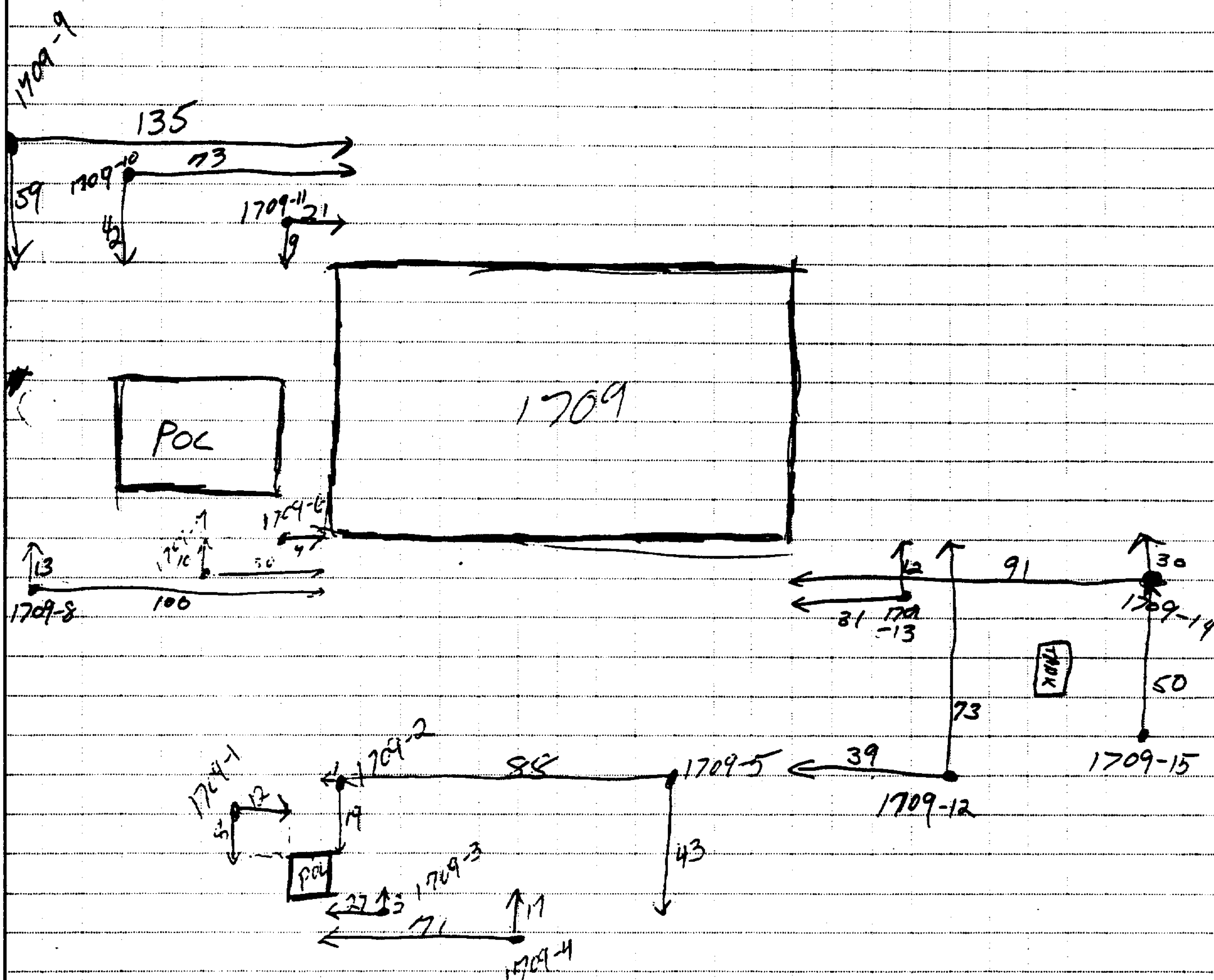
GAINESVILLE, FL 32602
(904) 332-3318

JOB
SHEET NO. OF
CALCULATED BY M. SMAR DATE
CHECKED BY 10/24/86 DATE
SCALE



DOC NO: CLEJ -00258-1.02-05/01/88

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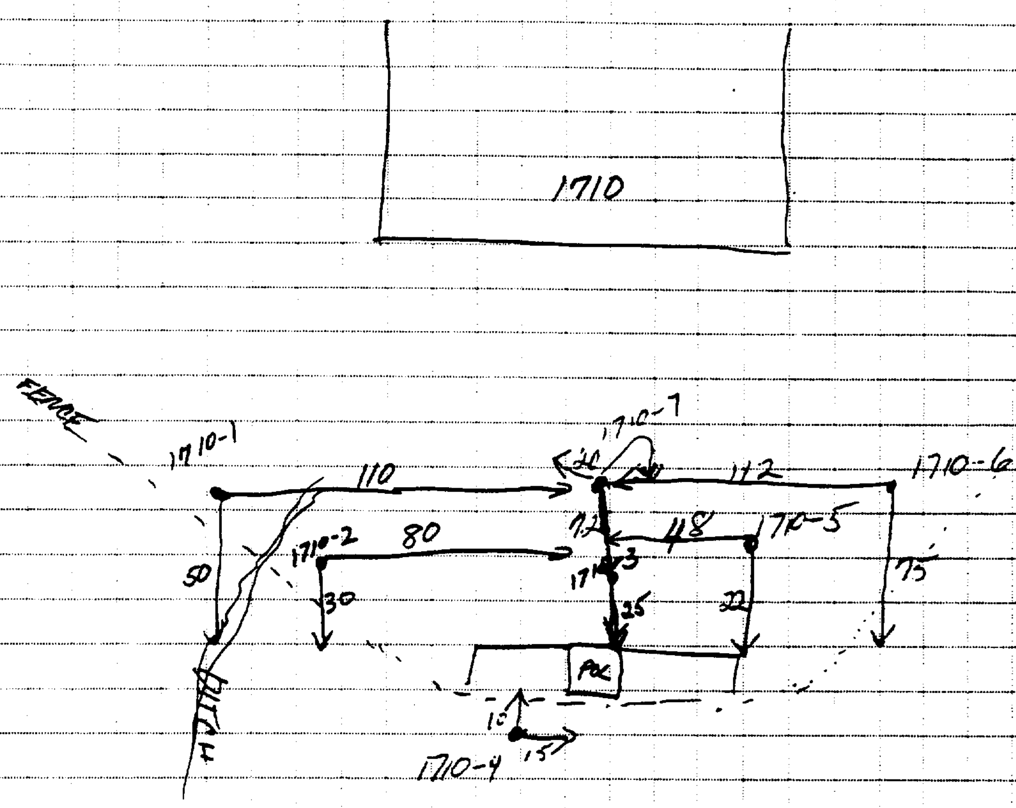
GAINESVILLE, FL 32602
(904) 332-3318

JOB
SHEET NO. OF
CALCULATED BY M. SMAR DATE
CHECKED BY 10/24/86 DATE
SCALE



Doc No: CLEJ-00258-1.02-05/01/88

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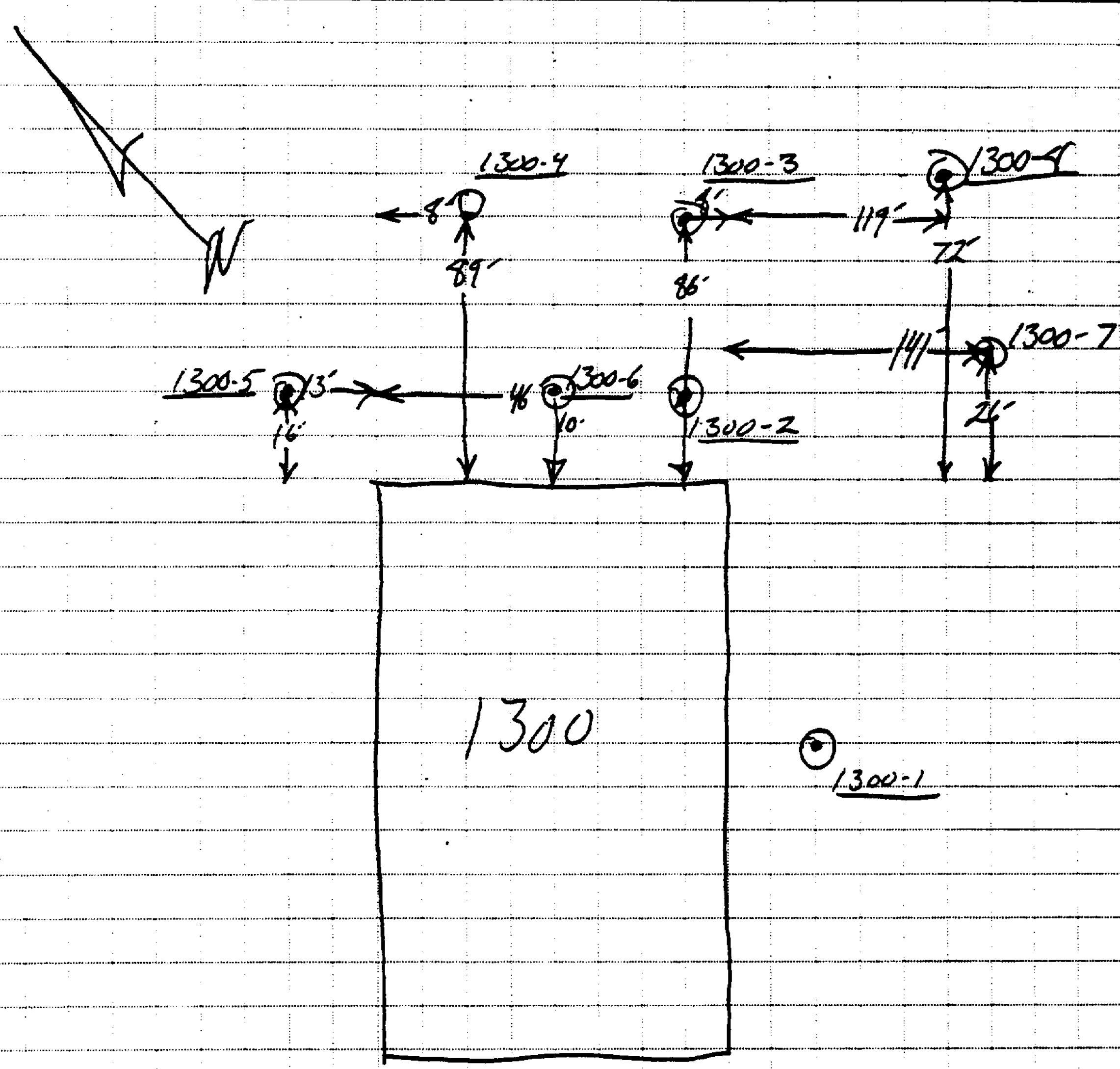
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB
SHEET NO. OF
CALCULATED BY M. Smad DATE 10/23/86
CHECKED BY DATE
SCALE

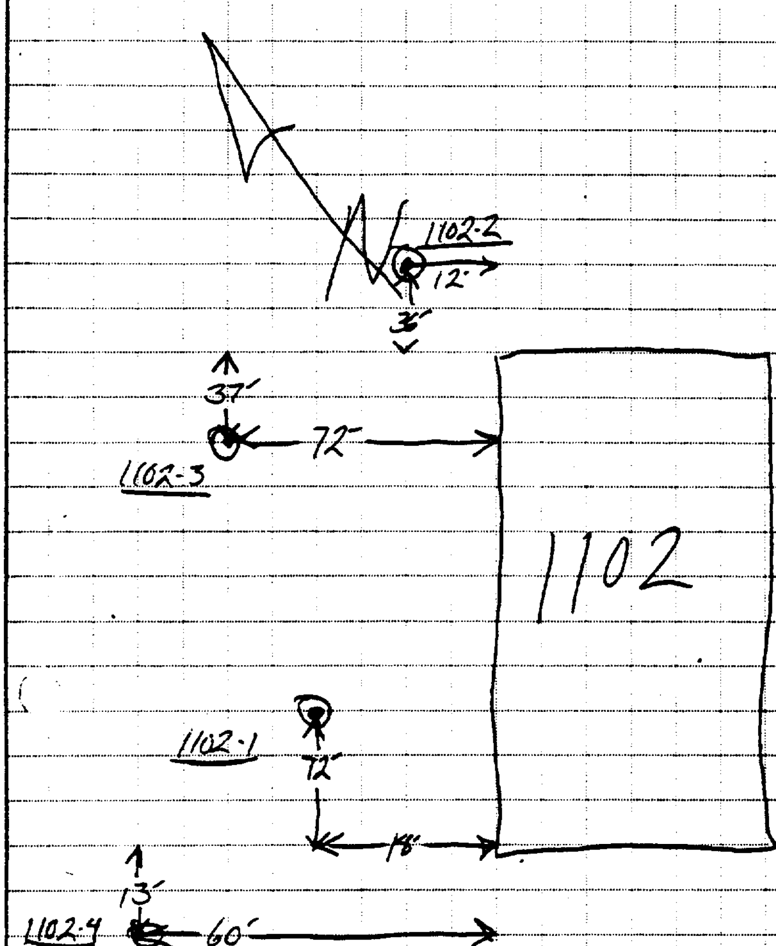


PRODUCT 204-1 NEBS Inc., Groton, Mass. 01471

DOC NO: CLEJ-00258- 1.02-05/01/88

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB
SHEET NO. OF
CALCULATED BY DATE 10/27/86
CHECKED BY DATE
SCALE

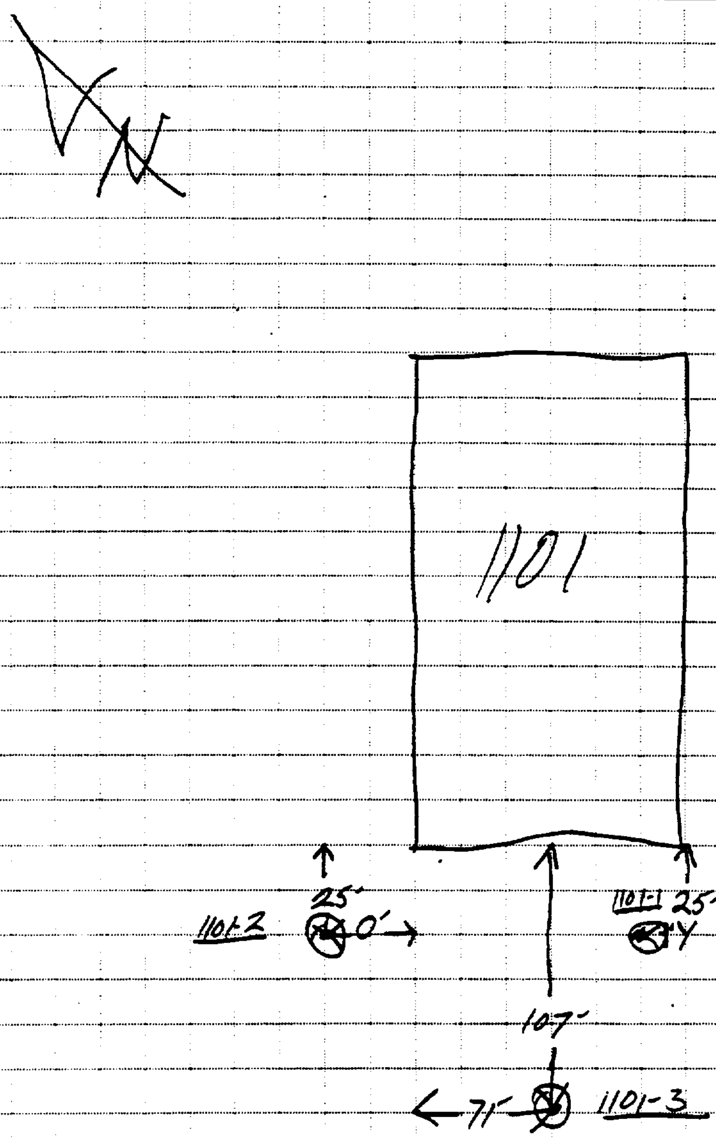


PRODUCT 204-1 NEBS Inc., Groton, Mass. 01471

DOC NO! CLEJ-06258-1.02-05/01/88

ESE
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB ____
SHEET NO. ____ OF ____
CALCULATED BY ____ DATE 10/27/86
CHECKED BY ____ DATE ____
SCALE ____



DOC NO: CLEJ-00258-1.02-05/01/88

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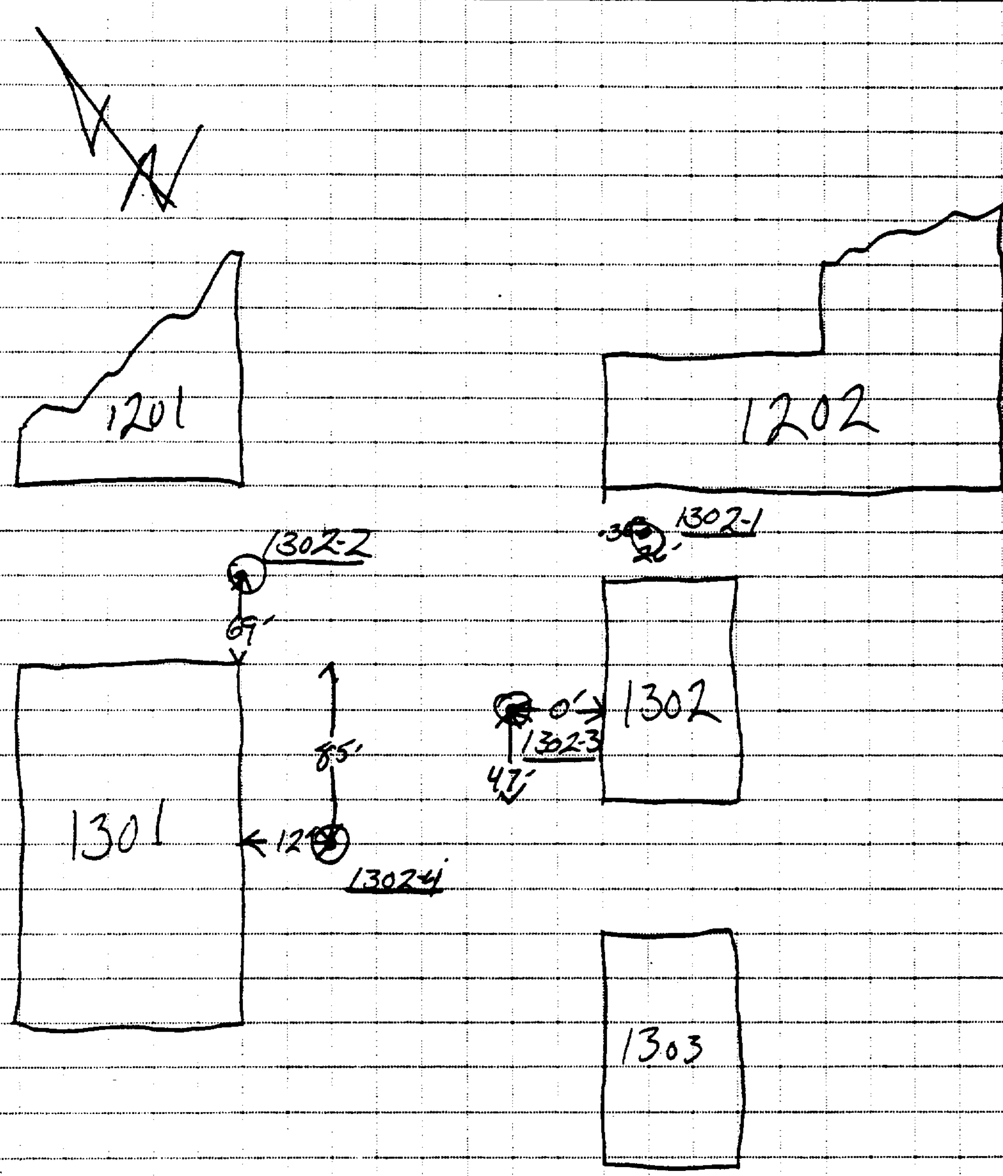
P. O. Box ESE
GAINESVILLE, FL 32602
(904) 332-3318

JOB
SHEET NO. OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

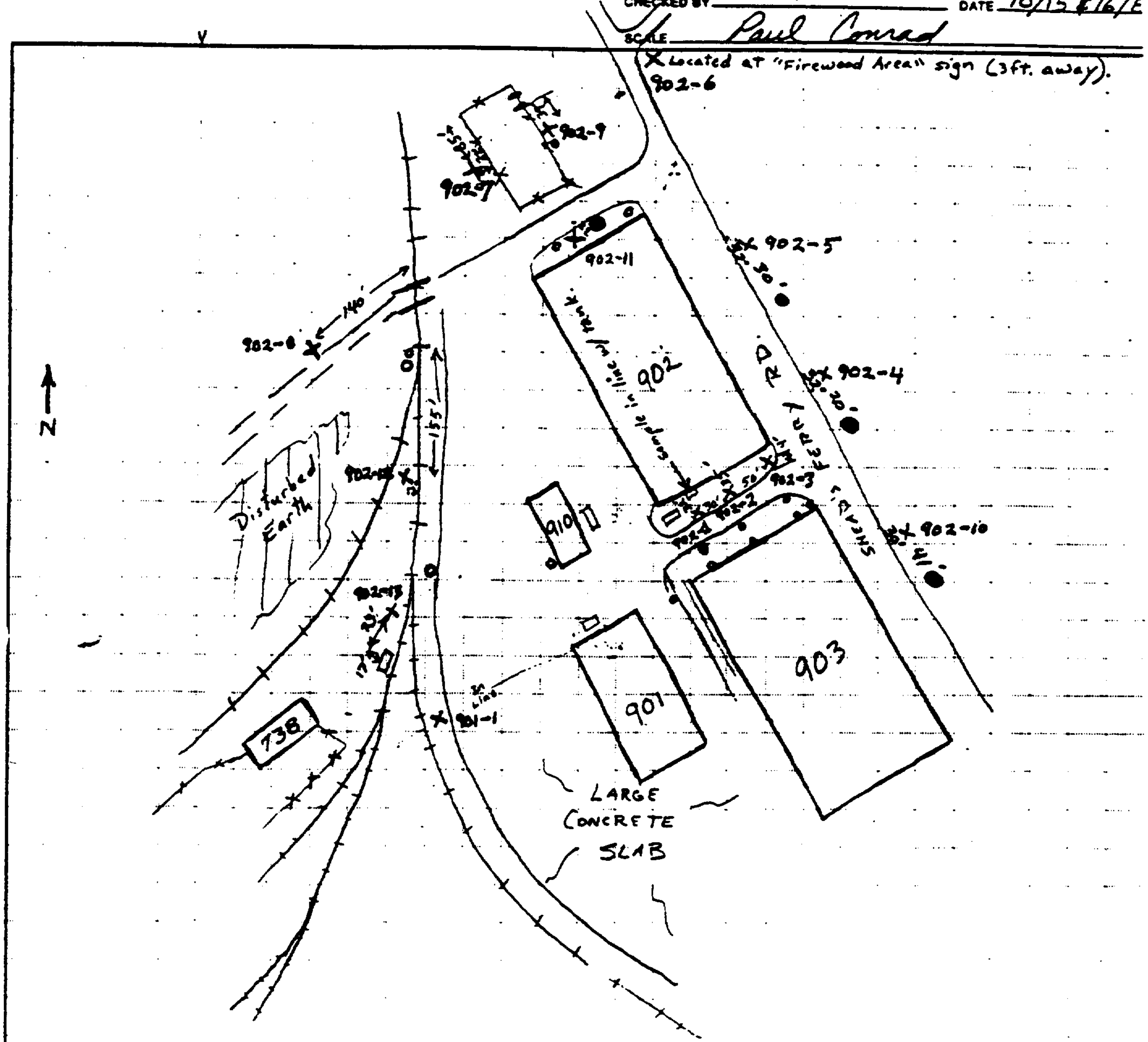


PRODUCT 204-1 NEBS Inc., Groton, Mass. 01471

DOC NO! CLEJ-00258-1.02-05/01/88

ESE, INC.
11665 Lilburn Park Road
ST. LOUIS, MISSOURI 63146
(314) 567-4600

JOB: Camp Lejeune, N.C.
SHEET NO. 4 OF 4
CALCULATED BY: Soil Gas Sampling DATE
CHECKED BY: DATE 10/15 & 16/8
SCALE: 100' 100'
Paul Conrad



LEGEND

X 902-3 Loc'n. of Sample #902-3

o Tube installed. Unable to collect sample due to high water table, compacted earth, ?

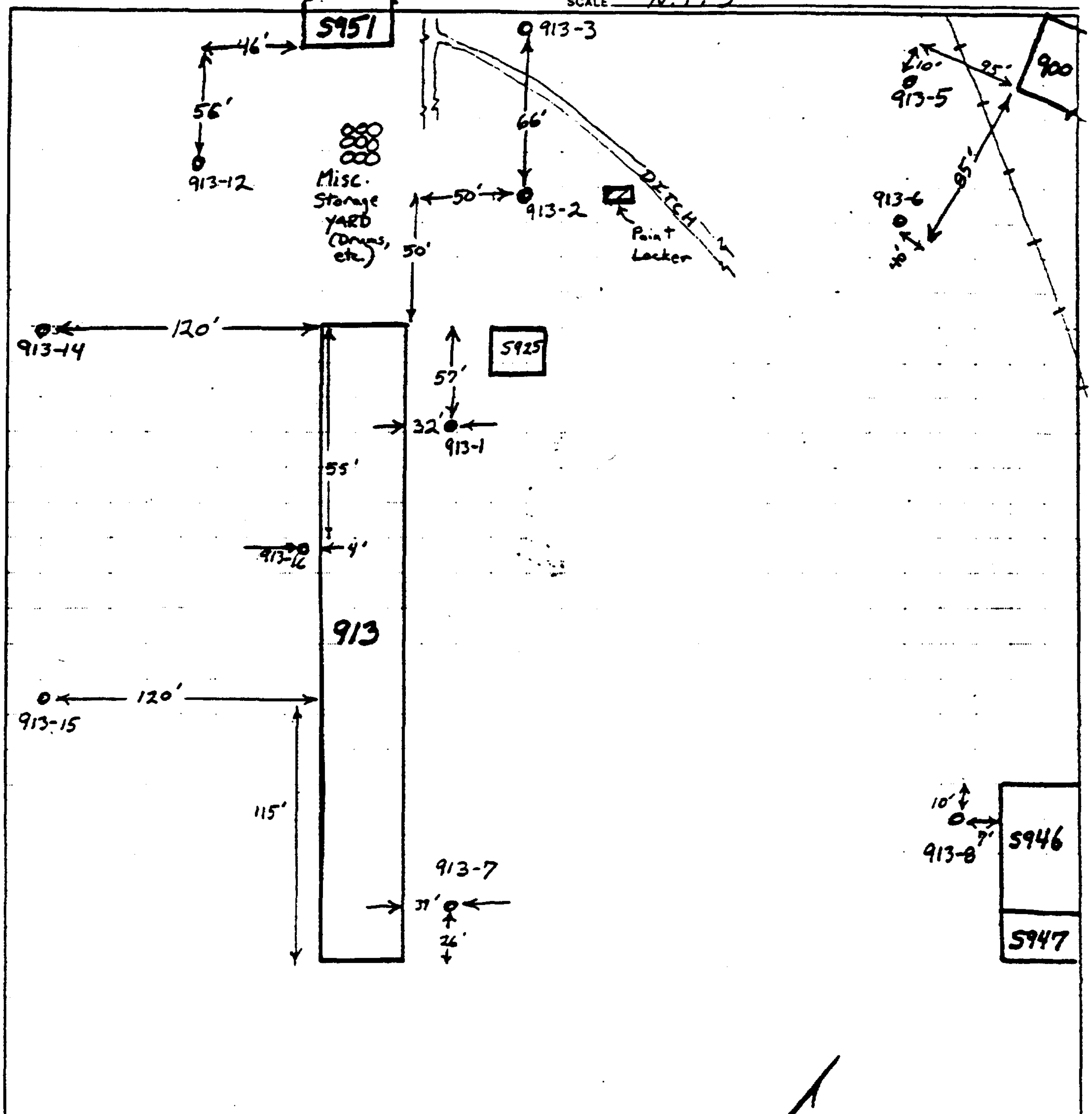
● Utility Pole

[901] Bldg. #901

Doc NO! CLEJ-00258-1.02-05/01/88

ESE, INC.
11665 Lilburn Park Road
ST. LOUIS, MISSOURI 63146
(314) 567-4600

JOB Soil Gas
SHEET NO 3 OF 4
CALCULATED BY DATE 10/17/86
CHECKED BY P.C. & M.S. DATE
SCALE N.T.S



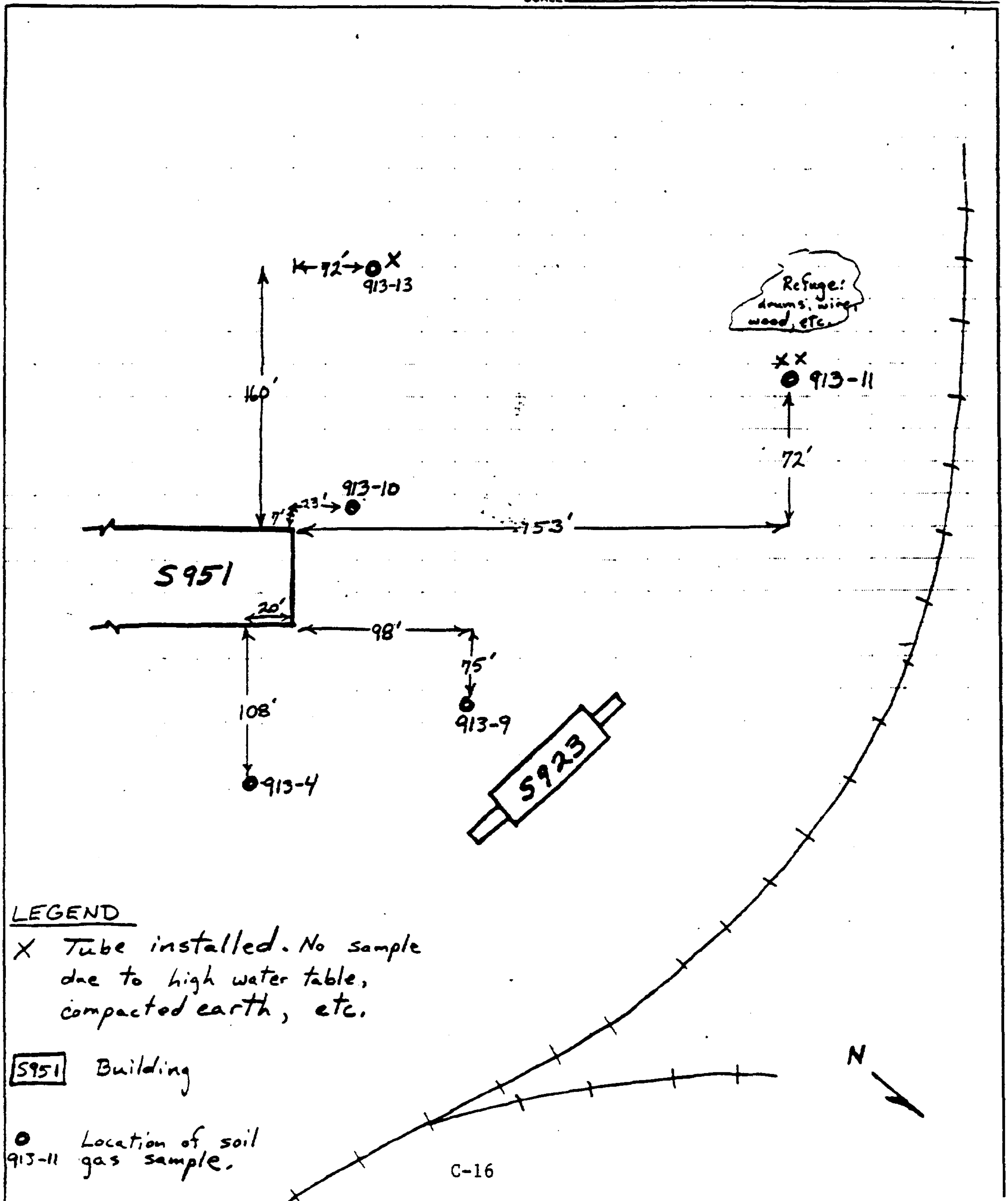
LEGEND

913-15 Location of soil gas sample.

913 Building

ESE, INC.
11665 Lilburn Park Road
ST. LOUIS, MISSOURI 63146
(314) 567-4600

JOB Soil Gas
SHEET NO. 4 OF 4
CALCULATED BY ______ DATE 10/17/86
CHECKED BY P.C. & M.S. DATE ______
SCALE N.T.S.



Doc NO: CLEJ-00258-1.02-05/01/88

SOIL GAS ANALYSIS PROCEDURE

The following section describes the soil gas setup, calibration, and analysis procedure.

1. Install appropriate column and precolumn. Hand tighten fittings and check for leaks.
2. Set flow rates using the flowmeter. Set both the yellow valve and the auxiliary valve to the same flowrate.
3. Run a program such that Valves V1, V2, and V4 are open for the duration of the run after initial sampling.
4. During the above run, use ultra-zero air and set the baseline with the red flow valve to return to where it started after the sampling. Use a high gain value of 200 to 500. Check for contamination at this high gain setting. Determine the baseline and verify that no peaks are present. Set flowmeter to same value as at the detector outport.
5. Select appropriate standards and prepare them in Tedlar® bags. Begin with liquid standards [3 to 5 microliters (uL)] and a high concentration [1,000 parts per million (ppm)]; prepare serial gas dilutions from these standards. Make standards at approximately 10 parts per billion (ppb) up to 10 ppm [volume to volume (v/v)].
6. Use headspace aliquots of the standards to determine the retention times of target compounds. Enter test values of 1 ppm into library.
7. In the field, run a standard after every sample. Note that only one standard needs to be run to update the others. Use a Tedlar® bag with a Scott® can standard added directly to it; run this in the "sample in" port. Scott® standard gases prepared in this manner may be diluted in ultra-zero air for more dilute standards.

8. Check for carryover and contamination by running a sample of ultra-zero air in a Tedlar® bag, especially after any high values have been detected. Initial runs of suspect samples should be run at the 0.1-second minimum sampling time to avoid column saturation.
9. Run repetitive samples for reliability of data, if required.

The checklist for the soil gas analysis procedure included the following supplies and equipment:

1. One-eighth-inch Teflon® tubing;
2. Desiccator with through-the-wall tubing and valve (spare valves in case of contamination);
3. Sampling pump (12-volt direct current);
4. Tedlar® bags (enough for one for each sample with extras);
5. Standards in Tedlar® bags [1 liter (L) should be enough for one day's samples, with various concentrations or the material to make them];
6. Ultra-zero air in Tedlar® bags (have about six of these per day ready for contamination checks and preparing standards);
7. Photovac® with spare columns, battery pack, alternating-current line, 12-volt converter line, flowmeter, extra pens, and paper; and
8. For extended sampling time (i.e., more than 1 day), a source of ultra-zero air, pure liquid standards, charger for sampling pump, and syringes.

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. HPGW1 (Vacinity of Bldg 1707)		Location Coordinates N	
Hole Size 6"	Slot 0.010"	E	
Screen Size 2"	Mat'l Sch 40 PVC	Filter Materials	Silica Sand
Casing Size 2"	Mat'l PVC	Grout Type	1' Bentonite Seal
Geologist Paul Conrad		Development	
Date Start 10/31/86	Finish 10/31/86	Static Water Level	20.54'
Contractor Davis Drilling Co		Top of Well Elevation	23.104'
Driller Charles Smith		Drill Type	Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-1.5			Peat, silt ~20%, dry, med. dense, non-plast, fibrous org. mtrl color 10 YR 2/1 (black), sand ~5% upper 4" misc. grav. & sand from parking lot.	Pt	6-4-6
1.5-3			same as above Peat	Pt	4-5-6
3-4.5			at 3.75' the above grades to Silty Fine Sand, silt 25-30%, Clay 10-15%, v. slight plast, moist, med. dense, mottled color 10 YR 6/6 (brnish yllw) and 10 YR 5/2 (gryish brn). Clayey zones are gryish brn.	ML	5-5-5
4.5-6			Silty/clayey Fine Sand, silt 25-30%, clay 10-15%, moist, med dense, v. slight plast., mottled color 10 YR 6/1 (gry) and 10 YR 6/6 (brnish yllw).	ML	4-4-6

Boring No. HPGW2 (near Bldg 608) Location Coordinates N ______

Hole Size 6" Slot ______ E ______

Screen Size 2" Mat'l Schd. 40 PVC Filter Materials Silica Sand

Casing Size 2" Mat'l PVC Grout Type 1' Bentonite Seal

Geologist Paul Conrad Development ______

Date Start 11/4/86 Finish 11/4/86 Static Water Level 18.90'

Contractor Davis Drilling Co. Top of Well Elevation 21.40'

Driller Charles Smith Drill Type Hollow Stem Auger.

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-1.5			Fine Sandy Peat, sand 5-10%, non-plast, moist, organic debris at top, color 10YR 2/1 (black) stains hands (oily?), loose.	Pt	3-2-3
1.5-3			Silty fine sand, silt 20-25%, non-plast, loose, moist, sand fairly uniform, color 10YR 7/2 (light gry) mottled w/ 10YR 7/8 (yllw)	SM	3-3-3
3-4.5			Silty Fine Sand, silt 20-25%, non-plast., med. dense, moist, color 10YR 6.5/6 (brnish yllw) mottled w/ 10YR 7/2 (lght gry).	SM	4-4-[illegible]
4.5-6			Fine sand, silt 10-12%, med. dense, moist, non-plast, some clay ~5%, color unif. 10YR 8/1 (White), qtz grains uniform.	SP	~~5-7-13~~

Boring No. HPGW2

Hole Size ______ Slot ______

Screen Size ______ Mat'l ______

Casing Size ______ Mat'l ______

Geologist ______

Date Start ______ Finish 11/4/86

Contractor ______

Driller ______

Location Coordinates N ______

E -

Filter Materials ______

Grout Type ______

Development ______

Static Water Level ______

Top of Well Elevation ______

Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
6-7.5			Silty fine sand, same as above	SP	5-7-5
7.5-9			silty fine sand, v. loose, silt 5-10%, same as above, v. moist	SP	2-1-1
9-10.5			Clayey fine sand, v. loose, saturated, clay 35-40%, slight plast., uniform color 2.5Y 45/0 (drk gry)	ML	0-3-1
14-15.5			Clay, clean, massive, high plast, wet, uniform color 2.5Y 4/0 (drk grey).	CL	5-3-[illegible]

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. HPGW2 Location Coordinates N Page 3 of 4

Hole Size Slot E

Screen Size Mat'l Filter Materials

Casing Size Mat'l Grout Type

Geologist Development

Date Start Finish 11/4/86 Static Water Level

Contractor Top of Well Elevation

Driller Drill Type

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
19-20.5			Clayey silty sand, silt 15-20%, Clayey ~ 5-10%, mottled color sand:-10YR 8/1 (white) clay: 10YR 7/1.5 (lght gry) silt: 10YR 6/7 ([illegible]) sand-loose, clay [illegible] at 20.5', plast., soft	SP	3-5-3
24-25.5			Silty fine sand, silt 12-15%, wet, med. dense, non-plast, color fairly uniform 7.5YR 6/8 (reddish yellow). at 25.5' grades to marle (color white).	SP/Marle	10-12-16

Boring No. HPGW2 SHEET 4 OF 4

1:_5 Finished washing rig

10:50 am. Began drilling & sampling.

11:45 am Last spoon. Pulled augers → hole stayed open. Casing installed and silica sand poured. Five 1hundred lb. bags used. No unusual events.

12:00 Well complete. Began washing rig.

Standard well construction. Hole 27 feet.

_4/86 DATE

Paul D. Conrad SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW3 ~~?~~ (near Bldg. 1711)
Location Coordinates N
E
Hole Size 6" Slot 0.010"
Screen Size 2" Mat'l Sched. 40 PVC
Filter Materials Silica Sand
Casing Size 2" Mat'l PVC
Grout Type 1' Bentonite Seal
Geologist Paul Conrad
Development
Date Start 11/4/86 Finish 11/4/86
Static Water Level 19.17'
Contractor Davis Drilling Co.
Top of Well Elevation 21.67'
Driller Charles Smith
Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-1.5			Fine Sandy silt, sand 25-30%, organic debris & misc. gravel, appears oily or Peaty, color 10YR 3/1 (v. drk gry), moist, non-plast, loose.	ML/Pt	2-3-3
1.5-3			~~Fine Sandy~~ Peat, sand 5-10%, appears v. oily, stains hands, moist, non-plast, v. loose, color 10YR 2/1 (black), slight oil sheen when placed in water.	Pt	2-2-3
3-4.5			Silty fine sand, silt 30-35%, moist, loose, oily appearance, stains hands, non-plast., color 5Y 2.5/1 (Black).	SM	4-3-3
4.5-6			Silty fine sand, silt 30-35%, v. moist, v. loose, non-plast., stains hands, color 5Y 2.5/1 (black)	SM	2-2-1

Boring No. ~~16~~ HPGW3 Location Coordinates N

Hole Size Slot E

Screen Size Mat'l Filter Materials

(sing Size Mat'l Grout Type

Geologist Development

Date Start 11/4/86 Finish 11/4/86 Static Water Level

Contractor Top of Well Elevation

Driller Drill Type

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
6-7.5			Silty fine sand, silt 15-20%, sat'd, non-plast, fairly unif. sand, med. dense, color 10YR 5/2 (gryish brn), slight foul odor.	SM	5-8-12
7.5-9			Silty Fine Sand, silt 15-20%, foul odor (swamp gas?), color change to uniform 5GY 6/1 (greenish gry), non-plast, med. dense, sat'd.	SM	5-11-11
9-10.5			fine Sandy clay, sand ~5%, plastic, sat'd, color unif. closest to N 4/0 (drk grey w/ grnish tint).	CH	2-1-2
14-15.5			Clay, clean, massive, high plast, wet, v. soft, unif. color 5GY 4.5/4 (drk greenish grey), foul odor not evident.	CH	0-1-0

Boring No. ~~X~~ HPGW3 SHEET 3 OF 4

Depth (ft)	Lithology Color	USCS	SPT (Bl/f)
19-20.5	19'-19.75': Fine Sandy Clay, sand 15-20%, wet, low plast., color closest to 5Y 5/1 (grnish gry), soft.	CL	2-3-3
	19.75'-20.5': silty Fine Sand, silt 10-15%, non-plast., sat'd, color mottled 10YR 7/2 (light gry) and 10YR 6/8 (brnish yllw) ~25%. Trace clay.	SM	
24-25.5	silty Fine sand, ~~calcareous~~ cemented, silt ~10%, shell fragments ~20%, color 10YR 6/4 (lght yllwish brn). v. moist, appears gravelly due to cementation.	SP	7-14-31

11/4/86
DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198[illegible]

Boring No. ~~1~~ HPGW3 SHEET 4 OF 4

4:30am Left for airport to take Mike Snar. (No Bkst. Br.
8:00am Arrived Camp Lejeune. Met drillers.
8:45 Began Drilling & Sampling. No unusual events.
9:40 Well complete.* Truck back to w.w.t. area for water.
Washed rig. Began Well 17.

*Augurs pulled before silica sand poured. Hole stayed open.

Standard well construction. Hole depth 30'.

Note: At ~29' depth auger bit picked up rock (driller reported hard drilling). Massive, hard silica/calc. (~~no acid~~) cementing large intact shell fragments (shells partially lithified). Possibly bedrock or float.

11/4/86 DATE

Paul D. Conrad SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198[illegible]

Doc NO! CLEJ-00258-1.02-05/01/88

Boring. No. HPGW 4 ~~P8~~ (near Bldg. 1703) Location Coordinates N Page 1 of 7
Hole Size 6" Slot 0.010" E
Screen Size 2" Mat'l Schd. 40 PVC Filter Materials Silica Sand
Casing Size 2" Mat'l PVC Grout Type 1' Bentonite Seal
Geologist Paul Conrad Development
Date Start 11/4/86 Finish 11/4/86 Static Water Level 18.08'
Contractor Davis Drilling Co. Top of Well Elevation 20.58'
Driller Charles Smith Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-1.5			Peat, sand ~5%, non-plast., loose, s. moist, color 10YR 2/2 (v. drk. brown).	Pt	2-3-4
1.5-3			Silty Fine Sand, silt 30-35%, loose, s. moist, non-plast., color 10YR 4/2 (drk greyish brn) some lighter mottling.	ML	3-3-4
3-4.5			Silty Fine Sand, silt 15-20%, moist, med. dense, non-plast., color unif. 10YR 6/2.5 (lght. brnish gry), grains uniform.	SM	4-6-9
4.5-6			Clayey Fine Sand, clay ~5-10%, silt ~5%, med. dense, slight plast, unif color 10YR 7.5/1 (lght gry).	ML	7-7-6

Boring No. ~~T-2~~ HPGW4 Location Coordinates N ______

Hole Size ______ Slot ______ E ______

Screen Size ______ Mat'l ______ Filter Materials ______

Casing Size ______ Mat'l ______ Grout Type ______

Geologist ______ Development ______

Date Start ______ Finish 11/4/86 Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
6-7.5			fine sandy clay, sand 15-20%, v. moist, v. soft, color unif. 5GY 5.5/1 (greenish gry).	ML	3-2-1
7.5-9			fine Sandy clay, sand 10-15%, sat'd, v. soft, color unif. 5GY 5.5/1 (grnish gry).	ML	1-0-1
9-10.5			silty, clayey fine sand, silt ~12%, clay ~12%, soft, sat'd, sand uniform, color uniform 5GY 5.5/1 (grnish gry)	ML	1-2-2
14-15.5			Clay, clean, massive, high plast, soft, unif. color 5GY 5/1 (grnish grey)	CH	0-1-0

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~T2~~ HPGW4 Location Coordinates N

Hole Size Slot E

Screen Size Mat'l Filter Materials

Casing Size Mat'l Grout Type

Geologist Development

Date Start Finish 11/4/86 Static Water Level

Contractor Top of Well Elevation

Driller Drill Type

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
19-20.5			Marl, large shell fragments, one 30mm x ~~10mm~~ rounded black gravel, overall color 10YR 6/8 (brnish yllow), silty ~20%, clayey ~10%, loose, sat'd.	Marl	2-3-4
24-25.5			Marl, same as above, more cemented, appears to be cherty cement but because of softness is prob. calcitic., sat'd, high % shells, Dense.	Marl	26-26-2[illegible]

Boring No. ~~T8~~ HPGW4 SHEET 4 OF 4

— 20' Lunch Break. —

:15 pm Began drilling & sampling.
Location selected by Bob Alexander &
Paul on 11/3/86. Too many utilities
near 1704 (Bldg.).

1:55 pm Well complete. 6 100 lbs bags of silica
sand used. Casing installed directly in the
hole. No heaving. 1' bentonite. No unusual
events.

Construction: Stick up - 2.5'
Bottom of casing at 24.5' (casing floated
up, so 6"
Hole - 27' deep. removed from
top)
Standard construction otherwise.

2:30 Left Location.

11/4/86 DATE

Paul D. Conrad SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198[illegible]

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW5 ~~2~~ (near Bldg. 1606) Location Coordinates N Page 1 of 4

Hole Size 6" Slot 0.010" E

Screen Size 2" Mat'l Sch 40 PVC Filter Materials Silica Sand

(sing Size 2" Mat'l PVC Grout Type 1' Bentonite Seal

Geologist Paul Conrad Development

Date Start 11/4/86 Finish 11/4/86 Static Water Level 16.13'

Contractor Davis Drilling Co. Top of Well Elevation 18.63'

Driller Charles Smith Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-1.5			Peat, sand ~5%, moist, non-plast, loose, organics, roots, color 10YR 3/1 (v.drk. gry).	Pt	2-3--
1.5-3			fine sandy silt, sand 15-20%; some roots, moist, non-plast, color 10YR 3/1 (v. drk gry); loose	ML	3-5-5
3-4.5			fine sandy silt, sand ~10%, moist, non-plast., color, med. dense, color 10YR 3/1 (v. drk gry) w/ thin bands of 10YR 5/3 (brown).	ML	3-5--
4.5-6			fine sandy silt, sand 10-15%, moist, loose, non-plast, color 10YR 7/2 (lght gry), some mottling of 10YR 7/6 (yllw).	ML	2-3-3

DOC NO! CLEJ-00258-1.02-05/01/88

Boring No. X HPGW5 — Location Coordinates N ______

Hole Size ______ Slot ______ — E ______

Screen Size ______ Mat'l ______ — Filter Materials ______

Casing Size ______ Mat'l ______ — Grout Type ______

Geologist ______ — Development ______

Date Start ______ Finish 11/4/86 — Static Water Level ______

Contractor ______ — Top of Well Elevation ______

Driller ______ — Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
6-7.5			fine sandy silty clay, sand 5-10%, silt <5%, slight plast., moist, color 5Y 6.5/1 (gray), 5% mottled w/ 10 YR 8/8 (yllw).	CL	1-2-1
7.5-9			fine sandy silty clay, sand 20-25%, silt ~15%, slight plast., v. moist, soft, color 10YR 7/2 (lght gry), heavily mottled w/ 10YR 6/8 (brnish yllw).	CL	2-2-3
9-10.5			Silty fine sand, silt 12-15%, clayey zones 5-10%, non-plast. (except clays), loose, v. moist, color 10 YR 7/2 (lght gry), mottled w/ 10 YR 6/3 (brnish yllw).	SM	5-5-5
14-15.5			Clay, clean, massive, high plast, wet, color 5GY 5.5/1 (greenish gry), soft.	CH	6-2-3

Boring No. X HP6W5 Location Coordinates N

Hole Size ______ Slot ______ E ______

Screen Size ______ Mat'l ______ Filter Materials ______

(sing Size ______ Mat'l ______ Grout Type ______

Geologist ______ Development ______

Date Start ______ Finish 11/4/86 Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
19-20.5			same description as above, med. stiff.	CH	3-3-5
24-25.5			silty fine sand, silt 10-15%, saturated, unif. sand grains, v. loose, color 2.5Y 6/4 (lght yllwish brn), mottled w/ 7.5YR 5/6 (strong brn).	SM	2-2-2

Doc NO! CLEJ-00258-1.02-05/01/88

Boring No. ~~X~~ HPGW5 SHEET 4 OF 4

? Washing rig.

Began sampling & drilling.

3:35pm Drilling finished. Pulled all augers out. Hole open. Pouring silica sand.

3:40pm Well complete. Four 100 lb bags silica sand used.

Standard construction configuration. Hole 27' deep.

Dismantling augers and cleaning up.

4:30pm Left site.

11/4/86 DATE

Paul D. Conrad SIGNED

SOURCE: Environmental Science and Engineering, Inc., 1986

DOC NO: CLEJ-00258-1.02-03/01/88

Boring No. HP 6W 6 | Location Coordinates N
Hole Size 6" | Slot 0.01 | E
Screen Size 2" | Mat'l PVC | Filter Materials Silica Sand
Casing Size 2" | Mat'l PVC | Grout Type Bentonite Pellets
Geologist David Brentlinger | Development —
Date Start 11/18/86 | Finish 11/18 | Static Water Level 16.25'
Contractor ESE | Top of Well Elevation 18.75'
Driller Davis | Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			10YR 6.5/3 Pale- Very Pale Brown, Silty fine Sand (silt 30%), organic matter top 3", Loose, moist, non plastic	SM	3 4 7
1.5-3.0			2.5Y 5.5/4 light olive Brown, Silty Clayey fine Sand, (silt + Clay 45%), loose - slightly dense, moist, slightly plastic	SM/SC	7 2 4
3.0-4.5			10YR 6/4 light Yellow Brown same as above (1.5-3.0)	SM/SC	3 4 7
4.5-6.0			10YR 6/8, Brown Yellow, Silty Clayey fine Sand (silt + Clay 35%), non plastic, moist, slightly dense	SM	4 7 8
6.0-7.5			10YR 6.5/1 Grey - Light grey with Red oxide streaks throughout, clean clay firm, dense, plastic, moist	CL	2 2 3

Boring No. HP6W6 Location Coordinates N

Hole Size Slot E

Screen Size Mat'l Filter Materials

(asing Size Mat'l Grout Type

G(ɔgist Development —

Date Start Finish Static Water Level

Contractor Top of Well Elevation

Driller Drill Type

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			Sam as above (6.0-7.5) Bottom 6" non plastic	CL	3 6 8
9.0-10.5			10YR 6.5/1 light grey, ultra fine - Fine Sand with 10% silt, loose, moist, non plastic	SW	5 9 12
14.0-15.5			10YR 6.5/3, Pale - very Pale Brown, silty fine sand, (silt 15-20%) moist - wet, slightly dense, non plastic	SM	7 11 13
19.0-20.5			10YR 7/4.5 Very Pale yellow - yellow, silty Sandy Clay (silt + Sand 70%), sticky, Plastic, wet, slightly dense	SC	12 13 8
24.0-25.5		24.0-24.80	10YR 7.5/1 light grey soft clean, very plastic clay wet, slightly dense	CL/SC	5 7 9
		24.8-25.5	10YR 7.5/2 light grey - very pale white brown, wet, sticky med. Sandy Clay Sand 30%		

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW 6 SHEET ______ OF ______

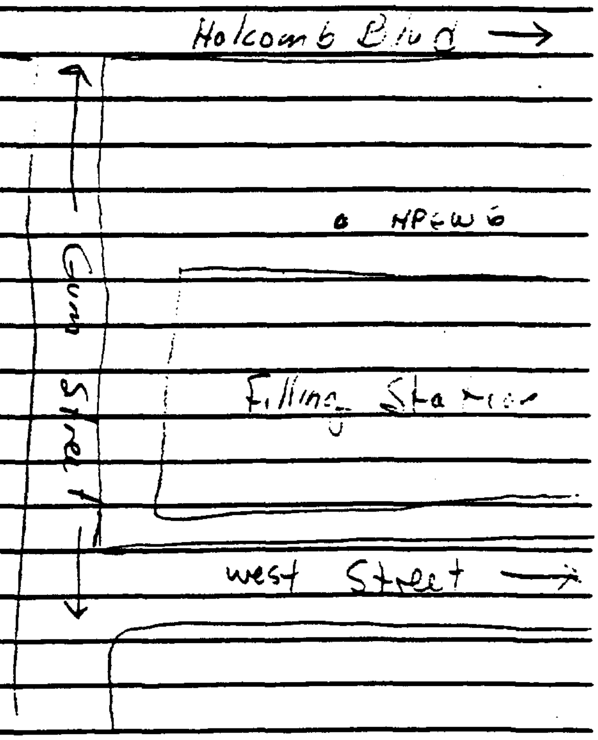
On Site 730 am 11/18/86

1st Spoon 735

last Spoon 815

Well Complete 840

Standard Well Specs



DATE ______ SIGNED ______

SOURCE: Environmental Science and Engineering, Inc., 198[illegible]

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No.	HP6W 7	Location Coordinates N	
Hole Size	6" Slot 0.01	E	
Screen Size	2" Mat'l PVC	Filter Materials	Silica Sand
Casing Size	2" Mat'l PVC	Grout Type	Bentonite [illegible]
Geologist	David Brentlinger	Development	—
Date Start	11/18/86 Finish 11/18	Static Water Level	14.33'
Contractor	ESE	Top of Well Elevation	16.83'
Driller	Davis	Drill Type	Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
[illegible]			10YR 6.5/3 Pale - Very Pale Brown, Silty Fine Sand (Silt 30%), loose, moist, non plastic, organic matter top 6"	SM	6 10 10
1.5-3.0			10YR 5.5/4, Light Yellow Brown, Silty Fine Sandy Clay (silt+sand 40%), moist, slightly plastic, med. dense	SC	3 5 5
3.0-4.5		3.0-3.9	Same as above (1.5-3.0)	SC / SW	6 5 5
		3.9-4.5	10YR 8/1 white, ultra fine - fine sand, loose, dry - moist, non plastic		
4.5-6.0		4.5-5.5	Same as above (3.9-4.5)	SW / SM	8 10 8
		5.5-6.0	10YR 5.5/8 yellow brown - yellow, silty clayey fine sand (clay + silt 45%) slightly plastic, moist, mod. dense		
6.0-7.5			2.5Y 6.5/4 light yellow brown - pale yellow, silty clayey fine sand (silt + clay 38%), moist slightly dense, non plastic	SM	8 10 15

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW 7

Location Coordinates N

Hole Size ____ Slot ____

E

Screen Size ____ Mat'l ____

Filter Materials ____

(asing Size ____ Mat'l ____

Grout Type ____

G 'ogist ____

Development ____

Date Start ____ Finish ____

Static Water Level ____

Contractor ____

Top of Well Elevation ____

Driller ____

Drill Type ____

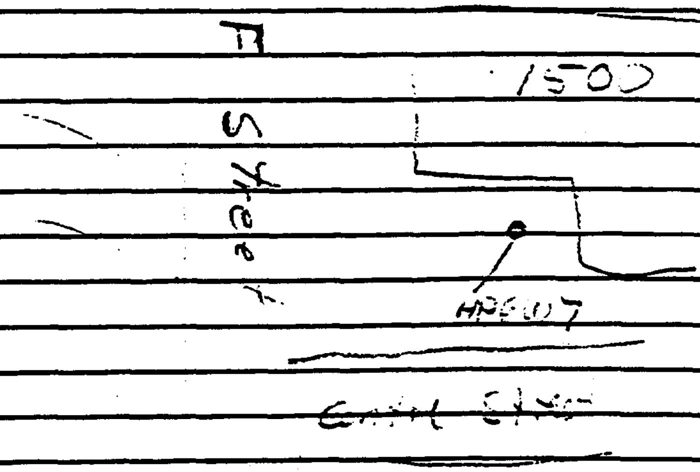
Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			10YR 6.5/8 yellow brown - brown yellow, silty clayey fine sand (silt + clay 30%), moist, non plastic, slightly dense	SM	5 6 6
9.0-10.5			10YR 7.8/8, yellow, very silty ultra fine sand, (silt 30-40%), loose, moist non plastic	SM	8 7 6
14.0-15.5			10YR 6.5/4 very pale yellow Brown, Same as above (9.0-10.5) with more density	SM	9 12 15
19.0-20.5			2.5Y 8/2 white - pale yellow, silty fine - med. sand (silt 10-15%), wet, slightly dense	SW	6 8 10
24.0-25.5			2.5Y 7.5/2 light grey - pale yellow, silty clayey med. sand (silt + clay 40%), sticky and plastic in clay layers, wet, slightly dense	SM/SC	3 3 3

DOC. NO: CLEJ-00258-1.02-05/01/88

Boring No. HP6W7 SHEET ____ OF ____

On Site 855 Am 11/18/86
1st Spoon 900
last Spoon 940
Well Complete 1040

Standard Well Specs



DATE ____ SIGNED ____

SOURCE: Environmental Science and Engineering, Inc., 198?

DOC NO: CLEJ-06258-1.02-05/01/88

Page 1 of 4

Boring No. HP6W8 ~~#8~~ (near Bldg. 1500) Location Coordinates N ______

Hole Size 6" Slot 0.010 E ______

Screen Size 2" Mat'l PVC Filter Materials Silica Sand

Casing Size 2" Mat'l PVC Grout Type Bentonite Seal - 1'

Geologist Paul Conrad Development ______

Date Start 11/6/86 Finish 11/6/86 Static Water Level 13.33

Contractor Davis Drilling Top of Well Elevation 15.83'

Driller Charlie Smith Drill Type Hollow Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-1.5			Silty Fine Sand, silt 15-20%, moist, med. dense, non-plast, color mottled around 10YR 5/3 (brown). Top 2" black & organic.	SM	4-6-10
1.5-3			Silty Fine Sand, silt 12-17%, moist, loose, non-plast., color 2.5Y 6.5/4 (lght yllwish brn) mottled w/ cleaner sand 2.5Y 8/2 (white), occ. clayey (soft) nodules (small).	SM	3-3-6
3-4.5			Silty Fine Sand, silt ~15-20%, ~3% clay, loose, non-plast, color uniform 2.5Y 6.5/2 (lght gry), s. moist.	SM	5-4-4
4.5-6			Fine sandy Clay, Sand 15-20%, med. stiff, moist, low plast, color 2.5Y 5.5/2 (lght brnish gry), some mottling of 10YR 6/6 (brnish yllw), a small root in sample.	CL	2-4-6

Boring No. ~~4~~ HPGW8 Location Coordinates N ______

Hole Size ______ Slot ______ E ______

Screen Size ______ Mat'l ______ Filter Materials ______

Casing Size ______ Mat'l ______ Grout Type ______

Geologist ______ Development ______

Date Start ______ Finish 11/6/86 Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
6-7.5			Fine Sand, silt 5-10%, fairly clean, sl. moist, non-plast, med. dense, mottled color clean white and 10YR 7/2 (light grey) silty zones are light grey.	SP	5-6-10
7.5-9			Fine Sand, silt 10-12%, moist, non-plast. ~~med~~ dense, color 2.5Y 7/2 (light grey), mottled w/ slightly lighter shade.	SP	5-7-12
9-10.5			Silty Clayey Fine Sand, silt 12-15%, clay ~5-10%, moist, small soft clayey nodules (plast.), silty sand non-plast, med. dense, color mottled - 2.5Y 7/4 (pale yllw) ~85%, 10YR 8/2 (white) ~5%, 7.5YR 6/8 (reddish yllw) ~10%	ML	5-5-9
14-15.5			Peat, massive, saturated, foul odor not evident, fine sand 5-10%, trace fibrous wood fragments, non-plast, loose, color 10YR 2/1.5 (v. drk brown) uniform.	Pt	3-3-5

DoC NO: CLEJ-00258-1.02-05/01/88

Boring No. 14 HPGW8		Location Coordinates N	
Hole Size	Slot	E	
Screen Size	Mat'l	Filter Materials	
Casing Size	Mat'l	Grout Type	
Geologist		Development	
Date Start	Finish	Static Water Level	
Contractor		Top of Well Elevation	
Driller		Drill Type	

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
19-20.5			Silty Fine Sand, silt 15-20%, clay ~5%, non-plast, small soft clayey ~~zones~~ slightly plast., dense, sat'd., color unif. 5Y 6.5/2 (light olive gry).	SM	8-12-20
24-25.5			Fine Sand, silt 5-8%, unif. qtz grains, non-plast, med. dense, sat'd, color 2.5Y 7/2 (lght gry) uniform.	SP	5-8-10

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. 4 HPGW8 SHEET 4 OF 4

— Charlie drilling w/ helper hired yesterday (no exp.).

7:30 am Arrived at Camp Lejeune.

Prep'd. for drilling.

8:25 am Began drilling & sampling. Location moved from near Blg. 1500 to 1481' to avoid buried utilities. App'd. by Bob Alexander

9:15 am Last spoon. Assembled Casing. 2 5' auger sections pulled out, pouring silica sand thru augers.

9:45 am Augers out. 1½ bags silica sand in hole. Hole staying open.

10:00 am. Well complete. 4+ bags (100 lb each) silica sand used. 1' Bentonite Seal placed.

Standard construction (27' hole, 25' casing below ground, 2.5' stick up, 5" point at casing bottom, bottom 20 ft. ss screen).

Washing rig, Preping for next hole.

11/6/86 DATE — Paul D. Conrad SIGNED

SOURCE: Environmental Science and Engineering, Inc., 1980

DOC. NO: CLEJ-00258-1.02-05/01/88

Boring No.	HPGW9 ~~HA-9~~ (near Bld. 1601)	Location Coordinates N	
Hole Size	6" Slot 0.010	E	
Screen Size	2" Mat'l PVC	Filter Materials	Silica Sand
Casing Size	2" Mat'l PVC	Grout Type	Bentonite Seal - 1'
Geologist	Paul Concad	Development	
Date Start	11/6/86 Finish	Static Water Level	15.63'
Contractor	Davis Drilling	Top of Well Elevation	18.13'
Driller	Charlie Smith	Drill Type	Hollow Stem Auger - 6"

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-1.5			Top 8" - mixture Peat, clay, silt, organic debris, roots, misc. gravel. Silty Fine Sand, silt ~25%, non-plast, moist, color 10YR 5/3 (brown), trace mottling of 10YR 6/6 (brnish yellow), loose.	SM	3-4-4
1.5-3			Silty Fine Sand, silt 20-25%, clay 3-5%, non-plast, s. moist, loose, color 10 YR 5.5/4 (lght yllwish brn) Trace mottling of 7.5YR 5/8 (strong brn), strong brown better cemented, several small frag's. of baked clay (float from sewer install'n?)	SM	3-4-4
3-4.5			Silty Fine Sand, silt 20-25%, clay-trace, non-plast., v. loose, s. moist, color 10YR 6/4 uniform. (lght yllwish brn), sand uniform	SM	1-2-2
4.5-6			Silty Fine Sand silt 20-25%, clay ~5%, s. moist, loose, sand uniform; non-plast. (except clayey zones), color 10YR 6/4 (lght yllwish brn).	SM	3-5-5

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No.	# HPGW9	Location Coordinates N	
Hole Size	Slot	E	
Screen Size	Mat'l	Filter Materials	
Casing Size	Mat'l	Grout Type	
Geologist		Development	
Date Start	Finish	Static Water Level	
Contractor		Top of Well Elevation	
Driller		Drill Type	

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
6-7.5			Silty Fine Sand, ~50% fairly clean loose sand, ~50% silty fine sand (~3% clay), med. dense, s. moist, mottled color 10YR 8/2 (white) sand and 10YR 6/6 (brnish yllw), silt in silty sand ~20-25%.	SM	3-5-8
7.5-9			Silty Fine Sand, silt ~20%, moist, med. dense, color 10YR 6/6 (brnish yllw), s. lighter mottling.	SM	5-7-5
9-10.5			Silty Fine Sand, moist, non-plast, med. dense, color 2.5Y 6/5 (light yllwish brn) mottled w/ lght brnish gry and rdish yllw, cluster of fine black fibres noted (fragile) — old roots?	SM	5-6-9
~~14~~ 15.5			Clayey Fine Sand, clay 5-10%, v. moist, v. strong foul odor (resemble natural gas?) v. low to no plast., color change to unif. 5Y 8/1 (white), med. dense.	SP	6-9-13

Boring No. H HPGW9 SHEET 3 OF 4

9-20.5 Fine Sand, ~5% fines, color 10YR 8/1 7-13-15
(white), saturated, v. foul odor (as above),
uniform grain size, med. dense.
SP

24-25.5 Clayey fine Sand, clay ~5%, unif. 7-12-15
grains, non-plast (slight in trace zones),
v. foul odor (as above), med. dense,
color 10 YR 8/2 (white), uniform.

11/6/86
DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc. 1980

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW9 SHEET 4 OF 4

11:05 am Began drilling & sampling.

12:05 pm Last spoon. Began backing augers and pouring silica sand. Odor rising from hole. Casing installed. Odor resembles natural gas(?), solventz *

12:30 All augers out. Pouring sand. Hole open.

12:45 Bentonite in. Well complete.

Standard construction. Hole 27' deep. 4 bags silica sand used.

Driller back to w.w.t. plant to load up sand. Paul to Base Telephone to locate next site's cables. Also coordinate w/ other rig.

15 min. lunch Brk.

* Driller did not notice any drilling difficulty. Geologist found no metal shavings or other indications of hitting pipeline. Propane tank ~30' away, but odor not exactly like propane. Observed no change in propane tank gauge. Evident from soil gas results that the odor is probably from solvents.

Because of near completion of well and the odor level judgement was made to quickly complete well.

11/6/86 Paul D. Conrad

DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 1980

DOC NO: CLEJ-00258-1.02-05/01/88

Geologist: Paul Conrad   Driller: Charles Smith, Davis Drilling Co.   Sheet 1 of 4.

Date: 11/6/86

TOC - 15.00'

Well: ~~#3~~ HPGW 10 ~~LN 10~~ ([illegible])   static - 12.50'

Depth (ft)	Lithology & Color	USCS	SPT (bl/ft)
0-1.5	Top six inches: Peat w/ fine sand 10-15%, roots & [illegible], color 10YR 2/1 (black) Fine Sandy silt, sand 15-20%, high root content, non-plast, loose, color 10YR 4/2 (drk. gryish brn), moist.	PT ML	3-3-6
1.5-3	Silty Fine Sand, silt ~10-15%, trace clay, color 10 YR 6/4 (light yllwish brn), trace mottling of 10YR 6/8 (brnish yllw), s. moist, non-plast. (except trace clayey zones), med. dense.	SM	6-9-6
3-4.5	same as above 2" fine Sandy Clay bed at 4', sand 25-30%, low plast., moist, color 10 YR 5.5/4 (lght yllwish brn), mottled w/ blck zones 4'-4.5': silty Fine Sand, very light weight, (sand?), color 10YR 3.5/1 (drk gry), loose.	SM/CL	3-3-2
4.5-6	Silty Clayey Fine Sand, silt 10-15%, clay ~10%, v. slight plast. in clayey zones, otherwise non-plast., v. loose, moist, color mottled 10YR 5/3 (brwn) and 10YR 7/8 (yllw)	ML	1-1-1

HPGW10

6-7': Same as above. ML

6-7.5 7-7.5': Silty Fine Sand, silt ~12-15%, v. loose, SM 1-1-2
non-plast., moist, mottled → clear
white 10%, 7.5YR 6/8 (reddish yllw) ~15%,
and 2.5Y 6/4 (lght yllwish brn)

7.5-9 Silty Fine Sand, silt ~15%, trace SM 2-2-2
clay, moist, mottled color, clean
sand 10YR 8/1 (wht), silty sand 7.5YR
5/8 (strong brn) to white, v. loose.

9-10.5 Silty Fine Sand, silt 15-20%, loose, SM 2-4-5
same descript. as above except
Strong brwn color dominant ~ 75%.

14-15.5 Peat, massive, v. soft, saturated, Pt 3-2-1
sand ~10%, color 10YR 2/1.5 (v.
drk brn), stains hands, foul odor not
evident, non-plast.

~~WELL #5~~ HP GW10

19-20.5 Silty Fine Sand, silt 15-20%, SM 6-7-7
trace clay, sat'd, med. dense,
grains uniform, unif. color 2.5Y
7/2 (light gry), occ sprinkling of
strong brown or v. thinly bedded
reddish yllw silt, v. slight plast. to none.

24-25.5 Silty V. Fine Sand, silt 15-20%, SM 12-20-[illegible]
trace clay, sat'd., dense,
grains uniform, color unif. 5Y 8/2
(white), non-plast.

DOC NO: CLEJ-00258-1.02-05/01/88

~~WELL 5~~ HPGW10

11/6/86 Log

50 pm. Began drilling & sampling.

3:05 Last Spoon. Backing out inner tri-cone string, and then augers. Assembling and installing casing.

3:30 All augers out. Hole open. No foul odor evident.

3:45 Well complete. 4 bags of silica sand used (100 lb. each). 1' bentonite placed.
Standard Construction. Hole 27' deep.
No unusual events.

4:15 Back at w.w.t. plant. Rig washed. Quit for day.

8:00 pm - 12:15 am. Constructed master maps of Industrial Area, which included all soil gas and locations of the ~18 characterization wells. Maps hung on Beach house wall for Bob Gregory's use in siting new wells, and general reference purposes.

1/2 hour spent coordinating on well development.

1 0 0 6 1

Doc No: CLEJ-00258-1.02-05/01/88

Boring No.	HPGW 11	Location Coordinates N	
Hole Size	6"	Slot 0.01	E
Screen Size	2"	Mat'l PVC	Filter Materials: Silica Sand
Casing Size	2"	Mat'l PVC	Grout Type: Bentonite Pellets
Geologist	David Brentlinger		Development: —
Date Start	11/18/86	Finish 11/18	Static Water Level: 13.57'
Contractor	ESE		Top of Well Elevation: 16.07'
Driller	Davis		Drill Type: Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			2.5Y 6.5/6 yellow-olive yellow, silty fine sand (silt 25%), organic matter top 2", loose, moist, non plastic	SM	3 0 3
1.5-3.0			10YR 7.8/5.5 very pale brown yellow, silty fine sand (silt 10-15%), loose, moist, non plastic. Brown mottles throughout	SM	2 3 3
3.0-4.5			10YR 5.25/8 Brown yellow-yellow brown, silty clayey fine sand (silt + clay 35%) slightly dense, moist, non plastic	SM	3 3 6
4.5-6.0			10YR 7.8/6, yellow, silty fine sand, (silt 30%) loose, moist, non plastic	SM	3 5 8
6.0-7.5			7.5YR 7/8, Red yellow, silty fine sand (silt 30%) loose, moist, non plastic	SM	4 5 8

DocNo: CLEJ-00258-1.02-05/01/88

Boring No. HP GW 11		Location Coordinates N	
Hole Size	Slot	E	
Screen Size	Mat'l	Filter Materials	
Casing Size	Mat'l	Grout Type	
Geologist		Development	
Date Start	Finish	Static Water Level	
Contractor		Top of Well Elevation	
Driller		Drill Type	

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			7.5YR 5.25/8 Strong Brown, silty fine sand with 10% clay mottles throughout (silt 25%), slightly dense-moist, non plastic	SM	3 6 8
9.0-10.5		9.0-9.75	10YR 6.5/6 yellow Brown, silty clayey fine sand (silt + clay 40%), slightly dense, moist, non plastic	SC	15 8
		9.75-10.5	10YR 7.5/1 light grey white, silty fine sand (silt 10-15%) loose, dry-moist, non plastic	SW	8
14.0-15.5			10YR 5.25/3 Pale brown-brown silty fine sand (silt 25%), slightly dense, moist, non plastic	SM	15 8 13
19.0-20.5			10YR 5.5/4 Brown-light yellow Brown, same as above (14.0-15.5)	SM	14 8 8
24.0-25.5			10YR 7.25/4, very pale brown, clayey fine-med. sand (clay 40%), sticky plastic clay layers throughout, wet, slightly dense, 10% coarse material	SC/SW	3 4 4

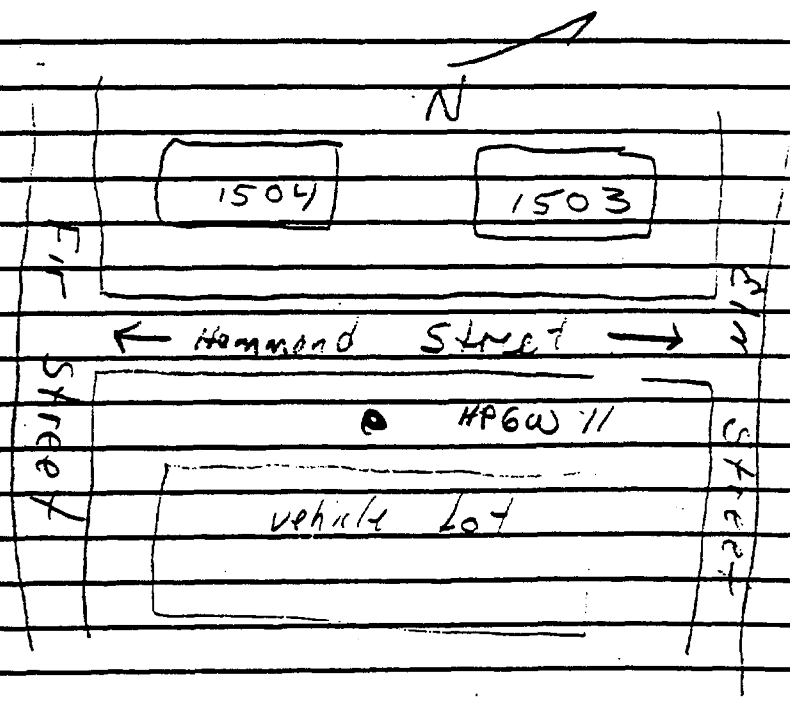
DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HP6W 11 SHEET ____ OF ____

11/18/85

On Site 1110 am
1st Spoon 1120
last Spoon 1220
Well Complete 110

Standard Well Specs



DATE ____ SIGNED ____

SOURCE: Environmental Science and Engineering, Inc., 198?

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW 12		Location Coordinates N	
Hole Size 6"	Slot 0.01	E	
Screen Size 2"	Mat'l PVC	Filter Materials	Silica Sand
Casing Size 2"	Mat'l PVC	Grout Type	Bentonite Pellets
Geologist David Brentlinger		Development	–
Date Start 11/18/86	Finish 11/18	Static Water Level	11.70'
Contractor ESE		Top of Well Elevation	14.20'
Driller Davis		Drill Type	Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			5Y 3.75/1, very dark grey, Silty Clayey Fine Sand, (silt + Clay 40%), Slightly dense moist, clay plastic	SM/SC	4 3 6
1.5-3.0			2.5Y 4.5/4 Brown-light olive Brown, silty fine Sand with silty clay layers, (silt + Clay 20-30%), slightly dense, clay is plastic, moist	SM	3 2 3
3.0-4.5			10YR 7.8/2, white - very Pale Brown, silty Fine Sand, (silt 20%), loose, moist, non plastic	SM	3 3 6
4.5-6.0			10YR 7/7.5 very Pale Brown-yellow, silty fine Sand, (silt 20%), Bright Yellow Brown mottles throughout, moist, slightly dense, non plastic	SM	6 8 10
6.0-7.5			10YR 6/8 Brown Yellow Silty Fine Sand, (silt 35%), moist, slightly dense, non plastic	SM	7 9 9

DOC NO: CLEJ-00258-1.62-05/01/88

Boring No. HP GW 12 — Location Coordinates N ______

Hole Size ______ Slot ______ — E ______

Screen Size ______ Mat'l ______ — Filter Materials ______

Casing Size ______ Mat'l ______ — Grout Type ______

Geologist ______ — Development ______

Date Start ______ Finish ______ — Static Water Level ______

Contractor ______ — Top of Well Elevation ______

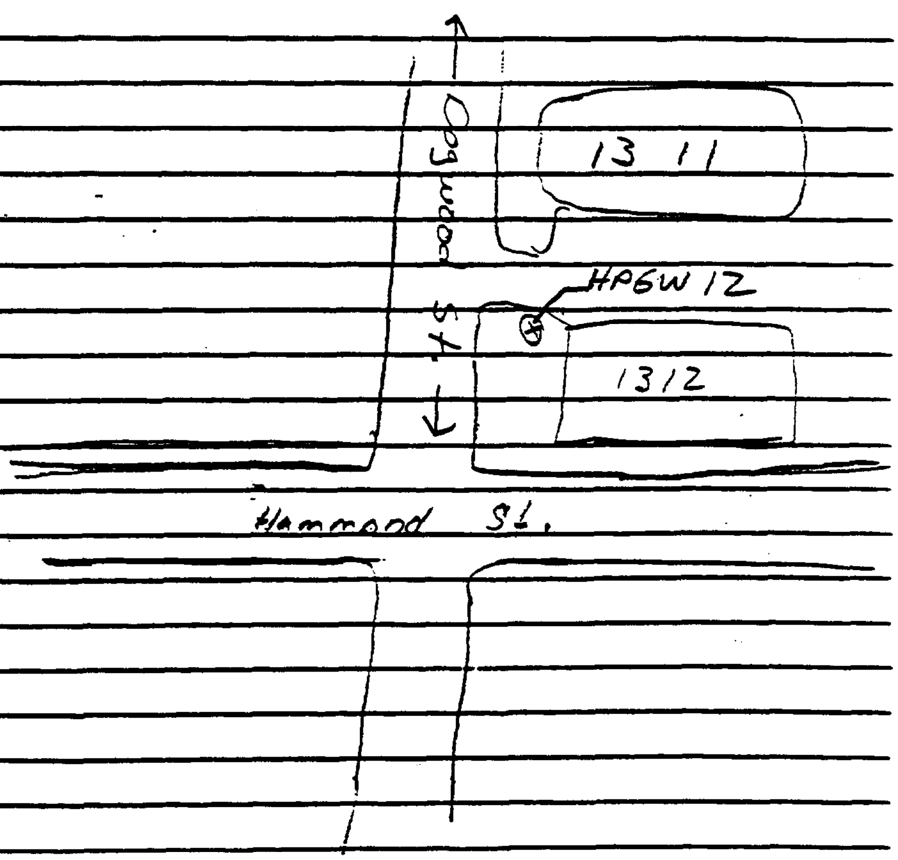
Driller ______ — Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			Same as above (6.0-7.5)	SM	9 6 7
9.0-10.5			10 YR 7.5/2, Very Pale Brown, Silty Clayey Sand, (silt + clay 40%) Slightly plastic, moist-wet, Slight-mod. dense	SM/SC	7 3 6
14.0-15.5			10 YR 8/2 white - Very Pale Brown, Silty fine - med. Sand, (silt 10-15%), 10% [illegible] silt mottles, Sand is wet, mod. dense, non plastic	SW	10 [illegible] 10
19.0-20.5			10 YR 7.25/8, yellow, Med. Sand with (10-15%) Coarse material, loose, wet, non plastic	SW	11 10 6
24.0-24.5			10 YR 8/1 white silty Clayey med. Sand, (silt + Clay layers 25%), 10% Coarse Sand, wet, Clay plastic, mod. dense - dense	SC/SW	5 16 7

Boring No. HP GW 12 SHEET ____ OF ____

On Site 135 pm 11/18
1st Spoon 140 pm
last Spoon 230 pm
Well Complete 330pm

Standard Well Specs



DATE ____ SIGNED ____

SOURCE: Environmental Science and Engineering, Inc., 198?

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW 13 | Location Coordinates N

Hole Size 6" | Slot 0.01 | E

Screen Size 2" | Mat'l PVC | Filter Materials Silica Sand

Casing Size 2" | Mat'l PVC | Grout Type Bentonite Pellets

Geologist David Brentlinger | Development —

Date Start 11/17/86 | Finish 11/17 | Static Water Level 12.00

Contractor ESE | Top of Well Elevation 14.50'

Driller Davis | Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			10YR 5.5/3 Brown-Pale Brown, silty fine sand (silt 30%), organic matter + Gravel fill throughout, 40%), Med. dense, moist, non plastic	SM	4 8 14
1.5-3.0			10YR 3.5/1, very dark grey, silty fine sand with 10% grey mottles throughout slightly-dense, moist, non plastic	SM	6 4 6
3.0-4.5			5Y 5.5/2, light Olive Grey, silty fine sandy clay, (silt + sand 45%), slightly plastic, slightly dense, moist	SC	6 3 3
4.5-6.0			2.5Y 5.6/4, light olive yellow Brown with oxide streaks throughout, silty sandy clay, (silt + sand 40%) slightly plastic, firm, dense, moist	SC/CL	2 3 6
6.0-7.5			2.5Y 5.6/4, light olive yellow Brown, silty clay (silt 30%) firm + Dense, moist, plastic	CL	4 8 6

DOC. NO: CLEJ-06258-1.02-05/01/88

Boring No. HP GW 13

Hole Size ______ Slot ______

Screen Size ______ Mat'l ______

(asing Size ______ Mat'l ______

G 'ogist ______

Date Start ______ Finish ______

Contractor ______

Driller ______

Location Coordinates N ______

E ______

Filter Materials ______

Grout Type ______

Development ______

Static Water Level ______

Top of Well Elevation ______

Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			2.5Y 6.5/6, Grey Brown - light grey brown, silty Clay same as above (6.0-7.5)	CL	3 3 5
9.0-10.5			2.5Y 6.5/4, pale Yellow - Light Yellow Brown, silty Clay same as above (6.0-7.5), less dense	CL	2 2 2
14.0-15.5			10YR 8/3, Very Pale Brown, silty Med. Sand, (silt 15-20%), wet, slightly dense, non plastic	SM/SW	2 2 4
19.0-20.5			5Y 4.5/1, grey-olive grey (green tint), silty med. Sand, (silt 20%), wet, loose, non plastic	SM/SW	2 2 0
24.0-25.5			2.5Y 4.5/0 grey Clean Medium Sand, wet, loose, non plastic	SW	2 1 4

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. HP GW 13 SHEET ______ OF ______

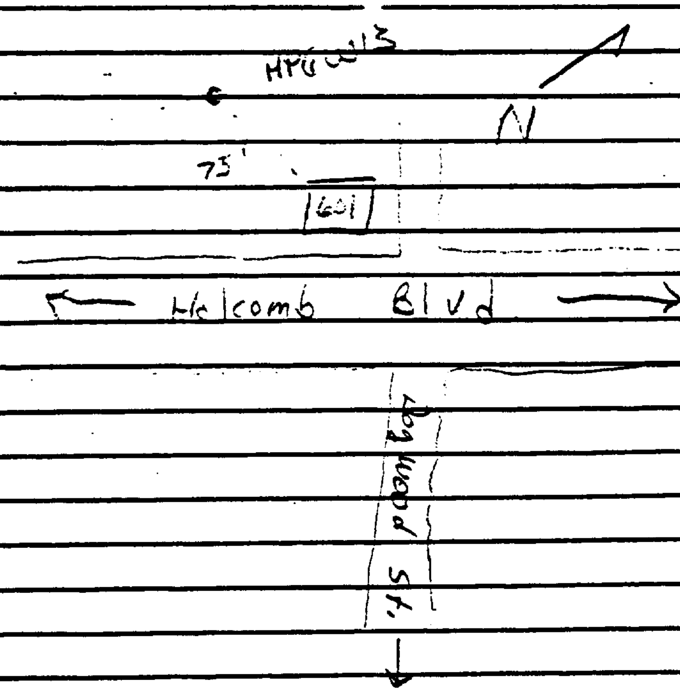
insite 120 PM 11/17/86

1st Spoon 130

last Spoon 120

well Complete 250

[illegible] Spcs



DATE ______ SIGNED ______

SOURCE: Environmental Science and Engineering, Inc., 1986

DEC NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~[illegible]~~ HPGW$14 (near Bldg. 1300) Location Coordinates N

Hole Size 6" Slot 0.010 E

Screen Size 2" Mat'l PVC Filter Materials Silica Sand

Casing Size 2" Mat'l PVC Grout Type 1' Bentonite Seal

Geologist Paul Conrad Development

Date Start 11/5/86 Finish 11/5/86 Static Water Level 10.91'

Contractor Davis Drilling Co. Top of Well Elevation ~~13.31~~ 13.31'

Driller Charlie Smith Drill Type Mobile 33 ATV - Hollow Stem Augers

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-1.5			Peat, sand 5-10%, silty, roots & org. debris, s. less pt. at 1.5', color 10 YR 3/1.5 (v. drk brn), mottled w/ 2.5Y 6/4 (light yllwish brn), med. dense, s. moist., non-plast.	Pt	3-4-8
1.5-3			~~[illegible]~~ Fine Sandy silt, sand 15-20%, organics ~35-40%, some clay (trace), non-plast., s. moist, color 2.5YR 6.5/4 (lght yllwish brown) mottled w/ 10 YR 3/1.5 (v. drk brn), loose density.	ML	4-4-3
3-4.5			fine sandy silty clay, sand 15-20%, silt 5-10%, ~~s. moist~~, Low plast., med stiff, color mottled 7.5 YR 5/8 (strong brn) and 10YR 6/4 (lght yllwish brn), thin roots encountered.	CL	3-4-3
4.5-6			Fine Sand, silt ~3%, clay ~3%, unif. grains, moist, med. dense, color uniform 10 YR 7.5/2 (lght gry to white).	SP	4-6-10

Doc No: CLEJ-00258-1.02-05/01/88

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
P.O. Box ESE
GAINESVILLE, FLORIDA 32602-3053
(904) 332-3318 TWX 810-825-6310

JOB ~~Boring #5~~ HPGW14 2 of 4
SHEET NO. 11/5/86
CALCULATED BY ________ DATE ________
CHECKED BY ________ DATE ________

Depth (ft)	Lithology / ~~Color~~	USCS	~~SPT~~ (BL/FT)
6-7.5	Silty Fine Sand, silt 25-30%, clay ~ 5%, color mottles from 10YR 8/2 (white) to 10YR 6/8 (brnish yllw), non-plast, loose, moist.	SM	6-6-4
7.5-9	Clayey Fine Sand, clay 15-20%, moist, loose, non-plast. unless sat'd., color 10YR 7/2 (light gry), s. yllwish mottling	ML	2-3-3
9-10.5	Fine Sandy Clay, sand 5-10%, silt - trace, plastic, moist, color 10YR 7/2 (lght gry) with distinct black lines (5%) haloed by 7.5YR 5/8 (strong brown), soft.	CL	3-2-3
14-15.5	Peat, ~5% fine sand, saturated, s. foul odor, ~~wood~~ fragment ~~(fibrous)~~, soft, non-plast, color 10YR 2/1 (black)	Pt	1-0-1

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GAINESVILLE, FLORIDA 32602-3053
(904) 332-3318 TWX 810-825-6310

JOB ~~Boring #5~~ HP6W14 3 of 4
SHEET NO. 11/5/86 OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

		USCS	SPT (Bl/6")
19-20.5	Silty Fine Sand, silt ~ 15%, sand uniform non-plast, sat'd, v. slight odor, color uniform 2.5Y 6.5/2 (lght brnish gry)	SP	8-5-9
24-25.5	Clayey sand, clay ≤ 10% (in small clusters), clr qtz grains, saturated, v. slight foul odor, non-plast (except clusters), med. dense, color 5Y, 7/1 (lght gry).	SC	6-9-15
	3" sandy clay layer at ~24.75', Plastic, (CH) color same as above, sand 0-5%		

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. B HPGW14 SHEET 4 OF 4

2:30 pm New helper found. Travel to W.W.T. to get truck. Washed rig. & Filled Tank.

1:40 pm. Began sampling & drilling. Location between two paved roads (asphalt) - grass strip ~ 8' wide.

2:35 pm Last spoon. Backed out 2 auger sects. (5') before pouring silica sand. Casing installed!

3:15 All augers out. Poured silica sand. Hydraulic fluid running from fitting when mast tilted over. Apparently none w/in 3 feet of hole.

Hole taking much sand. Fluid has drilling mud consistency in annulus, probably due to in-situ clay. (see comment following)

3:25 Well complete. 5 bags sand used (100 lb). Bentonite seal in place. Sand somewhat suspended in annulus when finished but not signif. Standard construction.

3:30 Began washing rig, etc.
4:00 Traveled back to W.W.T area. End of day

11/5/86 Paul D. Conrad
DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

DOC NO: CLEJ-00258-1.02-08/01/88

Boring No. ~~GW-10~~ HPGW15
Hole Size 6" Slot 0.01
Screen Size 2" Mat'l PVC
Casing Size 2" Mat'l PVC
Geologist David Brentlinger
Date Start 11/6/86 Finish 11/6
Contractor ESE
Driller Davis

Location Coordinates N
E
Filter Materials Silica Sand
Grout Type Bentonite Pellets
Development
Static Water Level 12.21'
Top of Well Elevation 14.71'
Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5		0.0'	Cement - Asphalt		
1.5-3.0		1.9'	Cement - Asphalt		
		1.9-3.0'	10YR 6.5/3, light grey Brown, silty fine sand (30% silt), loose, dry-moist, non plastic	SM	13 22 24
3.0-4.5			2.5Y 6.5/8, olive yellow, silty fine Sand, (silt 30%) loose, dry-moist, non plastic	SM	3 6 4
4.5-6.0			10YR 7/8+, yellow, Silty Clayey Sand (silt + Clay 40%), loose-slightly dense, slightly plastic	SM/SC	4 5 5

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 10~~ HPGW15 Location Coordinates N ____

Hole Size ____ Slot ____ E ____

Screen Size ____ Mat'l ____ Filter Materials ____

(asing Size ____ Mat'l ____ Grout Type ____

ologist ____ Development ____

Date Start ____ Finish ____ Static Water Level ____

Contractor ____ Top of Well Elevation ____

Driller ____ Drill Type ____

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
6.0-7.5			10YR 7.5/6 yellow - light brown, Silty fine Sand (silt 10-15%), loose, moist	SC	6 8 8
7.5-9.0			10YR 7.5/8, yellow, silty fine sand (silt 10-15%), Clay + Silty Sand top 6", moist, loose - slightly dense, non plastic	SW	8 8 7
9.0-10.5			2.5Y 7.5/2, light grey - pale yellow, silty fine Sand (silt 15-20%), loose, moist - wet, non plastic	SM	8 10 8
14.0-15.5			2.5Y 7.5/2, light grey, ultra fine sand with 30% uncemented clastics, wet, loose, non plastic	SW	0 0 3
19.0-20.5			10YR 7.5/1 light Grey, silty fine-med. Sand, wet, loose, non plastic (silt 10-15%)	SW	0 3 6

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW10~~ HPGW15 Location Coordinates N ______

Hole Size ______ Slot ______ E ______

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

ologist ______ Development ______

Date Start ______ Finish ______ Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
24-25.5		24-24.9	10YR 7.5/1, light grey, medium-fine sand little/no silt, wet, loose	SW	6
		24.9-25.5	Same color as above (24-24.9), medium Sand 40% coarse pebbles and sand 60%		2 1

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 10~~ HPGW 15 SHEET____ OF____

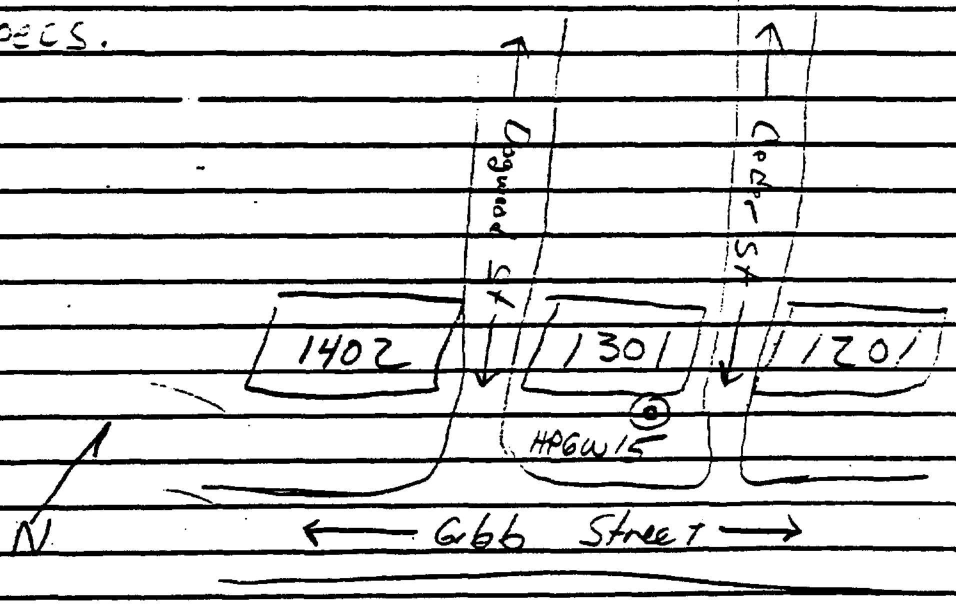
On Site 930 Am 11/6/86

1st Spoon 940

last Spoon 1040

Well finished 1055

Standard Well specs.



DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. #PGW16 | Location Coordinates N
Hole Size 6" | Slot 0.01 | E
Screen Size 2" | Mat'l PVC | Filter Materials Silica Sand
Casing Size 2" | Mat'l PVC | Grout Type Bentonite
Geologist David Grentheror | Development —
Date Start 11/19/86 | Finish 11/19 | Static Water Level 12.04'
Contractor ESE | Top of Well Elevation 14.54'
Driller Davis | Drill Type Hollow stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			10YR 3.25/1, Very Dark Grey, silty fine sand (silt 30%) organic matter top 8", loose, moist, non plastic	SM	3 3 5
1.5-3.0			2.5Y 5/6, light Olive Brown, Silty Sandy Clay (silt + Sand 45%) Slightly Plastic, Moist, Slightly dense	SC	3 15 2
3.0-4.5			2.5Y 6/6 olive yellow, Silty Clayey fine Sand (silt + Clay 45%), non plastic, moist, slightly dense	SM/SC	3 12 3
4.5-6.0			10YR 6.75/4 yellow - very pale yellow, silty fine sand, (silt 30%), loose, moist, non plastic	SM	3 6 3
6.0-7.5	Alternating 2-3" layers throughout	50% each	10YR 8/8 yellow Silty fine Sand loose, moist, non plastic 10YR 8/1 white ultra fine sand, loose, moist, little to no silt	SM/SW	5 9 12

DOC NO: CLEJ-00258-1.02-08/01/88

Boring No. HP6W16

Hole Size ______ Slot ______

Screen Size ______ Mat'l ______

asing Size ______ Mat'l ______

G ogist ______

Date Start ______ Finish ______

Contractor ______

Driller ______

Location Coordinates N ______

E ______

Filter Materials ______

Grout Type ______

Development ______

Static Water Level ______

Top of Well Elevation ______

Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			10YR 7.5/6 Yellow - Very Pale Yellow, Silty Ultra Fine Sand (silt 20%), loose - slightly dense, moist, non plastic	SM/SW	9 12 10
9.0-10.5			Same as above (7.5-9.0) with less silt	SW	10 12 15
14.0-15.5			10YR 7.25/1 Light Grey White Silty Fine Sand, (Silt 25%), moist-wet, loose, non plastic, 10% Clay layers	SM	6 6 4
19.0-20.5			10YR 5.5/8, Yellow Brown, silty fine-med. Sandy Clay, (Silt + Sand 45%), wet, sticky-plastic, clay very plastic, slightly dense	SC	3 6 10
24.0-25.5			10YR 7.5/1 white-light Grey, Silty Clayey Fine-Med. Sand, (silt + Clay 45%) Clay layers plastic, wet, slightly dense	SC/SW	3 8 16

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW 16 SHEET ____ OF ____

on site 1050 11/19/86

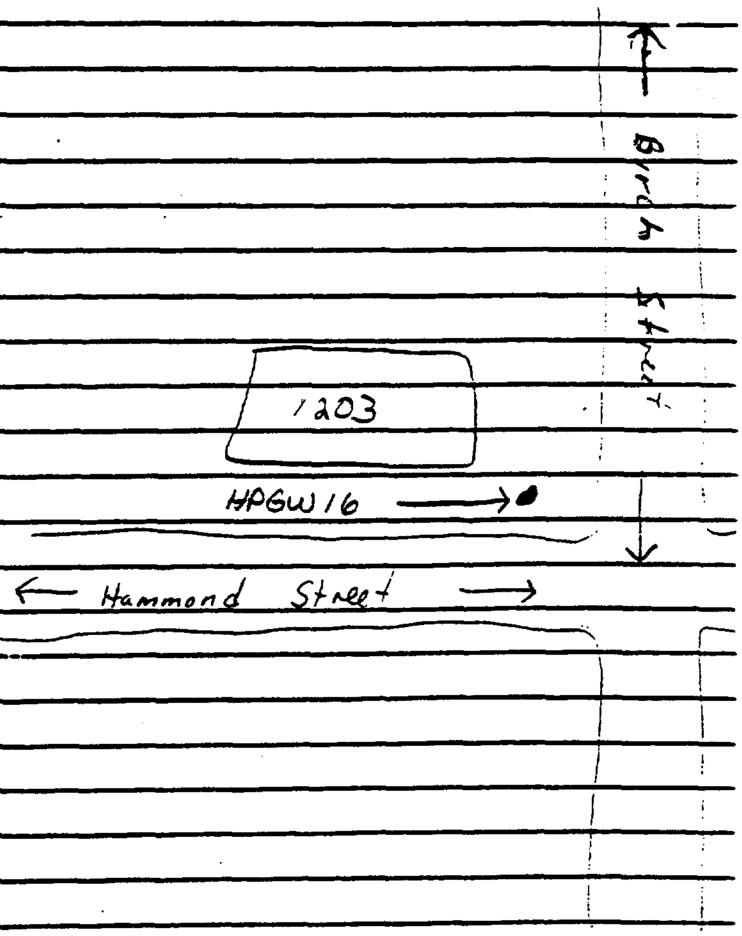
1st Spoon 1100

2nd Spoon 1130

Well Complete 1150

Standard Well Specs

* there is no well point rather sliding Cap at base of Casing



DATE ____ SIGNED ____

SOURCE: Environmental Science and Engineering, Inc., 198?

DOC NO: CLEJ-00258.1.02.05/01/88

Boring No. ~~GW 12~~ HFGW17 Location Coordinates N
Hole Size 6" Slot 0.01 E
Screen Size 2" Mat'l PVC Filter Materials Silica Sand
Casing Size 2" Mat'l PVC Grout Type Bentonite Pellets
Geologist David Brentlinger Development
Date Start 11/6/86 Finish 11/6 Static Water Level 11.08'
Contractor ESE Top of Well Elevation 13.58'
Driller Davis Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			10YR 2.5/2, very dark brown, silty fine sand (silt 30%), organic matter top 6", loose - slightly dense, moist non plastic	SM	2 2 4
1.5-3.0			10YR 6/3, light yellow brown silty clayey fine sand, (silt + clay 40%), med. dense - loose, slightly plastic	SC/SM	5 6 6
3.0-4.5			Same as (1.5-3.0)	SC/SM	4 4 4
4.5-6.0			10YR 7.2/1 light grey, ultra fine - fine sand, (silt 30%) little/no silt bottom 6", moist, slightly dense	SM	3 4 3
6-7.5			10YR 7.8/1 light grey - white, silty fine sand (silt 30%), moist, loose - slightly dense, non plastic	SM	3 5 7

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW17~~ HPGW17		Location Coordinates N	
Hole Size	Slot	E	
Screen Size	Mat'l	Filter Materials	
(asing Size	Mat'l	Grout Type	
ologist		Development	
Date Start	Finish	Static Water Level	
Contractor		Top of Well Elevation	
Driller		Drill Type	

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			Same as (6-7.5)	SM	5 6 5
9.0-10.5			10Y 7.5/1 light grey, silty sandy clay, (silt+sand 30%), wet, sticky, slightly plastic, mid. dense	SC	2 10 11
14.0-15.5			5Y 7.5/1, light grey, silty clayey sand (silt+clay 45%), 20% coarse sand, loose, slightly plastic, wet	SM/SC	4 4 8
19.0-20.5			2.5Y 6.5/2 light brown grey silty fine-med. sand (silt 20%), wet, mod. dense - dense, non plastic, 20% coarse sand	SM	4 10 12
[illegible]-25.5			10YR 7.5/1, light grey-white, silty medium sand with 20% clay, silt 20%, loose - slightly dense, wet, clay mottles very plastic	SW/SM	2 3 5

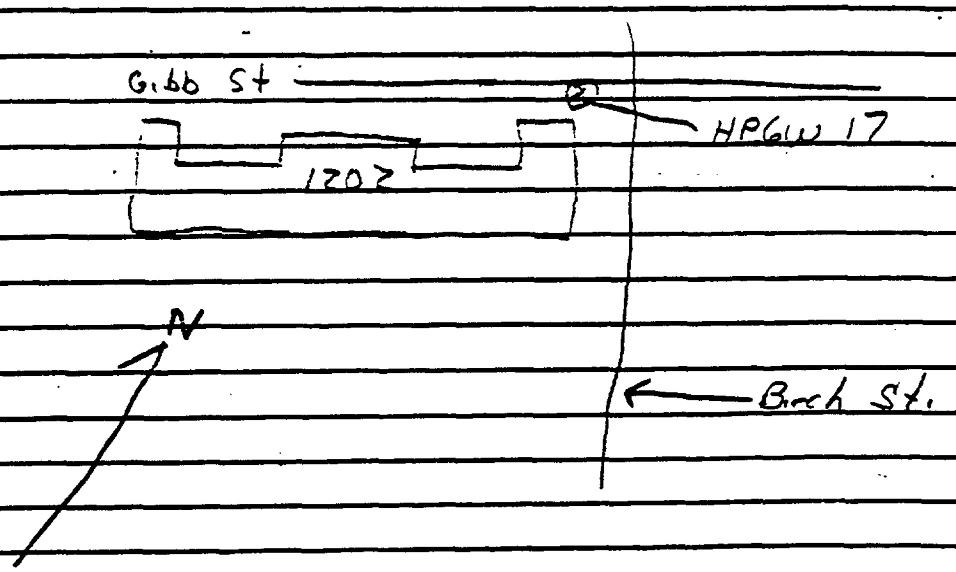
Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 12~~ HPGW17 SHEET ____ OF ____

On Site 12:00 PM 11/6/86

1st Spoon 1230
last Spoon 125
well Complete 200

located at the corner of
Gibb and Birch Street



DATE ____ SIGNED ____

SOURCE: Environmental Science and Engineering, Inc., 1980

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. HP GW 18

Hole Size 6" Slot 0.01

Screen Size 2" Mat'l PVC

Casing Size 2" Mat'l PVC

Geologist David Brentlinger

Date Start 11/19/96 Finish 11/19

Contractor ESE

Driller Davis

Location Coordinates N

E

Filter Materials Silica Sand

Grout Type Bentonite Pellets

Development —

Static Water Level 11.00

Top of Well Elevation 13.50'

Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			Roadside Gravel Fill		8 15 11
1.5-3.0			10YR 6.5/4 Light Yellow Brown, Silty Clayey Sand, (clay + silt 40%), moist, plastic very dense	SC	8 10 12
3.0-4.5			10YR 7.5/3 Very Pale Brown, Silty Fine Sand, (silt 40%), 10% clay mottles, moist, mod. dense, non plastic	SM	5 13 13
4.5-6.0			10YR 7.5/1 Light Grey, Silty Clayey Fine Sand, (silt + Clay 40%), Bright Orange-Brown mottles throughout, moist, slightly Plastic, mod. dense	SM/SC	8 6 5
6.0-7.5	alternating layers throughout →	50%	10YR 7/1 light grey same as above (4.5-6.0)	SC	4 6 6
		50%	10YR 6/8, Brown Yellow, Silty Fine Sandy Clay plastic, mod. dense, loose		

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. HP 6W 18 | Location Coordinates N

Hole Size ____ Slot ____ | E

Screen Size ____ Mat'l ____ | Filter Materials

(asing Size ____ Mat'l ____ | Grout Type

G ogist ____ | Development

Date Start ____ Finish ____ | Static Water Level

Contractor ____ | Top of Well Elevation

Driller ____ | Drill Type

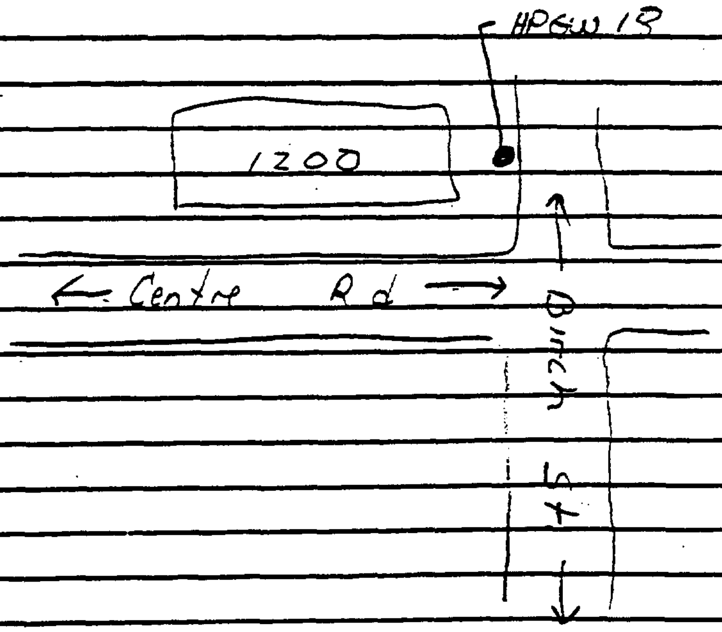
Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			10 YR 7.5/1 Light Grey, Silty Fine Sandy Clay (silt + sand 30%), Brown Yellow mottles throughout, plastic, mod. dense, moist	SC	2 3 10
9.0-10.5			10 YR 6.5/8 Yellow-Brown Yellow, Silty Clayey Fine-med. Sand, (silt-clay 40%), moist, slightly plastic, slightly dense	SC/SM	7 7 8
14.0-15.5			10 YR 8/1 white, Silty fine-med. Sand, (silt 30%), dense, moist, non plastic	SM	12 17 18
19.0-20.5			10 YR 8/1 white Fine-medium Sand, little to no silt, loose, wet, non plastic	SW	5 1 1
24.0-25.5			10 YR 8/4.5 Very Pale Brown Yellow, Fine-medium Sand Little to no silt, wet, med. dense - dense, 10% Coarse material	SW	15 15 15

Boring No. HPGW 18 SHEET ____ OF ____

On Site 830 Am 11/19
1st Spoon 845
last Spoon 945 ← Problem with augers locking up
Well Complete 1040

Standard Well Specs

* no well point on base of casing rather a sliding cap!



DATE ____ SIGNED ____

SOURCE: Environmental Science and Engineering, Inc., 198?

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 9~~ HAGW19 Location Coordinates N

Hole Size 6" Slot 0.01 E

Screen Size 2" Mat'l PVC Filter Materials Silica Sand

Casing Size 2" Mat'l PVC Grout Type Bentonite Pellets

Geologist David Brentlinger Development

Date Start 11/6/86 Finish 11/6 Static Water Level 9.08'

Contractor ESE Top of Well Elevation 11.58'

Driller Davis Drill Type

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			10YR 7.5/3, very pale Brown, Organic matter top 6", Silty Fine Sand, loose, moist silt 30%	SM	2 4 4
1.5-3.0			10YR 6.5/2, light Brown Grey Silty Fine Sand (Silt 25%), 10% clay, Clay mottles slightly plastic, mod. dense, moist	SM/SC	2 6 3
3.0-4.5			10YR 5.5/1 grey - light grey, Silty Sandy Clay, (silt + Sand 30%), dense - mod. dense, slightly plastic, moist	SC/CH	4 5 6
4.5-6.0			Same as above (3.0-4.5) less silt + Sand, Very Plastic	CH	3 4 5
6.0-7.5			Same as above 4.5-6.0	CH	3 4 3

Doc NO: CLEJ-06258-1.02-05/01/88

Boring No. ~~GW 9~~ HP GW 19		Location Coordinates N	
Hole Size	Slot	E	
Screen Size	Mat'l	Filter Materials	
asing Size	Mat'l	Grout Type	
eologist		Development	
Date Start	Finish	Static Water Level	
Contractor		Top of Well Elevation	
Driller		Drill Type	

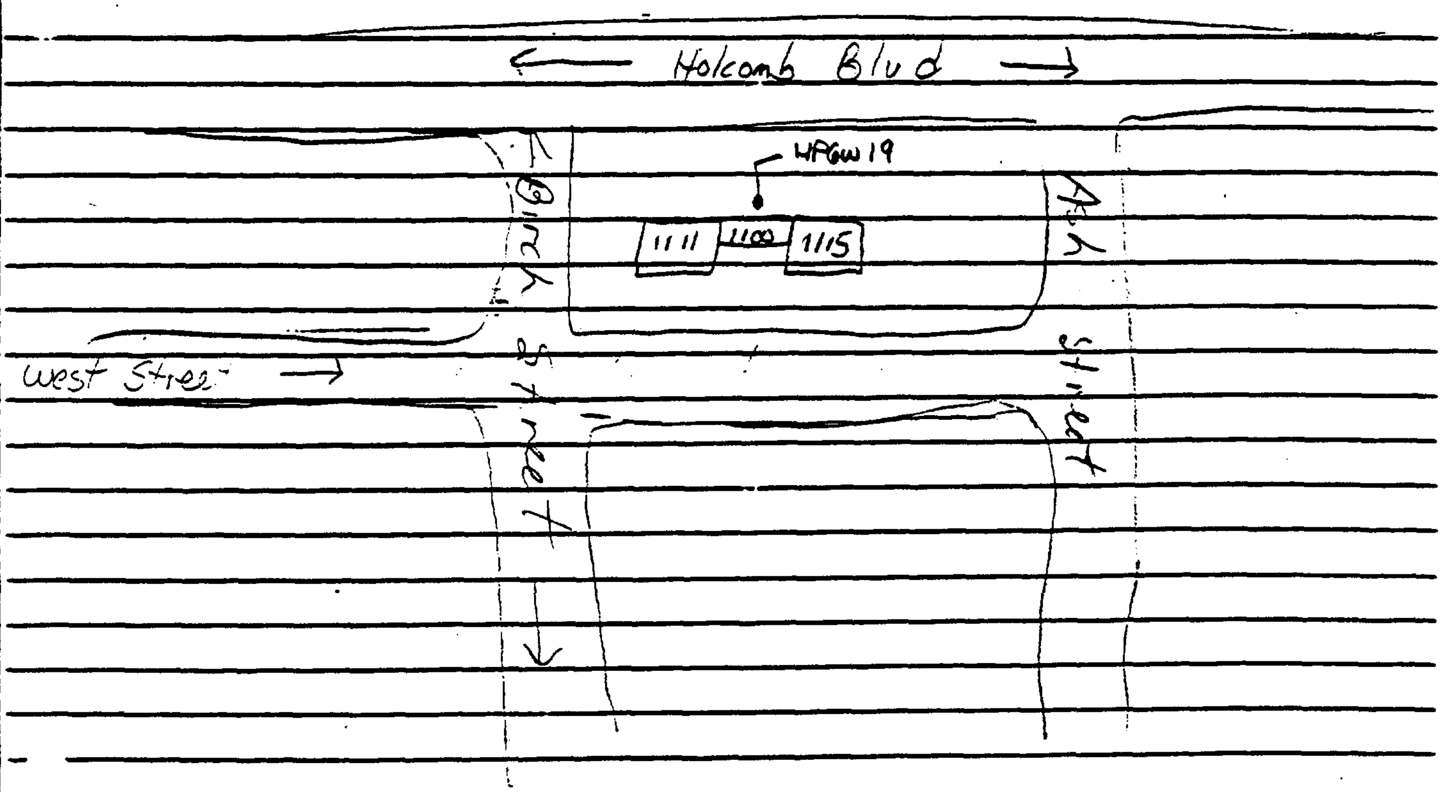
Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			Same as above (4.5-6.0)	CH	2 3 2
9.0-10.5 water table 10'			10YR 5/1, grey silty clay, plastic, moist-wet mod. dense, Silt 40%,	ML	1 1 2
14.0-15.5			7.5YR 5.5/0, light grey-grey, silty clayey fine-medium sand, (25-30% silt+clay), clay mottles very sticky, mod. dense, wet	SM	14 7 8
19.0-20.5		19.0-19.5	same as above (14.0-15.5)		8 5 4
		19.5-20.5	7.5YR 3.75/0 dark-very dark grey, very plastic, wet, very sticky clay with 20% silt + sand	MH	
24.0-25.5			2.5Y 2/0, Black Dry-moist Organic clay with 20% silt, slightly Dense, slightly f[illegible]	OL	1 2 1

Boring No. ~~EW 7~~ HPGW 19 SHEET ____ OF ____

11/6/86

On site 230 pm
1st Spoon 240 pm
last spoon 345 pm
Well complete 415 pm

Standard Well specs



DATE ____ SIGNED ____

SOURCE: Environmental Science and Engineering, Inc., 1980

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 602~~ HPGW20 Location Coordinates N ______

Hole Size 6" Slot 0.01 E ______

Screen Size 2" Mat'l PVC Filter Materials Silica Sand

Casing Size 2" Mat'l PVC Grout Type Bentonite Pellets

Geologist David Brentlinger Development ______

Date Start 11/6/86 Finish 11/6 Static Water Level 8.17

Contractor ESE Top of Well Elevation 10.67'

Driller Davis Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			2.5Y 2.5/6 very dark grey-black, very dense clay, organic matter top 6", plastic, moist	CL/MH	1 2 1
1.5-3.0			10YR 5.5/1 grey-light grey, very dense-dense clay, moist, softer than above (0.0-1.0), v. plastic	CH	2 3 5
3.0-4.5			10YR 6.5/1, light grey, silty clayey sand (silt + sand 40%), moist-wet, plastic in clay layers	SC	3 4 5
4.5-6.0			Very dense clay same as above (1.5-3.0), bright yellow mottles	CH	4 6 7
6.0-7.5			7.5YR 6.5/2, Brown-light Brown, silty clayey sand, silt + clay 40%, sticky, slightly plastic, dense, moist	SC	4 6 7

DOC NO. CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 602~~ HP GW 20 Location Coordinates N ______

Hole Size ______ Slot ______ E ______

Screen Size ______ Mat'l ______ Filter Materials ______

(asing Size ______ Mat'l ______ Grout Type ______

eologist ______ Development ______

Date Start ______ Finish ______ Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			10YR 7.5/1, light grey, Silty Clayey Sand, (Silt + Clay 40%), moist, slightly plastic, mod. dense, Coarse material 10%	SC	3 3 3
1.0-10.5 water table 10'			Same as above (7.5-9.0) with less Clay	SC/SM	3 4 6
14.0-15.5			10YR 4.25/1 grey-dark grey, very dense, massive Clay, plastic, moist	CH	13 18 21
19.0-20.5			10YR 7.5/1, light grey, Silty Clayey Sand (40% medium sand, 10% Coarse Sand), wet, slightly dense, Clay layers Sticky + very plastic	SC/SM	2 6 7
1.0-25.5			2.5Y 4.5/0 grey-dark grey, Silty med. Sand (Silt 10-15%), wet, loose, non p[illegible]	SW/SM	3 3 3

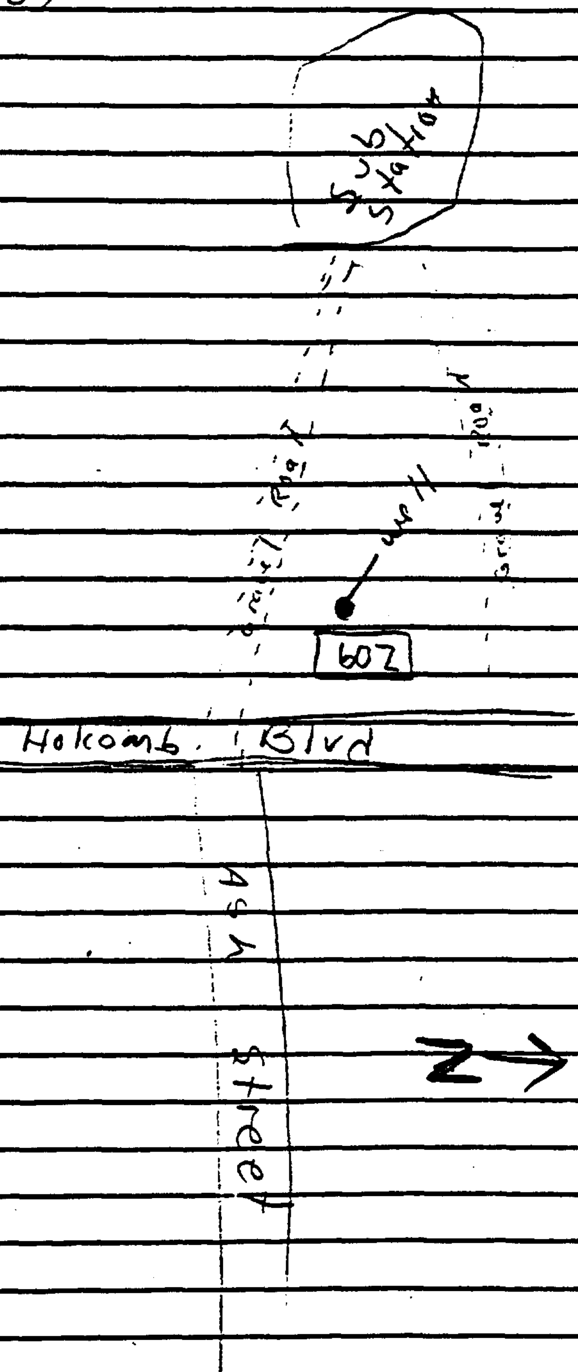
Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW602~~ HP6W20 SHEET ______ OF ______

On Site 210 PM 11/5/86

1st Spoon 215
20 minute Break (320-340)
last spoon 340
Well Complete 350

Standard Well Specs



DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

Boring No. HP SW 21 | Location Coordinates N ______
Hole Size 6" Slot 0.01 | E ______
Screen Size 2" Mat'l PVC | Filter Materials Silica Sand
Casing Size 2" Mat'l PVC | Grout Type Bentonite Pellets
Geologist David Grenteliner | Development —
Date Start 11/19/86 Finish 11/19 | Static Water Level 9.08
Contractor ASE | Top of Well Elevation 11.58'
Driller Davis | Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			Cement Fill + Gravel		6 6 6
1.5-3.0			2.5Y 2.5/8, Olive yellow-light olive Brown, silty fine sandy Clay, (silt + Sand 45%), slightly plastic, mod. dense, moist	SM/SC	4 15 12
3.0-4.5			10YR 5/6, Yellow Brown, Silty Clayey Fine Sand (Clay + silt 45%), non plastic slightly dense, moist	SC/SM	[illegible]
4.5-6.0			5YR 8/1 white - light grey, silty ultra fine - fine Sand, (silt 20-30%), loose, moist, non plastic	SM	[illegible] 7
6.0-7.5			Same as Above (4.5-6.0)	SM	6 10 8
7.5-9.0			2.5Y 7/5.5 Yellow - Pale yellow, Silty Fine Sandy Clay, (Silt + Sand ≈ 5 %), [illegible]	SC	[illegible]

DOC NO: CLEJ-00258-1.02-05/01/88

Hole Size HPGW 21 Slot ______ E ______

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

logist ______ Development ______

Dr Start ______ Finish ______ Static Water Level —

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
9.0-10.5		9.0-10.0	10YR 8/1, White-Light Grey, Silty fine sandy clay, wet same as above (7.5-9.5)	SC	3
		10.0-10.5	2.5Y 8/4, Yellow-Pale Yellow, Silty med. Sand (Silt 10-15%), wet, Slightly dense	SW	4 6
14.0-15.5			2.5Y 4/0, dark grey, very soft, sticky clay with 30% Silt, plastic, wet not dense	CH	1 1 1
19.0-20.5			7.5YR 7/0, light Grey, Fine-med. Sand with 10% Clay layers throughout, wet, slightly dense, Clay is plastic	SW	7 9 8
24.0-25.5			2.5Y 6/0, Light Grey, Sandy Silty marl, 50% Cemented Clastics, (Sand+silt 30%), Very dense, wet	GC	35 50-3"

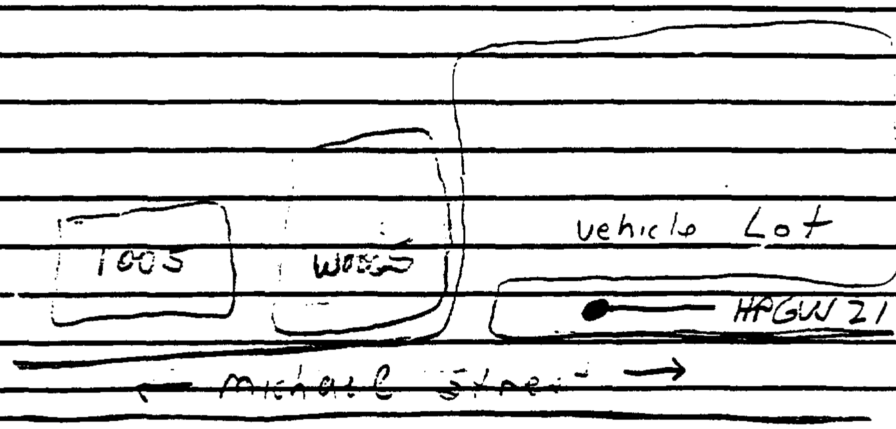
Doc No: CLEJ-00258-1.02-05/01/88

Boring No. HPGW 21

SHEET ______ OF ______

On Site 1245 PM 11/19/21
1st Span 1250
Last Span 145
Well Completed 250

Standard Well Specs
no well point
on bottom. Casing
riser & slide
on cap



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SOURCE: Environmental Science and Engineering, Inc., 198[illegible]

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW13~~ HPGW22 Location Coordinates N

Hole Size 6" Slot 0.01 E

Screen Size 2" Mat'l PVC Filter Materials Silica Sand

Casing Size 2" Mat'l PVC Grout Type Bentonite Pellets

Geologist David Brentlinger Development

Date Start 11/4/86 Finish 11/4 Static Water Level 8.17'

Contractor FSE Top of Well Elevation 10.67'

Driller Davis Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			2.5Y 2.5/0, Black - dark grey silty fine sand (silt 25%) 20% organic matter, loose, moist, non plastic	SM	2 2 2
1.5-3.0			(lost sample ?) was not in spoon!		2 1 0
3.0-4.5			2.5YR 3.5/4 Reddish Brown silty fine sand (silt 30%) over 50% organic matter + Roots	SM	0 0 2
4.5-6.0			5Y 2.75/2 dark Red Brown, silty fine sand, (silt 30%) organic matter 60%, loose moist, nonplastic	SM	6 12 16
6.0-7.5			10YR 7.5/1 light grey-white, silty fine sand Tree roots 90% of sample, loose, moist, non plastic	SM	21 47 46

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 13~~ HPGW22 Location Coordinates N ______

Hole Size ______ Slot ______ E ______

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

ologist ______ Development ______

Date Start ______ Finish ______ Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

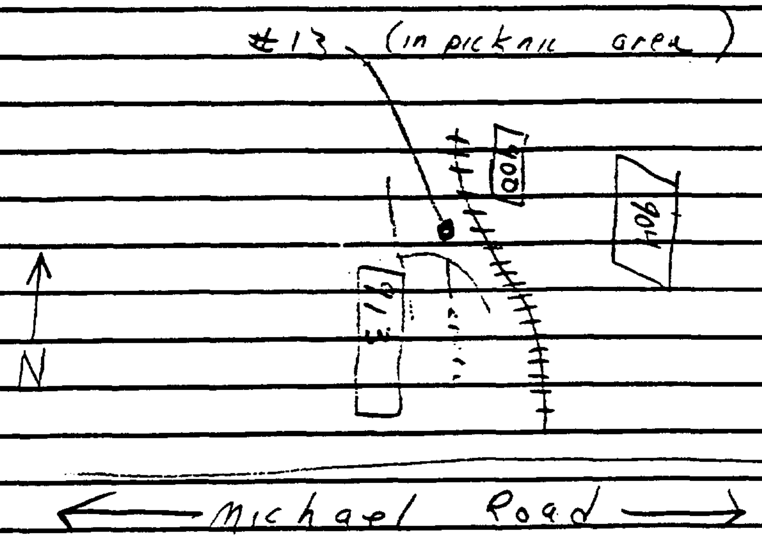
Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			Same as above (6.0-7.5) with less Roots	SM	15 14 16
9.0-10.5			10YR 6.5/1, light grey silty fine sand, (silt 30%), organic matter 40% moist, loose, non plastic	SM	8 9 9
14.0-15.5		14.0-14.75	5YR 2.75, Black-very dark grey (red tint), silty sandy organic peat (organics 60%),	SM	4 6 8
		14.75-15.5	5Y 8/1 white (blue tint), silty sandy clay (silt + sand 25%), sticky, slightly plastic, moist	SC	
19.0-20.5		Repetitive sand-silt-clay layers	10YR 6.5/2 Pale-very pale brown silty sandy clay, silt + sand 30%, more sand than silt bottom 6", wet, plastic - v. plastic in clay layers, slightly dense	CH ↓ SC	7 5 8
24.0-25.5			10YR 2.5/1 very dark grey-black, silty sandy clay, slightly plastic, wet, slightly dense, clay is soft silt + sand 30%	CH/SC	1 3 6

Boring No. ~~GW 13~~ HPGW22 SHEET ______ OF ______

11/4/86

On Site 150 pm
First Spoon 210
last Spoon 305
well Complete 325

Standard Well Specs



DATE ______ SIGNED ______

SOURCE: Environmental Science and Engineering, Inc., 1980

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 14~~ HPGW23 Location Coordinates N

Hole Size 6" Slot 0.01 E

Screen Size 2" Mat'l PVC Filter Materials Silica Sand

Casing Size 2" Mat'l PVC Grout Type Bentonite Pellets

Geologist David Brentlinger Development

Date Start 11/5/86 Finish 11/6 Static Water Level 11.08'

Contractor ESE Top of Well Elevation 13.58'

Driller Davis Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			10YR 6.5/4, Yellow - very Pale yellow, Silty fine Sand, little/No organic matter, Silt (25%), strong petroleum smell, loose, moist, mod. dense	SM	8 8 6
1.5-3.0			10YR 3.5/2, Grey Brown - Dark Grey Brown, Silty fine Sand, Silt 25%, Strong smell of petroleum, moist, mod. dense, non plastic, Gravel fill 10-15%	SM	8 8 6
3.0-4.5		3.0-4.0	Same as above (1.5-3.0)	SM ↓ Pt	2 3 4
		4.0-4.5	10YR, 2/1, Black, silty Peat, moist, mod. dense - loose, organic matter 70%		
4.5-6.0			Same as above (4.0-4.5) more silt than above	Pt	5 6 5

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 14~~ HP GW 23 Location Coordinates N ____

Hole Size ____ Slot ____ E ____

Screen Size ____ Mat'l ____ Filter Materials ____

asing Size ____ Mat'l ____ Grout Type ____

eologist ____ Development ____

Date Start ____ Finish ____ Static Water Level ____

Contractor ____ Top of Well Elevation ____

Driller ____ Drill Type ____

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
6.0-7.5			7.5YR 3.5/3, Strong Brown, Silty fine Sand (silt 30%), 10% Clay, Mod. dense, non plastic, moist- wet	SM	4 4 5
7.5-9.0			10YR 4.5/3 Silty Clayey Fine Sand (silt + Clay 45%), Brown- Dark Brown, moist mod. dense, slightly plastic	SM ↓ SC	6 6 8
9.0-10.5			10YR 4.5/3, Brown-dark Brown, Silty fine Sand, (silt 30%), moist-wet, mod. dense	SM	6 6 8
14.0-15.5			10YR 4.5/1, Grey - Dark Grey, silty Clayey fine Sand, (silt + Clay 20-30%), moist, sticky in clay layers, slightly plastic, slightly dense.	SM/SC	3 5 8
19.0-20.5		19.0-20.0	2.5 YR 4.5/2, weak pale red silty Clayey fine Sand, (silt + Clay 40%), wet, slightly dense, slightly plastic	SC/SM	4 7
		20.0-20.5	Silty fine-Mod. Sand, Same Color, loose, non plastic (silt 10-15%)	SW	7

Doc NO! CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 14~~ HPGW23 Location Coordinates N ____

Hole Size ____ Slot ____ E ____

Screen Size ____ Mat'l ____ Filter Materials ____

asing Size ____ Mat'l ____ Grout Type ____

ologist ____ Development ____

Date Start ____ Finish ____ Static Water Level ____

Contractor ____ Top of Well Elevation ____

Driller ____ Drill Type ____

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
24.0-25.5			10YR 7.5/1, white-light grey, silty fine-medium sand silt 10-15%, wet, loose, non plastic 10-15% coarse sand + pebbles	SW	3 3 5

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 14~~ HPGW23 SHEET ____ OF ____

on site 400 pm 11/5/86

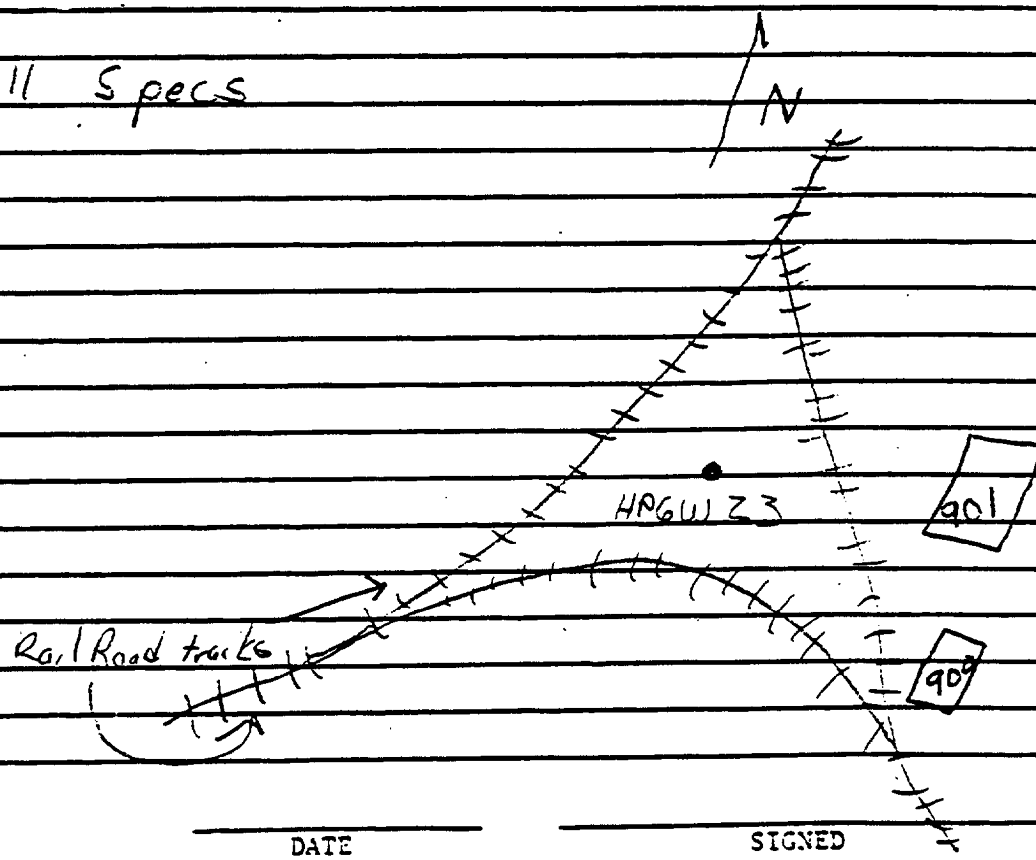
Continuous Spoon to 10'
Sampling out of 10' 420 pm

11/6/86

On Site 730 Am

~~Pr~~-Sampling begins 735
last Spoon 825
well Complete 845

Standard Well Specs



DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. HPGW 24 | Location Coordinates N
Hole Size 6" | Slot 0.01 | E
Screen Size 2" | Mat'l PVC | Filter Materials Silica Sand
asing Size 2" | Mat'l PVC | Grout Type Bentonite Pellets
ologist David Brentlinger | Development
Date Start 11/13/86 | Finish 11/12 | Static Water Level 6.83'
Contractor ESE | Top of Well Elevation 9.33'
Driller Davis | Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5		0.0-0.75	10YR 2.5/1 Black, Silty fine Sand, 50% organic matter, saturated H_2O	SM	4 3 4
		0.75-1.5	10YR 6.5/3 Pale - Very Pale Brown Silty fine Sand (silt 25%), loose, wet, slightly dense		
1.5-3.0			Same as (0.75-1.5) less wet	SM	4 8 6
3.0-4.5			10YR 5/3, light Brown with Black-grey, silty clay mottles throughout, Silty fine Sand (silt 30%), moist, non-plastic, slightly dense	SM	5 9 7
4.5-6.0			10YR 4.5/2, Grey - dark grey Silty Clayey Sand, (silt + Clay 45%), slightly dense - medi. dense, Moist, Slightly plastic	SC/SM	2 3 4
6.0-7.5			10YR 4.5/4 Yellow Brown - dark yellow Brown, Silty Clayey Sand, (silt + Clay 45%), Slightly plastic - Plastic, moist, Slightly dense	SC/SM	3 4 7

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HP GW 24 Location Coordinates N

Hole Size Slot E

'creen Size Mat'l Filter Materials

asing Size Mat'l Grout Type

ologist Development

Date Start 11/12 Finish 11/12 Static Water Level

Contractor Top of Well Elevation

Driller Drill Type

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			10YR 4/1, dark Grey, Silty Clayey Sand, (Silt + Clay 45%), Moist, Slightly plastic, med. dense - dense	SC / SM	5 10 26
9.0-10.5			10YR 6.5/1, Grey - light Grey, Silty Fine Sand (silt 10-15%), loose, slightly dense, moist - wet Top 5" Black Silty Sand	SW	8 12 15
14.0-15.5			2.5Y 4.5/6 Grey - dark Grey, Silty Fine Sandy Clay (silt + sand 30%) sticky, slightly dense, slightly plastic, wet	SC	2 1 1
19.0-20.5			7YR 2/0, Black, Silty ORganic Clay (organic matter 45%), firm, dense, moist, Slightly plastic	ML / Pt	2 3 5
24.0-25.5			10YR 2.5/1 Black Silty Sandy Peat (silt + Sand 30%, dry, Med. dense	Pt	5 6 10

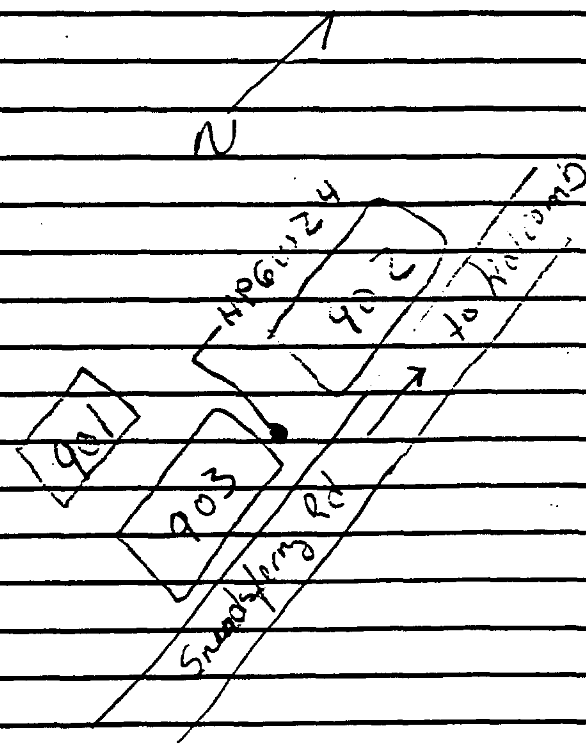
Doc No: CLEJ-00258-1.02-05/01/88

Boring No. HPGW24 SHEET ____ OF ____

On Site 1215 PM 11/12/86

1st Spoon 1220
last Spoon 120
Well Complete 150

Standard Well Specs



DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 1980

Boring No. ~~GW 15~~ HPGW25

DOC NO: CLEJ-00258-1.02-05/01/88

Location Coordinates N

E

Hole Size 6" Slot 0.01

Screen Size 2" Mat'l PVC

Filter Materials Silica Sand

asing Size 2" Mat'l PVC

Grout Type Bentonite Pellets

ologist David Brentlinger

Development

Date Start 11/5/86 Finish 11/5

Static Water Level 9.00'

Contractor

Top of Well Elevation 11.50'

Driller

Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			2.5Y 7.5/4, Pale Yellow, Silty fine Sand, (Silt 25%) organic matter top 6", loose, moist, non plastic	SM	1 2 5
1.5-3.0			2.5Y 6.5/2, light Brown, Silty fine Sand, (Silt 20%) loose, moist, non plastic	SM	5 5 6
3.0-4.5			2.5Y 7.5/2, white - pale yellow, silty fine Sand, Silt 10-15%, Bright Yellow mottles, loose, moist, non plastic	SM/SW	4 6 12
4.5-6.0			10YR 8.0/1, white silty fine Sand, (Silt 10-15%), loose, moist, non plastic	SW	8 16 12
6.0-7.5		6.0-7.0	Same as Above (4.5-6.0)	SW/ML	2 3 4
		7.0-7.5	2.5Y 7.5/6, yellow Silty Clay (little sand) silt 30%, moist, mod. dense, non plastic, sticky when wet		

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW-15~~ HPGW25 Location Coordinates N ______

Hole Size ______ Slot ______ E ______

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

ologist ______ Development ______

Date Start ______ Finish ______ Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			2.5Y 7.5/4 yellow, silty fine-med. sand, top 6" very silty clay, silt (20%), moist, mod. dense, non plastic	SW/SM	4 8 6
.0-10.5			2.5Y 7.5/4, yellow, silty clayey med. sand, (silt + clay 30%) 3" of firm clay in middle of sample, slightly dense, plastic in clay layers, moist - wet	SC/SW	3 1 2
14.0-15.5		14.0-14.5	10YR 6/3 silty sandy clay top 6"	SC/CH	4 3 5
		14.5-15.5	7.5YR 7.5+/0 grey-white, very firm silty clay, with coarse sand bottom 2", plastic - v. plastic, dense, wet		
19.0-20.5			10YR 8/1, white, med. sand with 30% clay, wet, slightly dense, plastic in clay mottles	SC	5 6 8

Doc NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW-15~~ HPGW 25

Location Coordinates N

E

Hole Size

Slot

Screen Size

Mat'l

Filter Materials

asing Size

Mat'l

Grout Type

ologist

Development

Date Start

Finish

Static Water Level

Contractor

Top of Well Elevation

Driller

Drill Type

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
24.0-25.5			Silty medium-coarse sand (10-15% silt), 20% clay layers throughout, slightly flo[illegible], wet, loose-slightly dense 10YR 8/1, white	SW/SC	2 4 1

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 15~~ HPGW 25 SHEET ______ OF ______

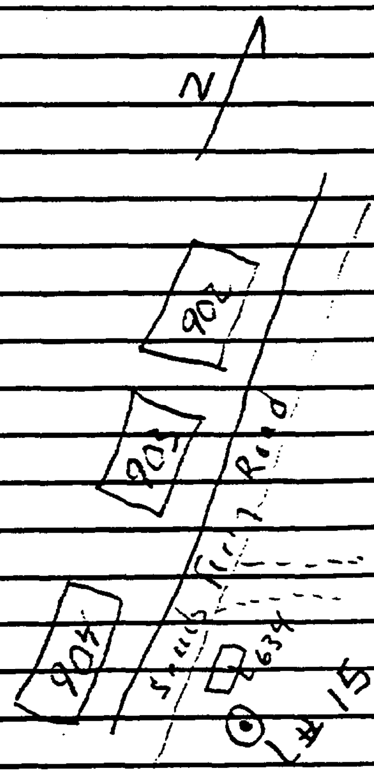
On Site 930 a.m. 11/5/86

1st Spoon 945

last Spoon 1040

Well Complete 1115

Standard Well Specs



DATE

SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198C

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW #8~~ NPGW 26 Location Coordinates N ____

Hole Size 6" Slot 0.01 E ____

Screen Size 2" Mat'l PVC Filter Materials Silica Sand

Casing Size 2" Mat'l PVC Grout Type Bentonite Pellets

Geologist David Brantlinger Development ____

Date Start 11/5/86 Finish 11/5 Static Water Level 17.96'

Contractor ESE Top of Well Elevation 20.46'

Driller Davis Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-1.5			5YR 2.8/1 Black - dark gray, silty fine sand, silt 25%, loose, moist non plastic, organic matter top 6"	sm	1 / 1 / 2
1.5-3.0			7.5YR 4.5/6, Strong Brown - Reddish Yellow silty fine sand (silt 20%), loose, moist	SM	2 / 2 / 3
3.0-4.5			7.5YR 5.5/2, Brown - Pink gray, silty fine sand (silt 20%, loose moist, non plastic	sm	3 / 4 / 5
4.5-6.0 water table 6'			7.5YR 5/2, Brown, silty fine sand, (silt 20%), 10% clay mottles, wet, slightly dense, nonplastic	sm	3 / 5 / 5
6.0-7.5			7.5YR 8/0 white (blue tint), silty fine sand, (20% silt), 20% clay mottles, wet, clay very plastic, slightly dense	sm	5 / 7 / 8

DOC NO! CLEJ-00258-1.02-05/01/88

Boring No. ~~GW #8~~ HPGW26 Location Coordinates N ______

Hole Size ______ Slot ______ E ______

Screen Size ______ Mat'l ______ Filter Materials ______

Casing Size ______ Mat'l ______ Grout Type ______

Geologist ______ Development ______

Date Start ______ Finish ______ Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.5-9.0			10YR 7.5/2, light grey - pale white, silty fine-med. sand, 45% silt + (clay mottles), moist, [illegible] plastic [illegible]	SM	- 5 6
10-10.5			10YR 6.25/1 grey - light grey, silty fine sand with 10-15% clay throughout. moist, non plastic - slight plastic	SM SC	4 9 11
14.0-15.5			very soft sticky clay 2.5Y 4.5/0 dark grey, very plastic, wet	MH / CH	3 1 2
19.0-20.5			5Y 5.5/2 olive - pale olive, silty clay with 10-15% medium - coarse sand layers, mod. dense, wet, plastic	SC / MH	4 4 4
24.0-25.5			5Y 5.5/1 grey - light grey, medium - coarse sand, 10-15% fines, loose, wet, non plastic	SW	5 5 6

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. ~~GW 8~~ HP 605 26

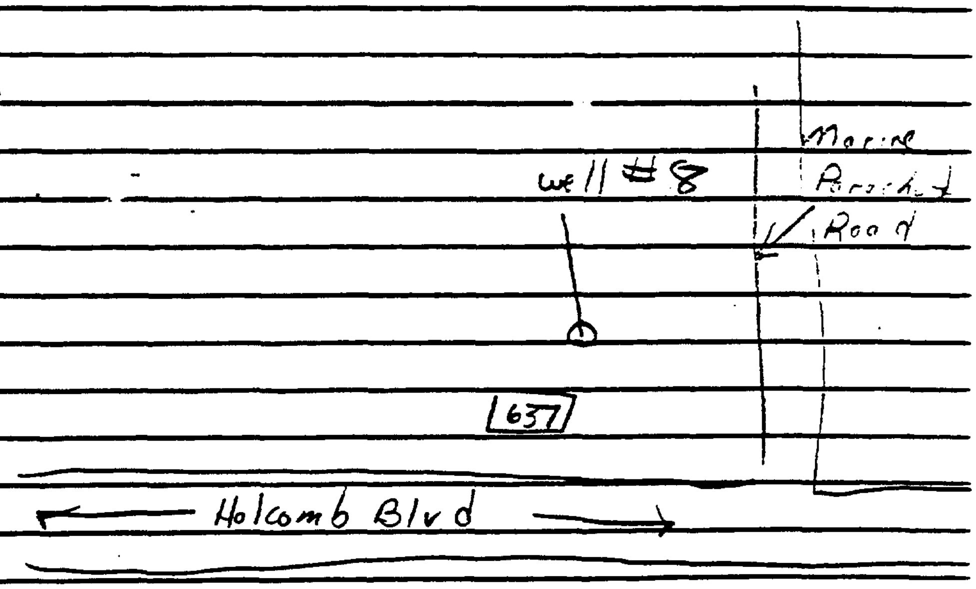
SHEET ______ OF ______

11/5/86

On Site 1215 pm

1st Spoon 1220
last Spoon 115
well complete 200

Standard Specs



DATE ______ SIGNED ______

SOURCE: Environmental Science and Engineering, Inc., 198[illegible]

DOC NO: CLEJ-00258-1.02-05/01/88

Boring No. HPSW 29 — Location Coordinates N

Hole Size 6" — Slot 0.01 — E

Screen Size 2" — Mat'l PVC — Filter Materials Silica Sand

Casing Size 2" — Mat'l PVC — Grout Type Bentonite Pellets

Geologist David Brentlinger — Development —

Date Start 11/17/86 — Finish 11/17 — Static Water Level 19.8'

Contractor ESE — Top of Well Elevation 22.3'

Driller Davis — Drill Type Hollow Stem Auger

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0 - 1.5			10YR 5.5/4 yellow Brown, silty fine Sand with 30% Cement fill (silt 30%), organic matter 40%, slightly dense, moist, non plastic	SM	3 10 13
1.5 - 3.0		1.5 - 2.2	Same as above (0.0 - 1.5)	SM/CL	10 11 11
		2.2 - 3.0	2.5Y 7/4, Pale Yellow - Yellow, firm silty Clay, silt 30%, dense, plastic, moist		
3.0 - 4.5			10YR 6/8 Brown Yellow Silty Clayey fine Sand, (silt + clay 40%), mod. dense, non plastic, moist	SM/SC	9 10 12
4.5 - 6.0			Same as above (3.0 - 4.5) less silt	SC	9 10 8
6.0 - 7.5		6.0 - 6.5	Same as above (4.5 - 6.0)	SC/SM	7 8 10
		6.5 - 7.5	10YR 7.5/4, very pale Brown, (silt 25%), loose, moist, non plastic, less clay		

DOC NO: CLEJ-00258-1.02-05/01/88.

Boring No. HPGW 29 | Location Coordinates N ______

Hole Size ______ Slot ______ | E ______

Screen Size ______ Mat'l ______ | Filter Materials ______

ing Size ______ Mat'l ______ | Grout Type ______

Ge 'ogist ______ | Development ______

Date Start ______ Finish ______ | Static Water Level ______

Contractor ______ | Top of Well Elevation ______

Driller ______ | Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
7.0 - 9.0			10YR 7.5/6 yellow silty fine Sand, (silt 25%) slightly dense, non plastic, moist	SM	4 6 5
9.0 - 10.5			10YR 8/1 white silty fine Sand, (silt 10-15%), loose, dry-moist, non plastic	SW	10 12 20
14.0 - 15.5			10YR 8/1 white silty fine Sand with 10% Clay layers (silt 15%), loose, Moist, non-plastic	SM	9 7 11
19.0 - 20.5			10YR 7.5/6 yellow silty Clayey Sand, (silt + Clay 40%), wet, slightly dense, slightly plastic	SC	5 7 10
24.0 - 25.5			10YR 5.75/8, yellow Brown, silty Fine - med. Sand, (silt 10-15%), wet, slightly dense, non plastic, 3" clean medium sand on top	7 7 8	SW

DOC NO: CLEJ-00258-1.02-05/01/88

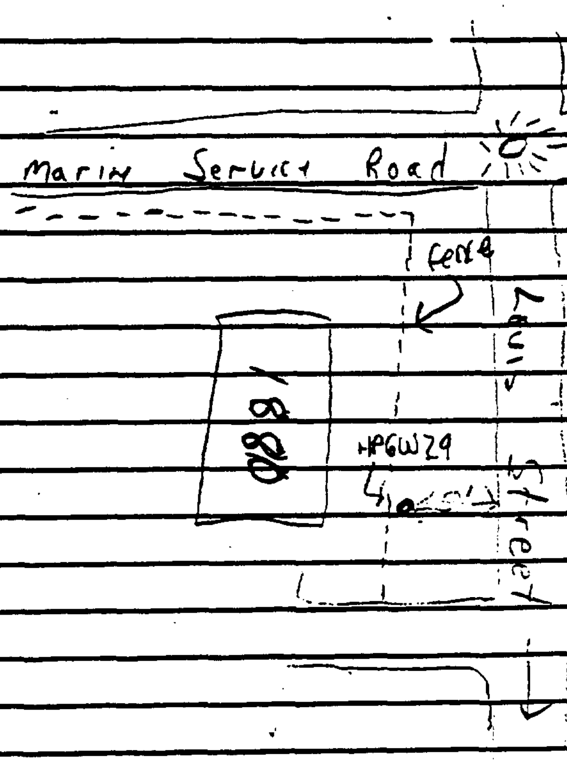
Boring No. HPGW 29

SHEET ____ OF ____

onsite 930 Am 11/17/86

1st Spoon 935
Rain delay 1000
Drilling resumes 1115
last spoon 1130
well Complete 1225

Standard Well Specs



DATE

SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

Doc No: CLEJ-00258-1.02-05/01/88

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

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

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Navy
   ADDRESS Camp LeJeune, N.C. (Street or Route No.)
   28542
   City or Town State Zip Code
3. DATE DRILLED 10/31/86 USE OF WELL monitor
4. TOTAL DEPTH 25' CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 20.54 FT. ☐ above ☒ below TOP OF CASING.
   TOP OF CASING IS 2.50' FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

	Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.5'	-5.0 Ft.	2"	1/8"	PVC
From		Ft.			
From		Ft.			

11. GROUT:

	Depth From	To	Material	Method
From	0.0	-2.0 Ft.	Concrete	
From	-2.0	3.0 Ft.	Clay	

12. SCREEN:

	Depth From	To	Diameter	Slot Size	Material
From	5.0	-25.0 Ft.	2" in.	.001 in.	PVC
From		Ft.	in.	in.	
From		Ft.	in.	in.	

13. GRAVEL PACK:

	Depth From	To	Size	Material
From	-3.0	-25' Ft.	Coarse	Sand
From		Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
0.0 - 3.0	Sandy Clay
3.0 - 4.5	Silty Fine Sand
4.5 - 6.0	Silty Clayey Fine Sand
6.0 - 9.0	Silty Fine Sand
9.0 - 20.5	Clay
24.0 - 25.5	Silty Fine Sand

If additional space is needed use back of form.

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

See sketch attached to handout (2-5).

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 Revised 11/84

DOC NO: CLEJ-00258-1.02-05/01/88

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

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

[redacted] **WELL CONSTRUCTION RECORD**

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0...

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C.   County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER U.S. Navy
   ADDRESS Camp LeJeune (Street or Route No.)
   28542
   City or Town   State   Zip Code
3. DATE DRILLED 11/4/86   USE OF WELL Monitor
4. TOTAL DEPTH 25'   CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 18.90 FT. ☐ above ☒ below TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.5	To -5.0 Ft.	2"	1/8"	PVC
From		To Ft.			
From		To Ft.			

11. GROUT:

	Depth		Material	Method
From	0.0	To -2.0 Ft.	Concrete	
From	-2.0	To -3.0 Ft.	Clay	

12. SCREEN:

	Depth		Diameter	Slot Size	Material
From	-5.0	To -20' Ft.	2" in.	0.01 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

13. GRAVEL PACK:

	Depth		Size	Material
From	-3.0	To -25' Ft.	Coarse	Sand
From		To Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
0.0 - 1.5	Fine Silty Peat
1.5 - 4.5	Silty Fine Sand
4.5 - 6.0	Fine Sandy Silt
6.0 - 9.0	Silty Fine Sand
9.0 - 10.5	Clayey Fine Sand
14 - 15.5	Clay
19.0 - 20.5	Clayey Silty Sand
24 - 25.5	Silty Fine Sand

If additional space is needed use back of form.

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

See Sketch attached to (Fig 2-5).

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

SIGNATURE OF CONTRACTOR OR AGENT   DATE

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

GW-1 Revised 11/84

Doc NO! CLEJ-00258-1.02-05/01/88

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

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

[redacted]

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune N.C. (Street or Route No.) 28542
   City or Town State Zip Code
3. DATE DRILLED 11/4/86 USE OF WELL monitor
4. TOTAL DEPTH 25' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 19.17 FT. ☐ above ☑ below TOP OF CASING,
   TOP OF CASING IS ______ FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Concrete	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25' Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25' Ft.	Coarse	Sand
	Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
0.0-1.5	Fine Sandy Silt
1.5-3.0	Fine Sandy Peat
3.0-9.0	Silty fine Sand
9.0-10.5	Fine Sandy Clay
14.0-15.5	Clay
19.0-20.5	Fine Sandy Clay and Fine Silty Sand
20.5-25'	Silty Fine Sand

If additional space is needed use back of form.

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

See sketch attached to fig (2.5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 Revised 11/84

DOC NO: CLEJ-00258-1.62-05/01/88

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

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

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, NC County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC 28542
   (Street or Route No.) City or Town State Zip Code
3. DATE DRILLED 11/4/86 USE OF WELL monitor
4. TOTAL DEPTH 25' CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 18.09 FT. ☐ above ☒ below TOP OF CASING,
   TOP OF CASING IS 2.5' FT. ABOVE LAND SURFACE.
7. YIELD (gpm): METHOD OF TEST
8. WATER ZONES (depth):
9. CHLORINATION: Type Amount
10. CASING:

	Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.5	-5.0 Ft.	2"	1/4"	PVC
From		Ft.			
From		Ft.			

11. GROUT:

	Depth From	To	Material	Method
From	0.0	-2.0 Ft.	Concrete	
From	-2.0	-3.0 Ft.	Clay	

12. SCREEN:

	Depth From	To	Diameter	Slot Size	Material
From	-5.0	-25 Ft.	2" in.	0.01 in.	PVC
From		Ft.	in.	in.	
From		Ft.	in.	in.	

13. GRAVEL PACK:

	Depth From	To	Size	Material
From	-3.0	-25' Ft.	Coarse	Sand
From		Ft.		

14. REMARKS:

Depth From - To	DRILLING LOG Formation Description
0.0 - 1.5	Silty Clay
1.5 - 4.5	Silty Fine Sand
4.5 - 6.0	Clayey Fine Sand
6.0 - 9.0	Fine Sandy Clay
9.0 - 10.5	Silty Clayey Fine Sand
14.0 - 15.5	Clay
19.0 - 25.5	Marl

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 sketch attached to Fig (2.5).

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 Revised 11/84

Doc No: CLEJ-00258-1.02-05/01/88

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

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

2-5

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C.
   (Road, Community, or Subdivision and Lot No.)

County: Onslow

2. OWNER US Navy
   ADDRESS Camp Lejeune N.C. (Street or Route No.)
   28542
   City or Town State Zip Code
3. DATE DRILLED 11/4/86 USE OF WELL monitor
4. TOTAL DEPTH 25' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 16.13 FT. ☐ above ☑ below TOP OF CASING, TOP OF CASING IS 2.5 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

	Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.5	-5.0 Ft.	2"	1/8"	PVC
From		Ft.			
From		Ft.			

11. GROUT:

	Depth From	To	Material	Method
From	0.0	-2.0 Ft.	Concrete	
From	-2.0	-3.0 Ft.	Clay	

12. SCREEN:

	Depth From	To	Diameter	Slot Size	Material
From	-5.0	-25 Ft.	2" in.	0.01 in.	PVC
From		Ft.	in.	in.	
From		Ft.	in.	in.	

13. GRAVEL PACK:

	Depth From	To	Size	Material
From	-3.0	-25' Ft.	Coarse	Sand
From		Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
0.0 - 1.5	Silty Peat
1.5 - 6.0	Fine Sandy Silt
6.0 - 9.0	Fine Sandy Silty Clay
9.0 - 10.5	Silty Fine Sand
14.0 - 15.5	Clay
19.0 - 20.5	Clay
24.0 - 25.5	Fine Silty Sand

If additional space is needed use back of form.

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

See sketch attached to Fig. (2-5).

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 Revised 11/84

Doc No: CLEJ-00258-1.02-05/01/88

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

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

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 06-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune N.C. (Street or Route No.) 28542
   City or Town / State / Zip Code
3. DATE DRILLED 11/18/86 USE OF WELL monitor
4. TOTAL DEPTH 25' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☐ No
6. STATIC WATER LEVEL: 16.25 FT. ☐ above ☒ below TOP OF CASING.
   TOP OF CASING IS 2.5' FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From +2.5	To -5.0 Ft.	2"	1/8"	PVC
From	To Ft.			
From	To Ft.			

11. GROUT:

Depth		Material	Method
From 0.0	To -2.0 Ft.	concrete	
From -2.0	To -3.0 Ft.	Clay	

12. SCREEN:

Depth		Diameter	Slot Size	Material
From -5.0	To -25' Ft.	2" in.	0.01 in.	PVC
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

13. GRAVEL PACK:

Depth		Size	Material
From -3.0	To -25 Ft.	Coarse	Sand
From	To Ft.		

14. REMARKS:

DRILLING LOG

Depth From To	Formation Description
0.0 - 1.5	Silty Fine Sand
1.5 - 6.0	Silty Clayey Fine Sand
6.0 - 9.0	Clay
9.0 - 10.5	ultra Fine Sand
14.0 - 15.5	Silty Fine Sand
19.0 - 20.5	Silty Sandy Clay
24.0 24.8	Clay
24.8 - 25.5	Sandy Clay

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 Sketch attached to fig. (2-5).

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

SIGNATURE OF CONTRACTOR OR AGENT   DATE

GW-1 Revised 11/84

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

Doc No: CLEJ-00258-1.02-05/01/88

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

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

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County:
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC (Street or Route No.) 28542
   City or Town State Zip Code
3. DATE DRILLED 11/18/86 USE OF WELL monitor
4. TOTAL DEPTH 25' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 14.33 FT. ☐ above ☐ below TOP OF CASING. TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): METHOD OF TEST
8. WATER ZONES (depth):
9. CHLORINATION: Type Amount
10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Cement	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25' Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25' Ft.	Coarse	Sand
	Ft.		

DRILLING LOG

Depth From - To	Formation Description
0.0 - 3.9	Silty Fine Sand
3.9 - 5.5	Ultra Fine Sand
5.5 - 9.0	Silty Clayey Fine Sand
9.0 - 10.5	Very Silty Ultra Fine Sand
14.0 - 15.5	Very Silty Ultra Fine Sand
19.0 - 20.5	Silty Fine-Med. Sand
24.0 - 25.5	Silty Clayey Fine Sand

If additional space is needed use back of form.

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

See fig. (2-5)

14. REMARKS:

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 Revised 11/84

Doc No: CLEJ-00258-1.02-05/01/88

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

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

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 06-035-wm-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, NC
   County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune (Street or Route No.)
   28542
   City or Town State Zip Code
3. DATE DRILLED 11/6/86 USE OF WELL Monitor
4. TOTAL DEPTH 25.5 CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 13.33 FT. ☐ above ☒ below TOP OF CASING.
   TOP OF CASING IS 2.5 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

Depth From	To	Diameter	Wall Thickness or. Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Concrete	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25 Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25 Ft.	Course	Sand
	Ft.		

DRILLING LOG

Depth From - To	Formation Description
0.0-4.5	Silty Fine Sand
4.5-6.0	Fine Sandy Clay
6.0-9.0	Fine Sand
9.0-10.5	Silty Clayey Fine Sand
14.0-15.5	Peat
19.0-20.5	Silty Fine Sand
24.0-25.5	Fine Sand

If additional space is needed use back of form.

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

See Fig (25)

14. REMARKS: ______

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

Doc. No: CLEJ-00258-1.02-05/01/88

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

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

[redacted]

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune N.C. (Street or Route No.) 28542
   City or Town / State / Zip Code
3. DATE DRILLED 11/6/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 15.63 FT. ☐ above ☑ below TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

	Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.5	-5.0 Ft.	2"	1/2"	PVC
From		Ft.			
From		Ft.			

11. GROUT:

	Depth From	To	Material	Method
From	0.0	-2.0 Ft.	Concrete	
From	-2.0	-3.0 Ft.	Clay	

12. SCREEN:

	Depth From	To	Diameter	Slot Size	Material
From	-5.0	-25' Ft.	2" in.	0.01 in.	PVC
From		Ft.	in.	in.	
From		Ft.	in.	in.	

13. GRAVEL PACK:

	Depth From	To	Size	Material
From	-3.0	-25' Ft.	Coarse	Sand
From		Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From	To	Formation Description
0.0	10.5	Silty Fine Sand
14.0	15.5	Clayey Fine Sand
19.0	20.5	Fine Sand
24.0	25.5	Clayey Fine Sand

If additional space is needed use back of form.

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

See sketch attached to Fig. (2-5).

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

[illegible]

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 Revised 11/84

Doc No: CLEJ-00258-1.02-05/01/88

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

?SW-10

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp Lejeune NC (Street or Route No.) 28542
   City or Town State Zip Code
3. DATE DRILLED 11/6/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5 CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 12.50 FT. ☐ above ☑ below TOP OF CASING. TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From +2.5	To -5.0 Ft.	2"	1/8"	PVC
From	To Ft.			
From	To Ft.			

11. GROUT:

Depth		Material	Method
From 0.0	To -2.0 Ft.	Concrete	
From -2.0	To -3.0 Ft.	Clay	

12. SCREEN:

Depth		Diameter	Slot Size	Material
From -5.0	To -25' Ft.	2" in.	0.01 in.	PVC
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

13. GRAVEL PACK:

Depth		Size	Material
From -3.0	To -25' Ft.	Coarse	Sand
From	To Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
0.0-1.5	Silty Peat
1.5-3.0	Silty Fine Sand
3.0-4.5	Silty Fine Sand and Sandy Clay
4.5-6.0	Silty Clayey Fine Sand
6.0-10.5	Silty Fine Sand
14.0-15.5	Peat
19.0-20.5	Silty Fine Sand
24.0-25.5	Silty V. Fine Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

DOC. NO: CLEJ-00256-1.02-05/01/88

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

[redacted]

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

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-wm-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune N.C (Street or Route No.) 28542
   City or Town / State / Zip Code
3. DATE DRILLED 11/18/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 13.57 FT. ☐ above ~~below~~ TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ________ METHOD OF TEST ________
8. WATER ZONES (depth): ________
9. CHLORINATION: Type ________ Amount ________
10. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.5	-5.0 Ft.	2"	1/8"	PVC
From		Ft.			
From		Ft.			

11. GROUT:

	Depth From	Depth To	Material	Method
From	0.0	-2.0 Ft.	Concrete	
From	-2.0	-3.0 Ft.	Clay	

12. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
From	-5.0	-25.0 Ft.	2" in.	0.01 in.	PVC
From		Ft.	in.	in.	
From		Ft.	in.	in.	

13. GRAVEL PACK:

	Depth From	Depth To	Size	Material
From	-3.0	-25' Ft.	Coarse	Sand
From		Ft.		

14. REMARKS: ________

DRILLING LOG

Depth From - To	Formation Description
0.0 - 3.0	Silty Fine Sand
3.0 - 4.5	Silty Clayey Fine Sand
4.5 - 10.5	Silty Fine Sand
14.0 - 15.5	Silty Fine Sand
19.0 - 20.5	Silty Fine Sand
24.0 - 25.5	Clayey Fine-Med. Sand

If additional space is needed use back of form.

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

See Fig (2-5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

Doc No! CLEJ-00258-1.02-05/01/88

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

[redacted]

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-035-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C County: ______
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune, N.C. (Street or Route No.) 28542
   City or Town State Zip Code
3. DATE DRILLED 11/18/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 11.70 FT. ☐ above ☑ below TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.5	To -5.0 Ft.	2"	1/8"	PVC
From		To Ft.			
From		To Ft.			

11. GROUT:

	Depth		Material	Method
From	0.0	To -2.0 Ft.	Concrete	
From	-2.0	To -3.0 Ft.	Clay	

12. SCREEN:

	Depth		Diameter	Slot Size	Material
From	-5.0	To -25' Ft.	2" in.	0.01 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

13. GRAVEL PACK:

	Depth		Size	Material
From	-3.0	To -25' Ft.	Coarse	Sand
From		To Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
0.0 - 1.5	Silty Clayey Fine Sand
1.5 - 9.0	Silty Fine Sand
9.0 - 10.5	Silty Clayey Sand
14.0 - 15.5	Silty Fine-Med. Sand
19.0 - 20.5	Med - Coarse Sand
24.0 - 25.5	Silty Clayey Med. Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

______
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

DOC NO: CLEJ-00258-1.02-05/01/88

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

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

[redacted] **WELL CONSTRUCTION RECORD**

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-wm-0141

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Jacksonville N.C. County: Onslow
(Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
ADDRESS Camp LeJeune N.C. (Street or Route No.)
28542
City or Town State Zip Code
3. DATE DRILLED 11/17/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 12.00 FT. ☐ above ~~☐~~ below TOP OF CASING.
TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Concrete	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25' Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25' Ft.	Coarse	Sand
	Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
0.0 - 3.0	Silty Fine Sand
3.0 - 4.5	Silty Fine Sandy Clay
4.5 - 6.0	Silty Sandy Clay
6.0 - 10.5	Silty Clay
14.0 - 15.5	Silty Med. Sand
19.0 - 20.5	Silty Med. Sand
24.0 - 25.5	Med. Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

[illegible]

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

DOC NO: CLEJ-00258-1.02-05/01/88

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

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: ____
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC (Street or Route No.) 28542
   City or Town State Zip Code
3. DATE DRILLED 11/5/86 USE OF WELL Monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 10.81 FT. ☐ above ☑ below TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ____ METHOD OF TEST ____
8. WATER ZONES (depth): ____
9. CHLORINATION: Type ____ Amount ____
10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Concrete	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25' Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25' Ft.	Coarse	Sand
	Ft.		

14. REMARKS: ____

DRILLING LOG

Depth From	To	Formation Description
0.0	1.5	Sandy Peat
1.5	3.0	Fine Sand - Silt
3.0	4.5	Fine Sandy Silty Clay
4.5	6.0	Fine Sand
6.0	7.5	Silty Fine Sand
7.5	9.0	Clayey Fine Sand
9.0	10.5	Fine Sandy Clay
14.0	15.5	Peat
19.0	20.5	Silty Fine Sand
24.0	25.5	Clayey Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

[illegible signature]

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

Doc NO: CLEJ-00258-1.02-05/01/88

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

MW-15

WELL CONSTRUCTION RECORD

FOR OFFICE USE ONLY

Quad. No. ______ Serial No. ______
Lat. ______ Long. ______ Pc ______
Minor Basin ______
Basin Code ______
Header Ent. ______ GW-1 Ent. ______

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135 - WM - 0141

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Jacksonville, N.C. County: Onslow

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

2. OWNER US Navy
ADDRESS Camp LeJeune N.C. (Street or Route No.) 28542
City or Town State Zip Code

3. DATE DRILLED 10/6/86 USE OF WELL Monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 12.21 FT. ☐ above ☑ below TOP OF CASING,
TOP OF CASING IS 0.00 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To -5.0 Ft.	2"	1/2"	PVC
From	To Ft.			
From	To Ft.			

11. GROUT:

Depth		Material	Method
From 0.0	To -2.0 Ft.	Concrete	
From -2.0	To -3.0 Ft.	Clay	

12. SCREEN:

Depth		Diameter	Slot Size	Material
From -5.0	To -25' Ft.	2" in.	0.01 in.	PVC
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

13. GRAVEL PACK:

Depth		Size	Material
From -3.0	To -25' Ft.	Coarse	Sand
From	To Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
0.0 - 1.9	Road Fill
1.9 - 4.5	Silty Fine Sand
4.5 - 6.0	Silty Clayey Sand
6.0 - 10.5	Silty Fine Sand
14.0 - 15.5	Ultra Fine Sand
19.0 - 20.5	Silty Fine-Med. Sand
24.0 - 25.5	Medium - Coarse Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

DOC NO: CLEJ-00258-1.02-05/01/88

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

[redacted] 16

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC (Street or Route No.)
   28542
   City or Town State Zip Code
3. DATE DRILLED 11/19/86 USE OF WELL Monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 12.04 FT. ☐ above ~~below~~ TOP OF CASING, TOP OF CASING IS 2.5 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): METHOD OF TEST
8. WATER ZONES (depth):
9. CHLORINATION: Type Amount
10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Concrete	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25' Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25' Ft.	Coarse	Sand
	Ft.		

14. REMARKS:

DRILLING LOG

Depth From	To	Formation Description
0.0	1.5	Silty Fine Sand
1.5	3.0	Silty Sandy Clay
3.0	4.5	Silty Clayey Fine Sand
4.5	6.0	Silty Fine Sand
6.0	7.5	50% layers of Silty fine and Silty V. Fine Sand
7.5	10.5	Silty ultra fine sand.
14.0	15.5	Silty Fine Sand
19.0	20.5	Silty Fine-Med Sand, Clay
24.0	25.5	Silty Clayey Fine-Med. Sand.

If additional space is needed use back of form.

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

See Fig. (2-5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 Revised 11/84

DOC NO: CLEJ-00258-1.02-05/01/88

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

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

#6610-17

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-035-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC (Street or Route No.)
   28542
   City or Town State Zip Code
3. DATE DRILLED 11/6/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 11.08 FT. ☐ above ☑ below TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): METHOD OF TEST
8. WATER ZONES (depth):
9. CHLORINATION: Type Amount
10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Concrete	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25' Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25' Ft.	Coarse	Sand
	Ft.		

DRILLING LOG

Depth From - To	Formation Description
0.0 - 1.5	Silty Fine Sand
1.5 - 4.5	Silty Clayey Fine Sand
4.5 - 6.0	ultra fine Sand
6.0 - 9.0	Silty Fine Sand
9.0 - 10.5	Silty Sandy Clay
14.0 - 15.5	Silty Clayey Sand
19.0 - 20.5	Silty Fine-Med. Sand
24.0 - 25.5	Silty Med. Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

14. REMARKS:

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

DOC NO! CLEJ-00258-1.02-05/01/88

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

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

GW-1 WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, NC County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC (Street or Route No.) 28542
   City or Town State Zip Code
3. DATE DRILLED 11/19/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 11.00 FT. ☐ above ☐ below TOP OF CASING, TOP OF CASING IS 0.00 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
0.0	5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	2.0 Ft.	Concrete	
2.0	3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
5.0	25' Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
3.0	25' Ft.	Coarse	Sand
	Ft.		

14. REMARKS:

DRILLING LOG

Depth From	To	Formation Description
0.0	1.5	Road Fill
1.5	3.0	Silty Clayey Sand
3.0	4.5	Silty Fine Sand
4.5	6.0	Silty Clayey Fine Sand
6.0	7.5	50% layers of Silty Fine Sand and Sandy Clay
7.5	9.0	Silty Fine Sandy Clay
9.0	10.5	Silty Clayey Fine-Med Sand
14.0	15.5	Silty Fine-Med. Sand
19.0	20.5	Fine-Med Sand
24.0	25.5	Fine-Med Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

DOC NO: CLEJ-00258-1.02-05/01/88

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

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

[redacted] WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune N.C (Street or Route No.)
   28542
   City or Town State Zip Code
3. DATE DRILLED 11/6/86 USE OF WELL Monitor
4. TOTAL DEPTH 25.5 CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 9.08 FT. ☐ above ☑ below TOP OF CASING, TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ________ METHOD OF TEST ________
8. WATER ZONES (depth): ________
9. CHLORINATION: Type ________ Amount ________
10. CASING:

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From +2.5	To -5.0 Ft.	2"	¼"	PVC
From	To Ft.			
From	To Ft.			

11. GROUT:

Depth		Material	Method
From 0.0	To -2.0 Ft.	Concrete	
From -2.0	To -3.0 Ft.	Clay	

12. SCREEN:

Depth		Diameter	Slot Size	Material
From -5.0	To -25' Ft.	2" in.	0.01 in.	PVC
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

13. GRAVEL PACK:

Depth		Size	Material
From -3.0	To -25' Ft.	Coarse	Sand
From	To Ft.		

14. REMARKS: ________

DRILLING LOG

Depth From - To	Formation Description
0.0 - 3.0	Silty Fine Sand
3.0 - 9.0	Silty Sandy Clay
9.0 - 10.5	Silty Clay
14.0 - 15.5	Silty Clayey Med Sand
19.0 - 20.5	Clay
24.0 - 25.5	Organic Clay

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 Fig. (2-5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

Doc No! CLEJ-00258-1.02-05/01/88

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

1PGW20

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-wm-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC (Street or Route No.)
   28542
   City or Town State Zip Code
3. DATE DRILLED 11/6/86 USE OF WELL Monitor
4. TOTAL DEPTH 25.5 CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 8.17 FT. ☐ above ~~below~~ TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): METHOD OF TEST
8. WATER ZONES (depth):
9. CHLORINATION: Type Amount
10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Concrete	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25 Ft.	2" in.	0.01 in.	PVC

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25 Ft.	Coarse	Sand

14. REMARKS:

DRILLING LOG

Depth From - To	Formation Description
0.0 - 3.0	Clay
3.0 - 4.5	Silty Clayey Sand
4.5 - 6.0	Clay
6.0 - 10.5	Silty Clayey Sand
14.0 - 15.5	Clay
19.0 - 20.5	Silty Clayey Sand
24.0 - 25.5	Silty Med Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

Doc. No: CLEJ-00258-1.02-05/01/88

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

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, NC   County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC (Street or Route No.) 28542
   City or Town   State   Zip Code
3. DATE DRILLED 11/19/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 9.08 FT. ☐ above ~~below~~ TOP OF CASING, TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

	Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
	+2.5	-5.0 Ft.	2"	1/8"	PVC
	From	To Ft.			
	From	To Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Concrete	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25' Ft.	2" in.	0.01 in.	PVC
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25 Ft.	Coarse	Sand
From	To Ft.		

DRILLING LOG

Depth From - To	Formation Description
0.0 - 1.5	Cement Fill
1.5 - 3.0	Silty Fine Sandy Clay
3.0 - 4.5	Silty Clayey Fine Sand
4.5 - 7.5	Silty Ultra Fine Sand
7.5 - 10.0	Silty Fine Sandy Clay
10.0 - 10.5	Silty Med. Sand
14.0 - 15.5	Soft Clay
19.0 - 20.5	Fine-Med Sand
24.0 - 25.5	Sandy Silty Marl

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 fig (2-5)

14. REMARKS: ______

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

SIGNATURE OF CONTRACTOR OR AGENT   DATE
Submit original to Division of Environmental Management and copy to well owner.

GW-1 Revised 11/84

Doc No: CLEJ-00258-1.02-05/01/88

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

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

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0171

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, NC County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC (Street or Route No.) 28542
   City or Town State Zip Code
3. DATE DRILLED 11/4/86 USE OF WELL Monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 8.17 FT. ☐ above ☒ below TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.5	-5.0 Ft.	2"	1/8"	PVC
From		Ft.			
From		Ft.			

11. GROUT:

	Depth From	Depth To	Material	Method
From	0.0	-2.0 Ft.	Concrete	
From	-2.0	-3.0 Ft.	Clay	

12. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
From	-5.0	-25' Ft.	2" in.	0.01 in.	PVC
From		Ft.	in.	in.	
From		Ft.	in.	in.	

13. GRAVEL PACK:

	Depth From	Depth To	Size	Material
From	-3.0	-25' Ft.	Coarse	Sand
From		Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
9.0 - 10.5	Silty Fine Sand
14.0 - 15.5	50% Silty Sandy Peat
	50% Silty Sandy Clay
19.0 - 20.5	Silty Sandy Clay
24.0 - 25.0	Silty Sandy Clay

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 Fig. (2-5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

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

DOC NO: CLEJ-00258-1.02-05/01/88

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

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-wm-0141

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, NC   County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC 28542
   (Street or Route No.)
   City or Town   State   Zip Code
3. DATE DRILLED 1/15/86 USE OF WELL Monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 11.08 FT. ☐ above ☑ below TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Concrete	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25' Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25' Ft.	Coarse	Sand
	Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From - To	Formation Description
0.0 - 4.0	Silty Fine Sand
4.0 - 6.0	Silty Peat
6.0 - 7.5	Silty Fine Sand
7.5 - 9.0	Silty Clayey Fine Sand
9.0 - 10.5	Silty Fine Sand
14.0 - 15.5	Silty Clayey Fine Sand
19.0 - 20.5	Silty Clayey Fine Sand
24.0 - 25.5	Silty Fine - Med Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

[illegible signature]
SIGNATURE OF CONTRACTOR OR AGENT   DATE

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

GW-1 Revised 11/84

Doc. NO: CLEJ-00258-1.02-05/01/88

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

[redacted]

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

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

   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune (Street or Route No.)
   28542
   City or Town State Zip Code
3. DATE DRILLED 11/12/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☑ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☑ No
6. STATIC WATER LEVEL: 6.83 FT. ☐ above ☑ below TOP OF CASING,
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ______ METHOD OF TEST ______
8. WATER ZONES (depth): ______
9. CHLORINATION: Type ______ Amount ______
10. CASING:

Depth	Diameter	Wall Thickness or Weight/Ft.	Material
From +2.5 To -5.0 Ft.	2"	1/8"	PVC
From ___ To ___ Ft.			
From ___ To ___ Ft.			

11. GROUT:

Depth	Material	Method
From 0.0 To -2.0 Ft.	Concrete	
From -2.0 To -3.0 Ft.	Clay	

12. SCREEN:

Depth	Diameter	Slot Size	Material
From -5.0 To -25' Ft.	2" in.	0.01 in.	PVC
From ___ To ___ Ft.	in.	in.	
From ___ To ___ Ft.	in.	in.	

13. GRAVEL PACK:

Depth	Size	Material
From -3.0 To -25' Ft.	Coarse	Sand
From ___ To ___ Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From	To	Formation Description
0.0	4.5	Silty Fine Sand
4.5	9.0	Silty Clayey Sand
9.0	10.5	Silty Fine Sand
14.0	15.5	Silty Fine Sand-Clay
19.0	20.5	Silty Clay
24.0	25.5	Silty Sand, Fe[illegible]

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 Fig. (2-5)

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

[illegible]   2/11/87

SIGNATURE OF CONTRACTOR OR AGENT   DATE

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

GW-1 Revised 11/84

Doc No: CLEJ-00258-1.02-05/01/88

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

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0171

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Jacksonville, N.C. County: Onslow
   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp Lejeune NC (Street or Route No.) 28542
   City or Town State Zip Code
3. DATE DRILLED 11/5/86 USE OF WELL monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 9.00 FT. ☐ above ☒ below TOP OF CASING.
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): METHOD OF TEST
8. WATER ZONES (depth):
9. CHLORINATION: Type Amount
10. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	+2.5	To -5.0 Ft.	2"	1/8"	PVC
From		To Ft.			
From		To Ft.			

11. GROUT:

	Depth		Material	Method
From	0.0	To -2.0 Ft.	Cement	
From	-2.0	To -3.0 Ft.	Clay	

12. SCREEN:

	Depth		Diameter	Slot Size	Material
From	-5.0	To -25' Ft.	2" in.	0.01 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

13. GRAVEL PACK:

	Depth		Size	Material
From	-3.0	To -25' Ft.	Coarse	Sand
From		To Ft.		

14. REMARKS:

DRILLING LOG

Depth From - To	Formation Description
0.0 - 7.0	Silty Fine Sand
7.0 - 9.0	Silty Clay
9.0 - 10.5	Silty Clayey Med. Sand
14.0 - 15.5	Silty Sandy Clay
19.0 - 20.5	Med. Sand
24.0 - 25.5	Silty Med-Coarse Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 Revised 11/84

DOC NO: CLEJ-00258-1.02-05/01/88

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

[redacted]

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co.
DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Jacksonville N.C.
County: Onslow
(Road, Community, or Subdivision and Lot No.)

2. OWNER US Navy
ADDRESS Camp LeJeune N.C. (Street or Route No.) 28542
City or Town State Zip Code

3. DATE DRILLED 11/5/86 USE OF WELL Monitor

4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☒ Yes ☐ No

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

6. STATIC WATER LEVEL: 17.96 FT. ☐ above ☒ below TOP OF CASING,
TOP OF CASING IS 2.5 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): ______ METHOD OF TEST ______

8. WATER ZONES (depth): ______

9. CHLORINATION: Type ______ Amount ______

10. CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+2.5	-5.0 Ft.	2"	1/8"	PVC
	Ft.			
	Ft.			

11. GROUT:

Depth From	To	Material	Method
0.0	-2.0 Ft.	Cement	
-2.0	-3.0 Ft.	Clay	

12. SCREEN:

Depth From	To	Diameter	Slot Size	Material
-5.0	-25' Ft.	2" in.	0.01 in.	PVC
	Ft.	in.	in.	
	Ft.	in.	in.	

13. GRAVEL PACK:

Depth From	To	Size	Material
-3.0	-25' Ft.	Coarse	Sand
	Ft.		

14. REMARKS: ______

DRILLING LOG

Depth From	To	Formation Description
0.0	7.5	Silty Fine Sand
7.5	9.0	Silty Fine-Med. Sand
9.0	10.5	Silty Fine Sand
14.0	15.5	Soft Clay
19.0	20.5	Silty Clay
24.0	25.5	Med.-Coarse Sand

If additional space is needed use back of form.

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

See Fig. (2-5)

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

[signature] 2/11/87
SIGNATURE OF CONTRACTOR OR AGENT DATE

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

GW-1 Revised 11/84

Dee N01 CLEJ-00258-1.02-05/01/88

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

[redacted]

WELL CONSTRUCTION RECORD

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

DRILLING CONTRACTOR Davis Drilling Co

DRILLER REGISTRATION NUMBER Pending

STATE WELL CONSTRUCTION PERMIT NUMBER: 66-0135-WM-0141

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

   (Road, Community, or Subdivision and Lot No.)
2. OWNER US Navy
   ADDRESS Camp LeJeune NC (Street or Route No.) 28542
   City or Town / State / Zip Code
3. DATE DRILLED 11/17/86 USE OF WELL Monitor
4. TOTAL DEPTH 25.5' CUTTINGS COLLECTED ☒ Yes ☐ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 19.80 FT. ☐ above ~~below~~ TOP OF CASING,
   TOP OF CASING IS 2.50 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ____ METHOD OF TEST ____
8. WATER ZONES (depth): ____
9. CHLORINATION: Type ____ Amount ____
10. CASING:

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From +2.5	To -5.0 Ft.	2"	1/8"	PVC
From	To Ft.			
From	To Ft.			

11. GROUT:

Depth		Material	Method
From 0.0	To -2.0 Ft.	Concret	
From -2.0	To -3.0 Ft.	Clay	

12. SCREEN:

Depth		Diameter	Slot Size	Material
From -5.0	To -25' Ft.	2" in.	0.01 in.	PVC
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

13. GRAVEL PACK:

Depth		Size	Material
From -3.0	To -25 Ft.	Coarse	Sand
From	To Ft.		

Depth From	To	DRILLING LOG Formation Description
0.0	2.25	Silty Fine Sand
2.25	3.0	Silty Clay
3.0	6.5	Silty Clayey Fine Sand
6.5	10.5	Silty Fine Sand
11.0	15.5	Silty Fine Sand
19.0	20.5	Silty Clayey Sand
24.0	25.5	Silty Fine-Med. Sand

If additional space is needed use back of form.

LOCATION SKETCH

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

See sketch attached to Fig. (2-5)

14. REMARKS: ____

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

SIGNATURE OF CONTRACTOR OR AGENT   DATE

GW-1 Revised 11/84

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

Soil samples for lithological interpretation were obtained using a split-spoon sampler during drilling. Each well was constructed using 2-inch inside-diameter (ID) Schedule 40 polyvinyl chloride (PVC) flush-threaded well screen and casing. All shallow monitor wells were installed to a depth of approximately 25 feet (ft) below land surface. Screen lengths of 20 ft (0.010-inch slot size) were used for each well. Filter sand (20- to 30-mesh silica sand) was installed with a tremie pipe around the well screen to a point approximately 2 ft above the top of the screen. In many of the wells, the shallow groundwater was within a few feet of the land surface. In these cases, the amount of filter sand above the top of the screen was less than the planned design. This allowed placement of the screen at or near the shallow groundwater surface to allow for capture of any potential contaminants whose density was less than that of water. The planned monitor well design called for the emplacement of a 5-ft bentonite seal (using bentonite pellets) on top of the filter pack materials. As discussed for the filter pack material, the closeness of the land surface to the shallow groundwater did not allow 5 ft of bentonite to be installed; the actual thickness was typically 1 ft. Bentonite-cement grout was placed on top of the bentonite seal and extended to the land surface. A 4-inch steel protective casing, with a locking cap, was placed into the grout. A concrete pad with three protective posts was installed at each monitor well location. Each well was clearly marked with a sign designating the well as a nonpotable well for groundwater monitoring purposes only.

After installation of each monitor well, the wells were developed by pumping or hand bailing, as appropriate. Development continued until the water was as clear and sediment free as practicable.

Each monitor well was surveyed for vertical control to a precision of at least 0.10 ft. This vertical control was established on a relative basis; the elevation of each well within a group of monitor wells located at specific study sites within HPIA was established relative to all of the other wells in the group, rather than to mean sea level.

Doc No: CLEJ-00258-1.02-05/01/88

DOC NO! CLEJ-00258-1.02-05/01/88

Hole Size 5 8" Slot 0.01 E HPGW 9-2

Screen Size 2" Mat'l PVC Filter Materials Med. Sand

asing Size Mat'l PVC Grout Type Portland #1

G- logist David Brentlinger Development Cent. Pump

Date Start 6/29/87 Finish 6/29 Static Water Level ~~15.90' TOC~~ 13.65

Contractor ATEC Top of Well Elevation 2.25'

Driller Sweeting Drill Type Rotary-Mud

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0 - 5			Silty fine - very fine sand little/no organic material		
5 - 10			same as above (0-5)		
10 - 15			same as above (0-5)		
15 - 20			silty fine sand with light grey clay peds		
20 - 25			silty fine - med. sand with light grey clay peds		
25 - 30			silty fine sand little/no clay or coarse material		
30 - 35			silty med. sand little/no coarse sand		
35 - 40			silty med. sand		

Hole Size 5" Slot 0.01" E HPGW 9-2
Screen Size 2" Mat'l PVC Filter Materials
asing Size 2" Mat'l PVC Grout Type ... = 1
Geologist David Brentlinger Development
..ce Start 6/29/87 Finish 6/29/87 Static Water Level —
Contractor ESE Top of Well Elevation
Driller Sanford Sweeting (ATEC) Drill Type

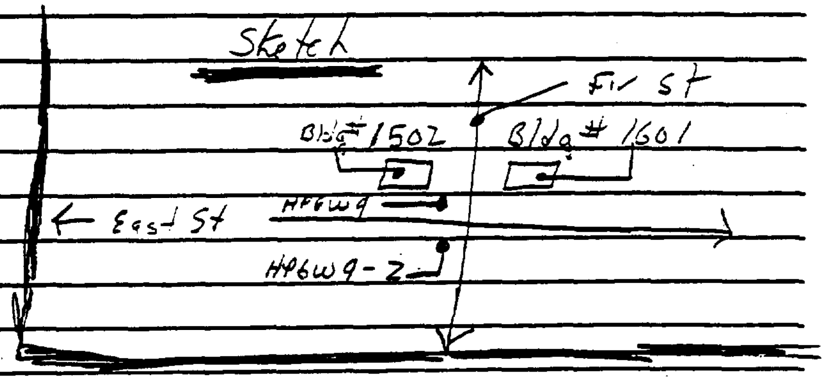
Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
40-45			silty fine-med sand some coarse, angular sand throughout		
45-50			same as above (40-45)		
50-55			Coarse sand, shells and cemented clastics, sand well rounded.		
55-60			Coarse well-rounded pebbles and sand, shells and uncemented clastics.	--	
60-65			cemented clastics little/no sand or shells		
65-70			same as (60-65)		
70-75			Same as above (65-70)		

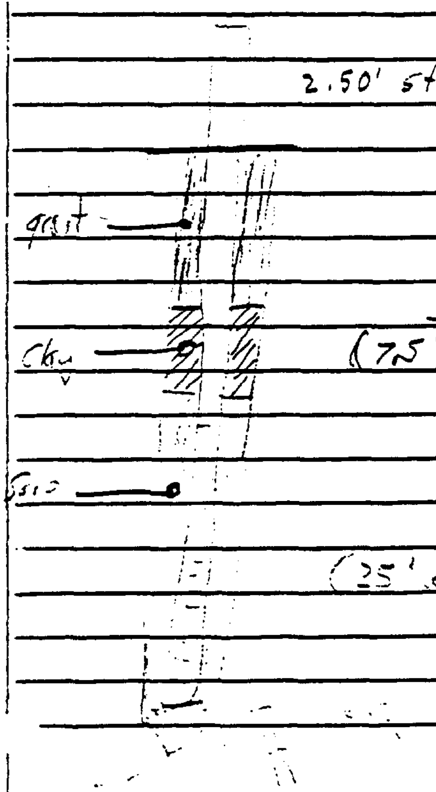
ATEC

Boring No. HP6W9-Z SHEET ____ OF ____

Onsite 0800, Drillers arrive 0815
Set up and drilling 0900, driller
needs more water and runs out of gas
at 0930, at 1030 drillers goes to get water
returns 1100 and Resumes drilling. At depth
± 60' Rods get clogged (1 hr delay) 1400 rods
unclogged 1500 drilling again, 80' drilled 1600
Screen + Casing in 1630, Sand pack and seal in
1645, grouted and complete 1715; drillers
[illegible] up [illegible] 1730.

6/30/87 0800 14.58' TOC
stick-up ~ 2.50'
Stick ~ 12.33' BGL
FW ~ 70.00' TOC





DATE ____ SIGNED ____

SOURCE: Environmental Science and Engineering, Inc., 198?

Doc. No: CLEJ-00258-1.02-05/01/88

WELL FACT SHEET

Well No. HPGW 9-2 Date 7/1/87 Start ~~3~~ 6/30 Finish 6/30

Total Depth of Boring Prior to Well Installation (79 - 80)'

Diameter of Boring 5"

Water Level 10.5'

Total Length of Well at Installation ~~75.29'~~ 77.79

Height of Well Above Ground Level 2.50'

Total Depth of Well Below Ground Level ~~77.79~~ 75.29

Total Length of Screen	20'	from	75.29'	BGL to	55.29	BGL
Total Length of Riser	55.29	from	55.29	BGL to	2.50	AGL
Sand Heave. Total Interval		from		BGL to		BGL
Filter Pack Total Interval	25.00'	from	75.29	BGL to	50.29	BGL
Bentonite Seal Total Interval	5'	from	50.29	BGL to	45.29	BGL
Grout Total Interval	43'	from	45.29	BGL to	2.29	BGL
Protective Casing Total Interval		from		BGL to		AGL

Well Screen Dia. 2" Schedule #40 Slot Size 0.01"

Well Riser Dia. 2" Schedule #40

Filter Material Med Sand.

Seal Bentonite

Backfill Portland #1 Cement ✓ Bentonite ____ Water ____

Protective Casing Dia. ____ Material ____

Well Development

Date 7/1/87 Time 1000 Start ~~[illegible]~~ 7/1 Complete 7/2

Water Level at Start 15.90 TOC Finish

Conductivity Start — Finish —

Water Color Start Muddy Brown Finish Clear

0.43 gpm ← Bail 130 gal Start 7/1 ~~1600~~ 0800 Finish 7/1 ~~1600~~ 1500

Surge Start Finish

Pump Start 7/2/87 (0900) Finish 7/2 (~~0400~~ 1300) Volume 7/2 1200

~~55 gal~~ 80 gal Type Cent. Rate (.3 - .4 gpm)

total purged

2

Doc NO! CLEJ-00258-1.02-05/01/88

Hole Size 10" (0-100) Slot 0.01

Screen Size 2" Mat'l PVC

asing Size 2" Mat'l PVC

G-logist David Brentlinger

Date Start 7/17/97 Finish 7/18

Contractor ESE

Driller Davis Drilling Co (Clayton Davis)

E HPGW 9-3

Filter Materials Med-Coarse Sand

Grout Type #1 Portland

Development Bailer

Static Water Level — 12.83

Top of Well Elevation 15.0'

Drill Type Mud-Rotary

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-15			Silty fine sand with 50% clay throughout top 4' Road fill		
15-20			Silty Clayey fine-med sand		
20-25			silty fine-med sand (more fines than sand), clay layers.		
25-30			Silty med. sand little/no clay sand very angular		
30-35			fine sandy clay		
35-40			silty fine sand with clay layers 10% med. sand		

Doc No: CLEJ-00258-1.02-05/01/88

Hole Size ______ Slot ______ E [illegible]-3

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

G· ·logist ______ Development ______

Date Start ______ Finish ______ Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
40-45			Same as Above 35-40		
45-50			Silty Fine - med sand little/no Clay		
50-55			Fine - med sandy marl Cemented Clastics 50% lots of shells		
55-60			Cemented Clast[illegible] [illegible] less sand than [illegible]-55		
60-65			Silty Med [illegible] with less [illegible] little cem[illegible]		
65-70			Silty fine sand with Some Rock - Sh[illegible]		

DOC NO: CLEJ-00258-1.02-05/01/88

Hole Size ____________ Slot ____________ E [illegible]

Screen Size ____________ Mat'l ____________ Filter Materials ____________

asing Size ____________ Mat'l ____________ Grout Type ____________

G logist ____________ Development ____________

Date Start ____________ Finish ____________ Static Water Level ____________

Contractor ____________ Top of Well Elevation ____________

Driller ____________ Drill Type ____________

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
70-75			Rock + Shells little to no sand or fines		
75-80			silty med. sand and shells, lots of fossils (teeth, Remains...)		
80-85			Med. Sand with shells Cemented clastics 20% some clay throughout		
85-90			fine - med sand More shells and more Cemented clastics than 80-85		
90-95			Cemented Clastics little/no fines + sand lots of shells		
95-100			Same as above 90-95		

Doc No: CLEJ-00258-1:02-05/01/88

Hole Size	Slot		E [illegible]
Screen Size	Mat'l	Filter Materials	
Casing Size	Mat'l	Grout Type	
Geologist		Development	
Date Start	Finish	Static Water Level	—
Contractor		Top of Well Elevation	
Driller		Drill Type	

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
100-105			Same as 90-95 less shells, more sand		
105-110			Silty med Sand with shells, little/no clastics		
110-120			Silty fine - med sand		
120-125			Same as 110-120		
125-130			Same as 110-120		
130-135			Silty med Sand with some cemented [illegible]		

DOC NO! CLEJ-00258-1.02-05/01/88

Hole Size ____ Slot ____ E ____

Screen Size ____ Mat'l ____ Filter Materials ____

asing Size ____ Mat'l ____ Grout Type ____

G--logist ____ Development ____

Date Start ____ Finish ____ Static Water Level ____

Contractor ____ Top of Well Elevation ____

Driller ____ Drill Type ____

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
135-140			Silty Fine sand and Shells, Some med-Coarse Sand.		
140-145			Silty Clayey Med. Sand with no shells		
145-150			silty Clayey Fine-med. Sand		

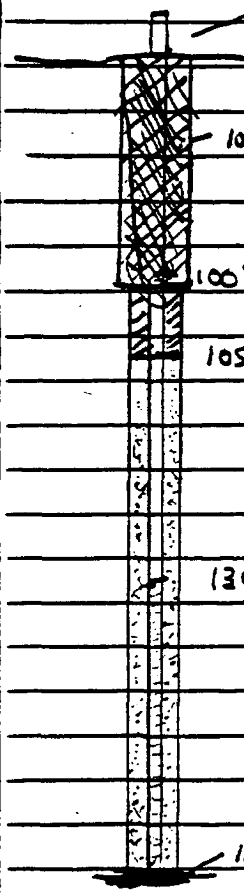
DoC NO: CLEJ-00258-1.02-05/01/88

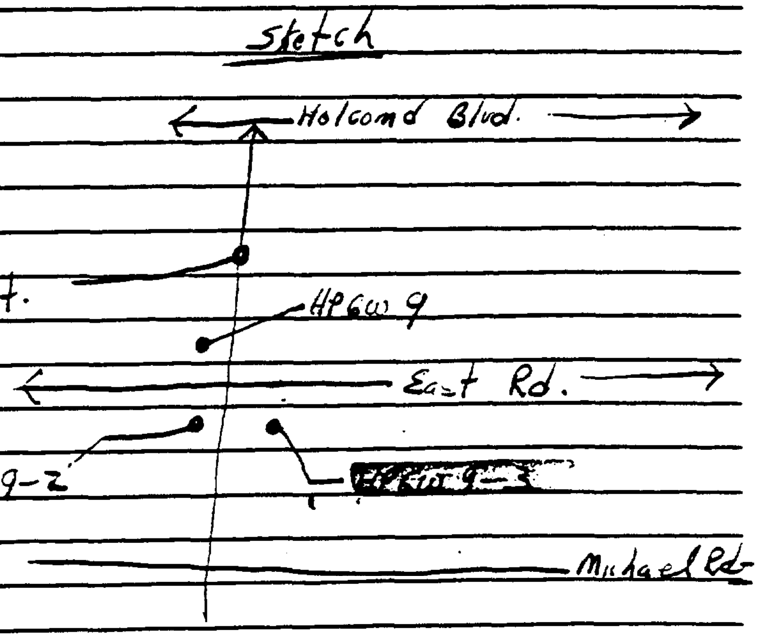
Boring No. HPGW 9-3 **DAVIS** SHEET ____ OF ____

On site 7/17/87 at 1150; drillers take 1 hr to set up and begin drilling at 1300. Hole bored to 105' at 1600, driller wastes out and begins to set 6" Casing 1615. Well grouted at 1730; Driller clean-up.

7/18/87

On site HPGW 9-3 0700, driller gets to 152' at 1030 sand pack + seal at 1100; Driller grouts hole, finish at 12:00.





0-100' 10" hole
100-152' 6" hole

7/18/87
DATE

SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

Materials used — (standard for 150 holes)

25 (80 pound) bags grout
12 (50 pound) bags med sand
3 bags of mud mix
1/2 bucket (5 gal) bentonite pellets

Doc No: CLEJ-00258-1.02-05/01/88

WELL FACT SHEET

Well No. HPEW 9-3 Date 7/20/87 Start 7/19/87 Finish 7/20/87

Total Depth of Boring Prior to Well Installation 152'

Diameter of Boring (10" 25 → 104', 6" 104 - 152')

Water Level 16.50' TOC

6" 5 7/8 bit from 100'-150'

Total Length of Well at Installation 152.50

Height of Well Above Ground Level 2.50

Total Depth of Well Below Ground Level 150.00

Total Length of Screen	20'	from	150'	BGL to	130'	BGL
Total Length of Riser	132'	from	130.	BGL to	2.5	AGL
Sand Heave. Total Interval	45'	from	150	BGL to	105	BGL
Filter Pack Total Interval		from		BGL to		BGL
Bentonite Seal Total Interval	5'	from	105'	BGL to	100'	BGL
Grout Total Interval	100'	from	100	BGL to	0.00	BGL
Protective Casing Total Interval		from		BGL to		AGL

Well Screen Dia. 2" Schedule #40 Slot Size 0.01"

Well Riser Dia. 2" Schedule #40

Filter Material Med Sand

Seal Bentonite Pellets 0.25"

Backfill Cement ___ Bentonite ___ Water ___

Protective Casing Dia. 4" Material Steel

Well Development

Date 7/19/87 Time 0800 Start 0800 7/19 Complete 1700 7/20

Water Level at Start 16.50 TOC Finish 40' TOC

Conductivity Start ___ Finish ___

Water Color Start turbid grey Finish Clear

Bailed 375 gals using 0.75 gal bailer, at rate of 1 gpm

Bail Start ___ Finish ___

Surge Start — Finish —

Pump Start — Finish — Volume —

Type — Rate —

Cent Pump will Not work!

DAB

Hole Size 5"	Slot 0.01		EHP176W-2
Screen Size 2"	Mat'l PVC	Filter Materials	Natural Formation
Casing Size 2"	Mat'l PVC	Grout Type	Portland #1
Geologist David Brentlinger		Development	Bailer (PVC)
Date Start 6/18/87	Finish 6/19/87	Static Water Level	11.33' BGL
Contractor ESE		Top of Well Elevation	2.67' ; 76' TOC
Driller ATEC (Don Sweeting)		Drill Type	Rotary - Mud

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-5			Top soil ~ organic matter with fine sand + silty clay		
5-10			Same as above less organic		
10-20			Silty clayey fine sand with (1-2)' of peat + organic clay dark brown		
20-25			Silty fine-med sand with less clay and organic matter		
25-30			Silty clayey fine-medium sand Grey + yellow brown clay peds, well rounded coarse sand [illegible]		
35-40			Same as above 25-30 more clay		
45-50			Silty fine - med sand		

Doc NO: CLEJ-00258-1.02-05/01/88

Hole Size	Slot		E HPGW 17-2
Screen Size	Mat'l	Filter Materials	
asing Size	Mat'l	Grout Type	
Geologist		Development	
Date Start	Finish	Static Water Level	—
Contractor		Top of Well Elevation	
Driller		Drill Type	

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
50-55			Silty clayey Med sand with well Rounded coarse sand grains + Pebbles		
55-60			Same as above (50-55)		
60-65			[illegible] Med. Sand, [illegible] Coarse Sand + Pebbles are well rounded		
65-70			Coarse, Rounded Sand + Pebbles with some [illegible] [illegible]		
70-75			[illegible]		
75-80			Same as above (70-75)		

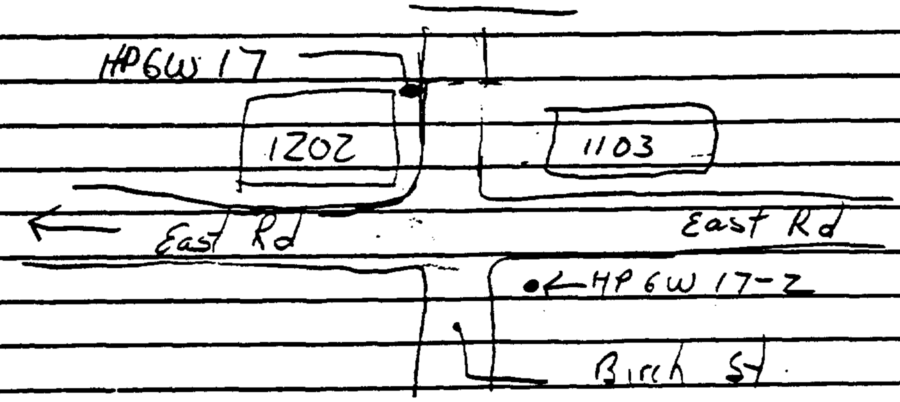
DOE NO: CLEJ-00258-1.02-05/01/88

Boring No. [redacted] SHEET ' OF

HPGW 17-2 6/18/87
on site 1230 ; Set up and drilling
1300 . 1430 well drilled ; Rods out.
Driller waits for casing (for about 20 minutes) meanwhile
hole badly closes, driller attempts to get casing
in by force ; successful in doing so and
achieves depth of about 74', however hole
has closed to 30' LS and sand pack is
natural formation up to 30'. Hole must be
Re-drilled. End of day ; off Post at 1630

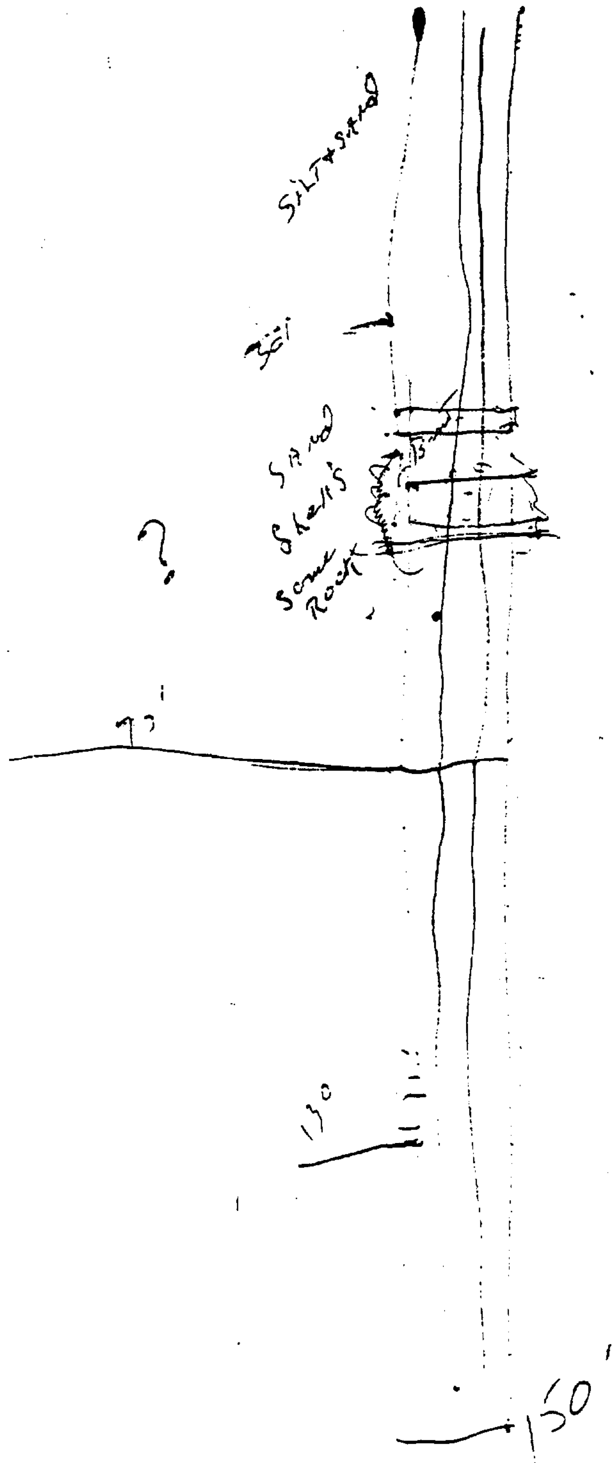
HPGW 17-2 6/19/87
on site 0800 ; drillers arrive 0930 ; must
fix other Rig at ?; Back on site 1300 ; At
1350 drillers return ; Attempt to inject a Bentonite
slurry at 50' LS to seal the well ; they are successfull
and then attempt to inject a Bentonite - Cement grout
from 40' to LS . they are successfull ; hole is
thus complete ; Day Ends off post 1630 .

sketch



DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?


SILT & SAND
30'
SAND
Shells
Some Rock
?
130
150'

Doc NO: CLEJ - 00258 - 1.02 - 05/01/88

WELL FACT SHEET

Well No. HP6W17-2 Date 6/24/87 Start 6/22/87 Finish 6/24/87

Total Depth of Boring Prior to Well Installation 80.3'

Diameter of Boring 5"

Water Level 10' (± 1')

Total Length of Well at Installation 74' (± 0.25') (73.33 BGL)

Height of Well Above Ground Level 2.67'

Total Depth of Well Below Ground Level 73.33

Total Length of Screen	~~73.33~~ 20.00'	from	73.33'	BGL to	53.33	BGL
Total Length of Riser	49.33'	from	53.33'	BGL to	2.67	AGL
Sand Heave. Total Interval	Natural formation	from	73.33'	BGL to	48.33	BGL
Filter Pack Total Interval	None	from		BGL to		BGL
Bentonite Seal Total Interval	5'	from	48.33'	BGL to	43.00'	BGL
Grout Total Interval	42.50'	from	43.00'	BGL to	0.50'	BGL
Protective Casing Total Interval		from		BGL to		AGL

Well Screen Dia. 2" Schedule 40 Slot Size 0.01

Well Riser Dia. 2" Schedule 40

Filter Material Natural formation (silty med sand)

Seal Bentonite

Backfill Portland #1 Cement ✓ Bentonite ___ Water ___

Protective Casing Dia. ___ Material ___

Well Development

Date 6/22/87 Time 0700 Start 0700 (6/22) Complete 1400 (6/24)

Water Level at Start 15.33' TOC Finish 37.00' TOC

Conductivity Start ___ Finish ___

Water Color Start turbid Finish clear

Bail Start ___ Finish ___

Surge Start ___ Finish ___

Pump Start 6/22 Finish 6/24 Volume ~~260~~ 260 gallons

Type PVC pipe Rate 1/2 gpm

Doc NO! CLEJ-00258-1.02-05/01/88

Hole Size 6" Slot 0.01 E HP6W 17-3

Screen Size 2" Mat'l PVC Filter Materials

Casing Size 2" Mat'l PVC Grout Type Portland #1

Geologist David Brentlinger Development [illegible]

Date Start ~~6/22/87~~ 7/16/87 Finish 7/17/87 Static Water Level 12.67

Contractor SSE Top of Well Elevation 15.17

Driller ~~ATEC & Associates~~ Davis Drilling (Clayton Davis) Drill Type Rotary Mud

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0.0-5.0			Silty clayey fine sand, much organic matter		
5.0-10.0			Silty fine sandy clay, clay dark brown-black		
10.0-15.0			same as above (5-10)		
15.0-20.0			Silty fine-med sand, coarse sand [illegible], some clay upper portion, pebbles well rounded		
20.0-25.0			Silty clayey med sand, little/no coarse [illegible], organic matter 24-25'		
25.0-30.0			Silty fine sand, some med.-coarse material		
30.0-35.0			Silty fine-med sand with clay layers [illegible]		
35.0-40.0			[illegible] light grey clay pebs with well rounded [illegible]		

Hole Size ______ Slot ______ E HPGW 17-3

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

Ge-logist ______ Development ______

Date Start ______ Finish ______ Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
40.0-45.0			Silty med. Sand		
45.0-50.0			silty med sand with clay layers little/no coarse material		
50.0-55.0			Silty fine-med. sand		
55.0-60.0			silty fine sand to 58' 58' coarse sand, shells semi-cemented [illegible]		
60.0-65.0		Rock 64'	Cemented [illegible]		
65.0-70.0		70'	cemented [illegible] less dense after 68' lots of shells, [illegible]		
70.0-75.0			Silty med- [illegible] [illegible] [illegible]		

Doc NO! CLEJ-00258-1.02-05/01/88

Hole Size ____ Slot ____ E HP6W17-3

Screen Size ____ Mat'l ____ Filter Materials ____

asing Size ____ Mat'l ____ Grout Type ____

Ge-logist ____ Development ____

Date Start ____ Finish ____ Static Water Level —

Contractor ____ Top of Well Elevation ____

Driller ____ Drill Type ____

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
75.0 - 80.0			silty fine sand		
80.0 - 85.0			silty fine sand		
85.0 - 90.0			silty fine sand with light clay peds		
90.0 - 95.0			Coarse sand and shells with some well rounded pebbles and clay peds		
95.0 - 100.0		95 - 97	Rock layer (Hard!) Silty med. sand some coarse sand + pebble		
100.0 - 105.0			silty med sand and shells, some cemented clastics at bottom		
105.0 - 110.0			Cemented clastics with shells and coarse sand		

Doc No: CLEJ-00258-1.02-05/01/88

Hole Size ______ Slot ______

E HPGW 17-3

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

Ge-logist ______ Development ______

Date Start ______ Finish ______ Static Water Level —

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
110-115.0			Same as Above 105-110		
115.0-120.0			Cemented clastics w sand and shells; little no fines		
120.0-125.0			Same as Above 115-120		
125.0-130.0			Silty fine - med sand	-	
130.0-135.0			Same as Above (125-130).		
135.0-140.0			Same as Above (125-130)		
1[illegible].0-145.0			Silty fine sand		
145.0-150.0			Silty fine sand		

Doc NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW 17-3 **ATEC** SHEET ____ OF ____

Onsite HPGW 17-2 0700 6/22/87
Beginning of well development of HPGW 17-2

Drillers arrive 0830 set up at HPGW 17-3 1000
Break to go to town. Back at 1300 (2hrs O.T.)
work top 10' go to lunch 1330. Drillers Return
1500 Can't finish hole, have drill rods that are
too small for the bit. have new rods in
the morning. Begin to clean up bailing materials
And Meet with Flick Acosta at Airstation 16.00.

HPGW 17-3 6/23/87
On site 0800 drillers not arrived, beginning
to bail 17-2. Drillers arrive 0900. Parts for Rig
won't be in till 1200. Meet back at 130-200; go to
bail HPGW 17-3. (Drillers do not Return).

HPGW 17-3 6/24/87
On site at 0800 drillers arrive 0900
Drilling 0930. Problem 1030, down until 1130.
Lunch 1200-1400; Rest of afternoon, [illegible]
[illegible] pulling rods (sub piece are
Threaded now rods [illegible] working) 20' of [illegible]
[illegible] 1542. ; 60' remains in [illegible].
1630 drill rods out, driller attempts to [illegible]
Casing, gets down to 45' hole [illegible]
[illegible] driller quits 1715 off [illegible] 1730.

HPGW17-3 6/25/87
Drillers arrive 0930; have to make fitting for
disc on back (gone to town 10:00); drillers return
1130 get drill rig circulating at 1200 lunch break
till 100, drillers cant get 4" casing up-down
they try till 300. Hole lost. Drillers quit 300 PM

DATE ____ SIGNED ____

SOURCE: Environmental Science and Engineering, Inc., 198?

Materials used HPGW 17-3

* 15 (10') sections of Threaded PVC un used, 50' (5 sections) in hole.
* 5 bags of portland #1
* no sand
* 2-5 bags of Clay for mud

Materials used for HPGW 17-2

* No sand
* 2-4 bags of clay for mud
* 1 bag of bentonite for seal
* 4 bags of Portland #1 for grout

materials used for HPGW 24-3

* NO Sand
* 5 bags of clay for mud
* 8-10 bags of portland for grout
* 1/3 bucket of Bentonite for seal

materials for HPGW 17-2

* 4 bags (100 lbs) sand
* 1/3 bucket bentonite for seal
* 4 bags portland # 1 for grout

Doc NO: CLEJ-00258-1.02-05/01/88

Boring No. ______________________ SHEET ______ OF ______

HPGW 17-3

ATEC

6/26/87

Drillers on site 0930; discuss items on next wells till 1000. 1000 Drillers begin to gather materials for grouting hole which is lost and to be grouted to land surface. Weather slows drillers down. Finish grouting hole 1245 pm, break for lunch. Drillers Return 1355. Too late to start next hole HPGW 9-2. I get driller to move rig to HPGW 9-2 and also tell him to get everything over there and be ready to drill 0700 on monday. I go to HPGW 24-3 to bail 25 gallons at 1430

Materials Used: 200 4" threaded PVC pipe was ordered and 50' was used and remained in hole. No sand or bentonite was used, only clay for mud.

DATE ______ SIGNED ______

SOURCE: Environmental Science and Engineering, Inc., 198?

DOC. NO: CLEJ-00258-1.02-05/01/88

Boring No. HPGW 17-3 SHEET ______ OF ______

[redacted]

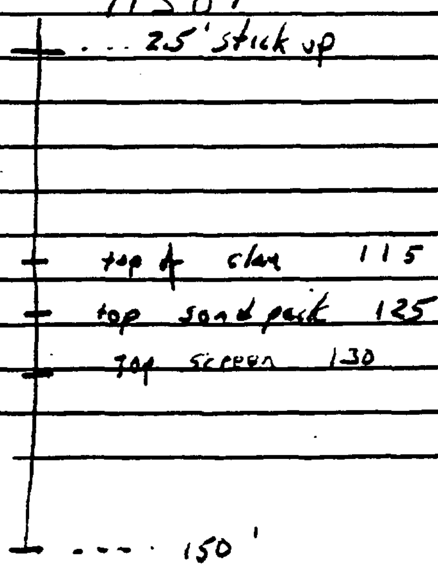
7/15/87 0800

Arrive on site, drillers organizing - working on rig. 0900 mud is made, drilling begins. Drilling complete 1215; driller attempts to place temporary casing 1230, driller cannot get casing past 75', Driller pulls casing out 1300, attempts to wash out hole and thunderstorms set in 1315 and general rain follows until 1400. Call it off 'till morning.

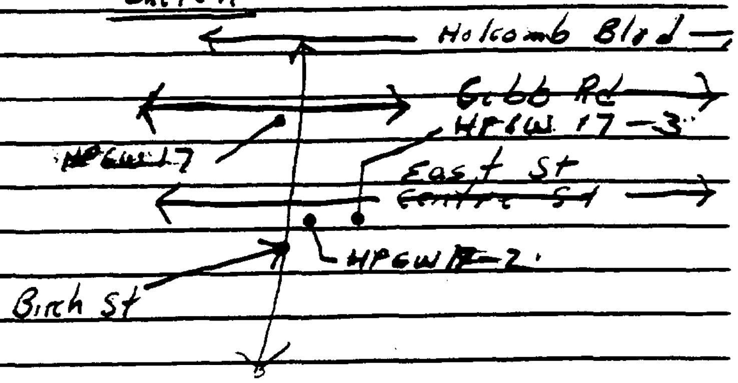
CAB

7/16/87 0700 drillers on site + drilling out hole, takes all morning to set 6" casing at 100'; Grouting casing until 1330; driller wants to stay onsite, painting of unpainted wells done remainder of day, driller goes to town and gets supplies while helpers paint.

7/17/87 On site 0700; drillers begin drilling out grout from casing; setting 2" PVC casing 1000. Well installed 1100, grouted and complete 1130.



sketch



DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

WELL FACT SHEET

Well No. MPGW 17-3 Date 7/20/87 Start 7/15/87 Finish 7/16/87

Total Depth of Boring Prior to Well Installation 152'

Diameter of Boring 6"

Water Level 15.50 ±(1/4")

Total Length of Well at Installation 150' (152.5 with stick-up)

Height of Well Above Ground Level 2.50'

Total Depth of Well Below Ground Level 150'

Total Length of Screen	20'	from	150	BGL to	130	BGL
Total Length of Riser	132.5	from	130	BGL to	2.5	AGL
Sand Heave. Total Interval		from		BGL to		BGL
Filter Pack Total Interval	25'	from	150	BGL to	125	BGL
Bentonite Seal Total Interval	10'	from	125	BGL to	115	BGL
Grout Total Interval	110	from	115	BGL to	05	BGL
Protective Casing Total Interval	4'	from	1.0	BGL to	3.0	AGL

Well Screen Dia. 2" Schedule #40 Slot Size 001"

Well Riser Dia. 2" Schedule #40

Filter Material Med. Sand

Seal Bentonite Pellets

Backfill Cement ✓ Bentonite ___ Water ___

Protective Casing Dia. 3" Material Steel

Well Development

Date 7/19/87 Time 0800 Start 0800 (7/19) Complete 1400 (7/20)

Water Level at Start 15.65 Finish 32'

Conductivity Start — Finish —

Water Color Start — Finish —

Bail Start 0800 (7/19) Finish 1400 (7/20)

Surge Start — Finish —

Pump Start — Finish — Volume —

Type — Rate —

Doc NO: CLEJ-00258-1.02-05/01/88

Hole Size 5" Slot 0.01 HPGW 24-2 E

Screen Size 2" Mat'l PVC Filter Materials Coarse Sand

Casing Size 2" Mat'l PVC Grout Type #1 Portland

Geologist David Brentlinger Development Bailed (184 gallons.)

Date Start 6/8/87 Finish 6/9/87 Static Water Level ~~14.67 TOC~~ 11.42 BGL

Contractor ESE Top of Well Elevation ~~3.34~~' 3.25 ' stickup

Driller ATEC & Associates (Don Sweetinn) Drill Type Rotary - Mud

79.40 TOC

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0 - 5			Silty fine sand		
5 - 10			Silty fine sand		
10 - 15			Silty fine sand		
15 - 20			Silty very fine sand		
20 - 25			Very fine sand		
25 - 30			very fine sand, some coarse sand, white fines, coarse material well rounded		
30 - 35			very fine sand same as above		
35 - 40			very ~~fine~~ silty-clayey fine sand		
40 - 50			same as above 35-40 with more clay in peds		

Hole Size	Slot	HPCW 24-2	E
Screen Size	Mat'l	Filter Materials	
asing Size	Mat'l	Grout Type	
G--logist		Development	
Date Start	Finish	Static Water Level	—
Contractor		Top of Well Elevation	
Driller		Drill Type	

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
50 - 55			Silty Sandy - fine Sandy si— with Clay + Small shells		
55 - 60			Clayey Silty fine sand mostly fine sand some Med.-Coarse sand ~~sand~~ with small Clastics (shells)		
60 - 65			same as above 55 - 60 more shells		
65 - 70		hard layer semi lithofied? limestone?	silty Med Sand with Coarse Sand and uncemented Clastics + Cemented (lots of shells)	Rock	
70 - 75			Same as above 70 - 75	Rock	

Comments:

Rock layer is not very hard, driller went through easily.

Boring No. HPGW 24-2 [redacted] SHEET 01 OF 04

on-site and Ready 1:45 PM
6/8/87

start - 6/8/87
Finish - 6/9/87

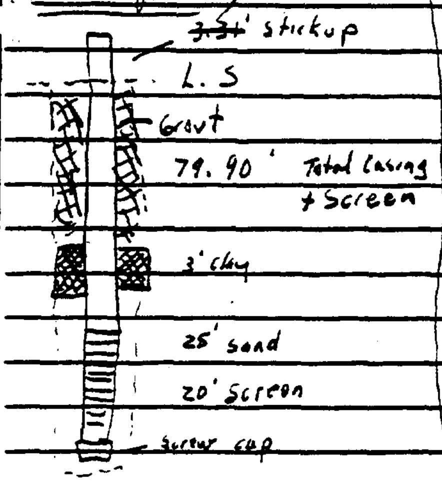
Drilling Stops 300 PM, hole closing, mud Pump breaking down

HPGW 24-2
On site 700 Am 6/9/87
Well Drilling complete - 1030
Casing + Screen in - 1038
Well Complete - 2:30

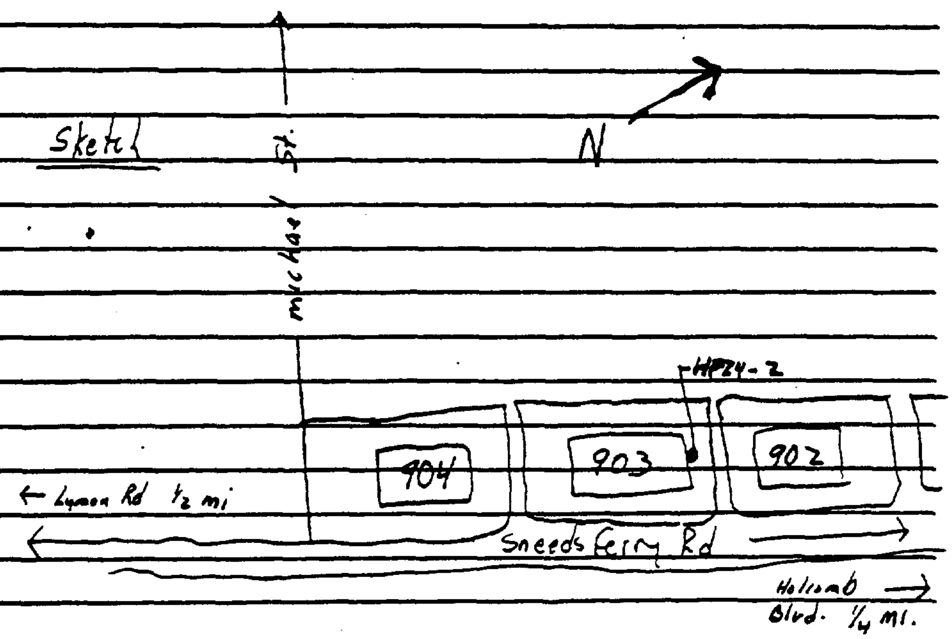
Lunch 1130 - 100 PM

Comments: Drillers worked very well, hole remained open during casing installation. (soft fine sand most of hole)

Well Profile



Sketch



6/8/87
DATE

SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

WELL FACT SHEET

Well No. HPGW24-2 Date 6/9/87 Start 6/8/87 Finish 6/9/87

Total Depth of Boring Prior to Well Installation 80' ± 1'

Diameter of Boring 5"

Water Level 14.67 (TOC 0800 6/9/87)

Total Length of Well at Installation 79.90'

Height of Well Above Ground Level 3.31'

Total Depth of Well Below Ground Level 76.59'

Total Length of Screen	20' ~~76.59~~'	from	76.59' BGL	to	56.59' BGL
Total Length of Riser	59.90	from	56.59' BGL	to	3.31' AGL
Sand Heave. Total Interval		from	3 BGL	to	BGL
Filter Pack Total Interval	25'	from	~~51.13~~ 76.59' BGL	to	51.59' BGL
Bentonite Seal Total Interval	3'	from	51.59' BGL	to	48.59' BGL
Grout Total Interval	48' ~~51.00~~'	from	48.59' BGL	to	0.59' BGL
Protective Casing Total Interval		from	BGL	to	AGL

Well Screen Dia. 2" Schedule 40 Slot Size 0.01

Well Riser Dia. 2" Schedule 40

Filter Material Coarse Sand

Seal Btonite

Backfill Concrete Cement X Bentonite___ Water___

Protective Casing Dia.___ Material___

Well Development 6/10/87

Date 6/10/87 Time 1315 Start 1330' Complete 1730 6/13/87

Water Level at Start 14.67' TOC Finish 75.00' TOC after bail

Conductivity Start ——— Finish ———

Water Color Start turbid grey Finish Clear

Bail Start 6/10/87 Finish 6/13/87

Surge Start ——— Finish ———

Pump Start 6/10/87 Finish 6/15/87 Volume 185.0 gallons

Type Bailor (PVC Sch. 40) Rate 0.15 gpm

LAB

Doc NO: CLEJ-00258-1.02-05/01/88

Hole Size 5" Slot 0.01 E HPCW 24-3

Screen Size 2" Mat'l PVC Filter Materials natural formation

asing Size 2" Mat'l PVC Grout Type Portland #1

Geologist David Brentlinger Development Boiler

Date Start 6/10/87 Finish 6/18/87 Static Water Level 11.90' BGL

Contractor ESE Top of Well Elevation 1.81'; 150' TOC

Driller Don Sweeting (ATEC) Drill Type Rotary - Mud

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-10			silty fine sand with organic matter top 5', some clay layers		
10-15			silty fine sand and organic clay throughout.		
15-20			silty fine - med. sand with coarse sand + pebbles bottom 3'		
20-30			coarse sand top 5', silty clayey finesand		
30-35			silty fine sand		
35-40			silty med sand with clay layers (clay brown with coarse sand)		
40-50			Same as above (35-40) little/no coarse material		
50-60			silty med. - coarse sand Rock at 58' (cemented clastics + shells).		

Doc NO: CLEJ-00258-1.62-05/01/88

Hole Size	Slot		E HP24-3
Screen Size	Mat'l	Filter Materials	
asing Size	Mat'l	Grout Type	
Geologist		Development	
Date Start	Finish	Static Water Level	—
Contractor		Top of Well Elevation	
Driller		Drill Type	

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
60-70	Sand Silt Rock	68-70'	Silty fine-med sand, v. little clay, coarse sand well rounded + small shells Cemented Clastics Limestone + Shells	very	Hard
70-75			Rock (uncemented clastics) shells and coarse sand (well rounded). fine silty sand (74-75)' with less rock and shells		
75-80			silty fine sand with yellow clay peds, less 10% coarse sand.		
[illegible]-85	Soft	Sand Rock (1.2') Sand	fine silty sand; Rock layer (83→84)', silty fine sand		
85-90			Silty very fine sand with small shells and rounded v. coarse sand pebbles		
90-95			silty med. sand with more shells and coarse sand + pebbles		
95-100			Same as above (90-95)		
100-105		100-103 103-104 104-105	Silty fine sand solid cemented layer silty fine sand		

Doc NO: CLEJ-00258-1.02-05/01/88

E HP6W24-3

Hole Size ______ Slot ______

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

G-logist ______ Development ______

Date Start ______ Finish ______ Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
105-110			Silty fine - vc fine sand with shells + rock fragments		
110-115			silty fine sand and coarse sand with cemented clastics, shells Coarse sand angular, clear		
115-120			med. sand, 50% semi cemented clastics (gray) and fossils, shells.		
120-125			same as above (115-120)		
125-130			silty fine sand with lots of shells + fossils, coarse rounded sand		
130-135			same as above (125-130)		
135-140			silty med sand (angular) with cemented clastics loosely fill of shells		

Doc No: CLEJ-00258-1.02-05/01/88

Hole Size ______ Slot ______ E HP6W24-3

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

ologist ______ Development ______

Date Start ______ Finish ______ Static Water Level —

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
140-145			silty fine-med. sand with less shells + rocks, not much coarse sand		
145-150			same as above (140-145)		
150-155			silty fine-med. sand little shell + rock		

Boring No. HPGW 24-3 [redacted] SHEET ____ OF ____

6/18/87
onsite 700 Am; drilling begins 715
Problems
10:30 Am Pump Breaks down; hole 60'

6/15/87 (HPGW 24-3)
On site 0700 Am Drillers arrive 0730
Rig set up and drilling 0815; (40' hole closed in).
0930 - Rig's Rods clogged, Helper gets water
1030 - Drilling Resumes
1130 - Drill breaks down; Mud pump broke
need new pump; get from Raleigh
start up Tuesday 21

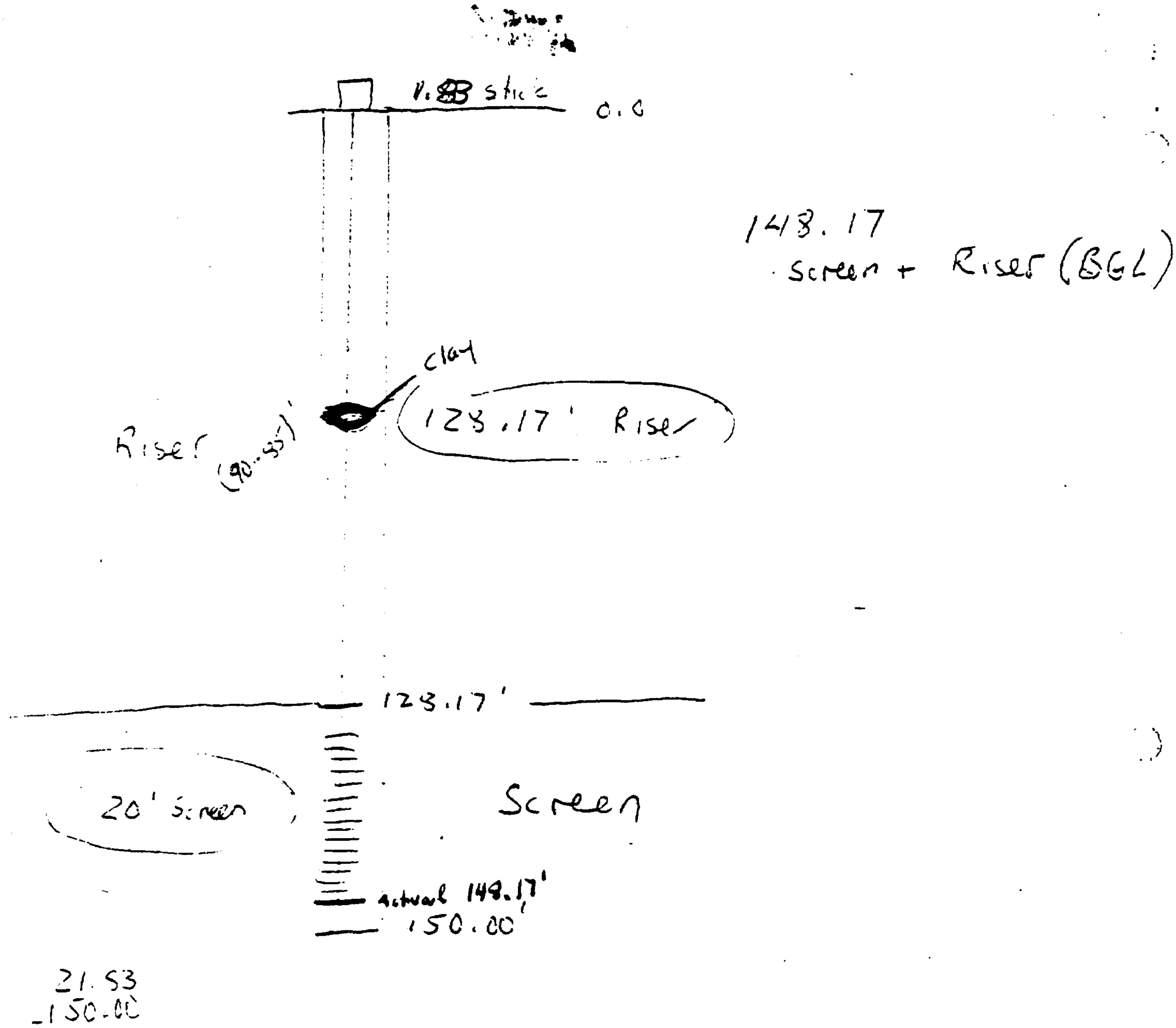
6/16/87 (HPGW 24-3)
On site 0830 drillers arrive
0900 begin working on rig, drilling Begins
1200 pm. 1330 drilling stops at 150' begin pulling Rods.
(130'-1500) 1500 Screen + casing into hole, at 70' hole
closes, casing stuck, after 1 hour driller
pulls casing + screen out; 1630 off post.

6/17/87
Onsite 0700 Drilling begins 0800, hole
Closed badly overnight driller trys to set the
casing but fails at 1045. 1200 pm after 1hr break
driller sets 75' casing (temporary) casing in place
1350; driller begins drilling past casing and
by 1600 bores down to 150', pulls out and
finally gets Screen + casing in hole 1630;
off post 1700

DATE SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

Doc No! CLEJ-00258-1.02-05/01/88



DOC NO: CLEJ-00258-1.02-05/01/88

WELL FACT SHEET

Well No. HPGW24-3 Date 7/1/87 Start 6/19 Finish 7/1

Total Depth of Boring Prior to Well Installation 155'

Diameter of Boring 5"

Water Level 10.5'

Total Length of Well at Installation 150'

Height of Well Above Ground Level 1.83'

Total Depth of Well Below Ground Level 148.17' 148.17

Total Length of Screen	20'	from	~~150'~~ 148.17	BGL to	128.17	BGL
Total Length of Riser	130' ~~128.17~~	from	128.17'	BGL to	1.83'	AGL
Sand Heave. Total Interval	None	from	—	BGL to	—	BGL
Filter Pack Total Interval	NONE	from	—	BGL to	—	BGL
Bentonite Seal Total Interval	5-7'	from	90'	BGL to	84'	BGL
Grout Total Interval	80'	from	84'	BGL to	4	BGL
Protective Casing Total Interval		from		BGL to		AGL

Well Screen Dia. 2" Schedule #40 Slot Size 0.01"

Well Riser Dia. 2" Schedule #40

Filter Material Natural Formation (silty fine-med. Sand)

Seal Bentonite Pellets

Backfill Portland #1 Cement ✓ Bentonite ___ Water ___

Protective Casing Dia. ___ Material ___

Well Development

Date 6/19 Time 1600 pm Start 6/19 Complete 7/1

Water Level at Start 14.07' TOC Finish 13.67' TOC

Conductivity Start — Finish —

Water Color Start — Finish —

Bail all Start 6/19 Finish 7/1

Surge Start — Finish —

Pump Start — Finish — Volume 300 gal

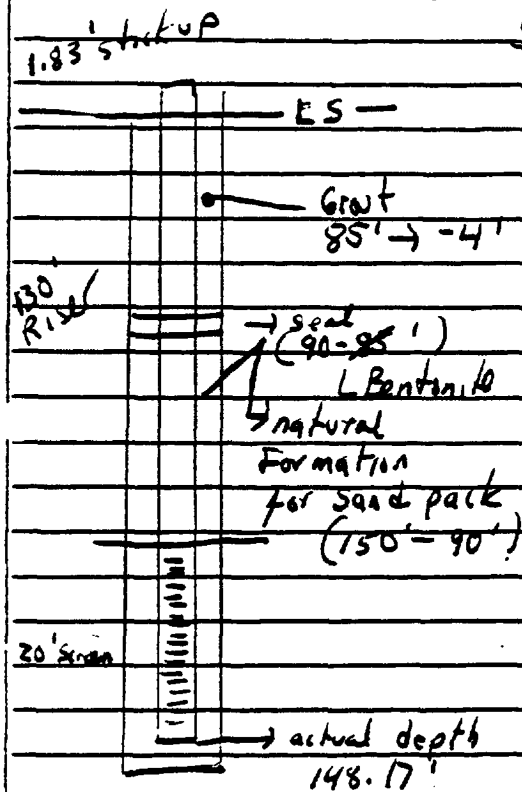
Type — Rate —

Doc No: CLEJ-00258-1.02-05/01/88

Boring No. ______ [redacted] SHEET ______ OF ______

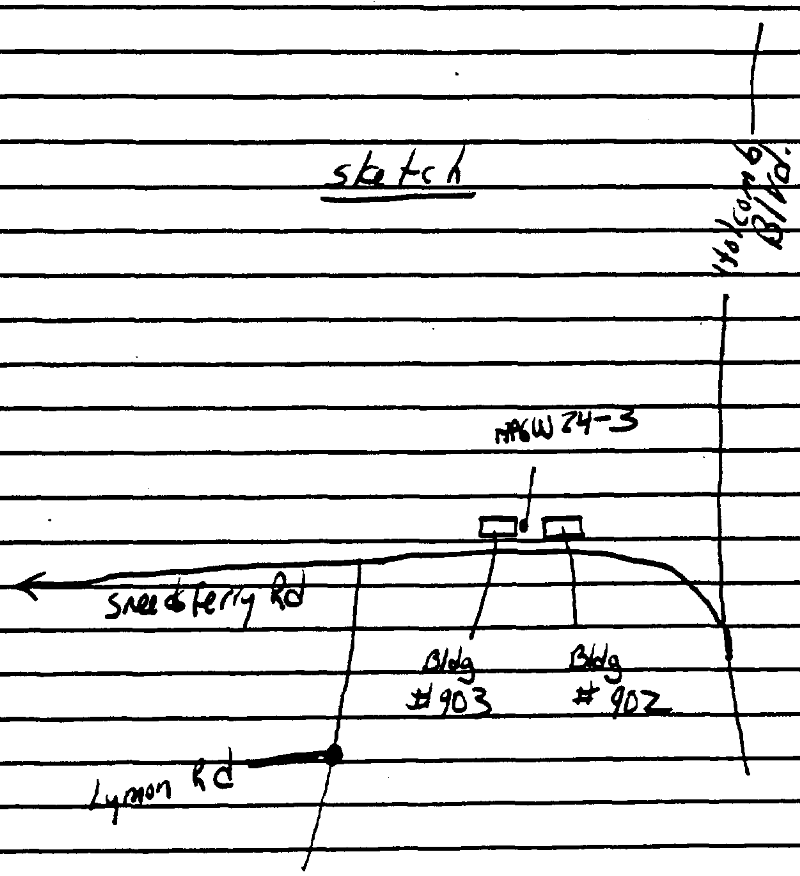
6/18/87 HPGW24-3

On site 0730, drillers arrive 0800. Begin pulling casing 0830 (hole caves to 90') Bentonite (90→80) cement portland #1 to LS well complete 1130. Drillers Breaking down - heading to next hole.



Comments: Strong chemical smell at 50'
Broke down consistency of drill mud!

sketch



7/1/87 — DATE

[signature] — SIGNED

SOURCE: Environmental Science and Engineering, Inc., 198?

Each deep monitor well was constructed using 2-inch inside-diameter (ID) Schedule 40 polyvinyl chloride (PVC) flush-threaded well screen and casing. Screen lengths of 20 feet (ft) (0.010-inch slot size) were used for each well. Filter sand (20- to 30-mesh silica sand) was installed with a tremie pipe around the well screen to a point approximately 2 ft above the top of the screen. A bentonite seal, consisting of bentonite pellets, was placed on top of the filter pack material. The thickness of this seal was approximately 5 ft. Grout was pumped into the annulus above the bentonite seal, using a tremie pipe, to form a continuous seal from the bentonite to the land surface.

The Atec Associates rig was insufficiently sized to overcome major caving problems in two of the 150-ft wells. As a result, a larger drilling rig from Davis Drilling Co. was brought back to the site to install these two wells. Davis Drilling Co. drilled a 10-inch hole, using mud-rotary techniques, to a depth of 100 ft. Six-inch ID steel temporary casing was installed to 100-ft to prevent the upper portion of the boring from collapsing. A 6-inch hole was drilled from the bottom of the temporary casing to the design depth of the hole (150 ft). After well materials were installed, some caving of natural formation materials occurred around the well screen. The design intent of the deep monitor wells was not compromised by the use of natural filter materials versus the designed filter pack.

All descriptions of geologic materials in the deep borings were performed on drill cuttings brought to the surface by the drilling mud.

After installation of all downhole well materials, a 4-inch steel protective casing, with a locking cap, was placed into the grout. A concrete pad with three protective posts was installed at each monitor well location. Each well was clearly marked with a sign designating the well as a nonpotable well for groundwater monitoring purposes only.

Each deep monitor well was developed by pumping or hand bailing, as appropriate. Development continued until the water was as clear and sediment free as practicable.

The deep monitor wells were surveyed for vertical control to a precision of at least 0.10 ft. This vertical control was established on a relative basis; the elevation of each deep well was established relative to the shallow monitor wells adjacent to them.

Doc NO: CLEJ-00258-1,02-05/01/88

[illegible]ENDIX B

[illegible]

[illegible]

DOC NO: CLEJ-00258-1.02-05/01/88

Hole Size 10" to 100', 6" to 200'	Slot 0.01		E 642-2
Screen Size 2"	Mat'l PVC	Filter Materials	Silica Sand 100-200
Casing Size 6" to 100', 2" to 200'	Mat'l PVC	Grout Type	Portland #1
Geologist David Brentlinger		Development	
Date Start 3/28/87	Finish 3/30	Static Water Level	—
Contractor ESE		Top of Well Elevation	10' ± 2'
Driller Davis ; James Davis		Drill Type	Tri Comb, Rotary 10" to 100' 5 7/8" to 200'

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-25			Silty Clayey fine Sand, Sand white in color, Clay clumps, grey in color		
25-50			very Coarse sandy silty Clayey formation 35' otherwise, Silty Clayey very fine Sand Coarse material is sand mostly Color dark grey - grey		
50-75			very fine sand with silty clay throughout little to no coarse material, shells begin at about 70', formations are grey-white	-	
75-100			fine silty sand with shells and Cemented Clastics more shells + Clastics last 10' (90-100)'. Coarse sand grains 10% throughout, grey color of cement sand grains clear - white fines		
	Comments:		642-2 has overall, less Clay than 642-1; the 1st 100' of hole closes badly especially at (60-70)'		

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Hole Size ______ Slot ______ E 642-2

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

Geologist ______ Development ______

Date Start 3/28/87 Finish 3/30/87 Static Water Level —

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
100-125		Castle Hayne Limestone → Chert? question of material origin from hole	Shells and cemented clastics, fine silty sand, sand is dark grey in color, cement also dark grey, chert found at 125' (plugged the drill bit) chert red in color.		
125-150			very fine silty sand (blue grey in color) shells and clastic cement possibly limestone. Coarse sand increasing		
150-175			Very fine sand and silt with clay peds, peds mixed with med. sand, shell + cement mix, less common clay peds light brown in color.	—	
175-200			Very fine silty sand throughout little shell material, no cement, less [illegible], fines grey in color. Very little coarse material.		
			Well Complete 5:00 pm 3/30		

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WELL FACT SHEET

Well No. 62-2 Date 3/31 Start 3/28 Finish 3/30

Total Depth of Boring Prior to Well Installation 204'

Diameter of Boring 10" to 100' 6" to 204'

Water Level ~ 15' BGS

Total Length of Well at Installation 202.5

Height of Well Above Ground Level ~ 2.5

Total Depth of Well Below Ground Level 200'

Total Length of Screen	100'	from 100	BGL to 200	BGL
Total Length of Riser	102.5 ~~~~	from 100	BGL to 2.5	AGL
Sand Heave. Total Interval	—	from —	BGL to —	BGL
Filter Pack Total Interval	105.5	from 94.5	BGL to 200	BGL
Bentonite Seal Total Interval	5.5	from ~~~~ 90	BGL to ~~~~ 94.5	BGL
Grout Total Interval	84	from 0	BGL to 84	BGL
Protective Casing Total Interval	5'	from 2.3	BGL to 2.7	AGL

Well Screen Dia. 2" Schedule 40 Slot Size 0.010

Well Riser Dia. 2" Schedule 40

Filter Material 20-30 silica sand

Seal Bentonite Pellets

Backfill natural sand to 84' BGS Cement ✓ Bentonite ____ Water ____

Protective Casing Dia. 4" Material Steel

Well Development

Date 4/1 Time 1300 Start 1145 Complete 1600

Water Level at Start ____ Finish ____

Conductivity Start ____ Finish ____

Water Color Start gray black Finish sl cloudy gray

Bail Start ____ Finish ____

Surge Start ____ Finish ____

Pump Start ____ Finish ____ Volume ____

Type Centr. Syst Rate ____

Doc No! CLEJ-00258-1.02-05/01/88

Hole Size 10" (to 100') Slot 0.01 E 642-1

Screen Size 6" (100-210') Mat'l PVC Filter Materials Coarse Sand

Casing Size 6" to 100' Mat'l PVC Grout Type Cement (Porter)

Geologist David Breitlinger Development

Date Start 3/26 Finish 3/27 Static Water Level 12.75' LS

Contractor ESE Top of Well Elevation

Driller James Davis Drill Type Rotary (10 and 6)" tricomb bits

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
0-5			silty fine sand (30% fines) organic material abundant		
5-10		Clay is tan color	Silty & clayey fine sand clay very abundant, loss of organics		
10-15		Clay is tan color	silty clay - silty v. fine sandy clay much more clay than 5-10		
15-20		Clay is Blue-Grey in color	very silty clay. little/no sand		
20-25			Same as 15-20		
25-30			less clay ~ very silty fine sandy clay		
30-35			Very sandy silty clay ~ very silty sandy clay		
35-40			very clayey silty fine sand less 10% coarse sand		
40-45			silty clayey fine sand coarse material 10%		
45-50			silty very fine sand with 30% coarse material		
50-60			very silty fine sand 30% Shells + Cemented Clastics 70%		

Doc NO: CLEJ-00258-1.02-05/01/88

E 642-1

Hole Size ______ Slot ______

Screen Size ______ Mat'l ______ Filter Materials ______

asing Size ______ Mat'l ______ Grout Type ______

Geologist ______ Development ______

Date Start ______ Finish ______ Static Water Level ______

Contractor ______ Top of Well Elevation ______

Driller ______ Drill Type ______

Depth (feet)	Sample	Sketch	Lithology, Color	USCS	SPT (BL/FT)
60-70		silt / sand 50%	very silty very fine sand 50% Shells + Cemented Clastics 50% less 10% Clay		
70-80		silt / sand 50%	very silty very fine sand 60% Shells + Cemented Clastics 30% 10% Coarse rounded Sand 10%		
80-100			same as above 70-80 with more shells than clastic Cement		
	1045/4m		Quit Drilling, Cement 6" Casing in place		
100-125			very silty very fine shelly sand with 10-20% Clay, 10% Coarse Sand (fines Grey in Color)		
125-150			same as above (100-125)		
150-175			Shelly fine-med Sand with Clay fines Grey-blue, 10% Coarse Sand		
175-200			very fine Sand + Shells with some Clay, fines are blue grey in color less shells than above (150-175)		
	Find drilling Hole 945 Am				

Doc NO: CLEJ-00258-1.02-05/01/88

WELL FACT SHEET

Well No. 6421 Date 3/27 Start 3/26 Finish 3/27

Total Depth of Boring Prior to Well Installation ~~210~~ 107

Diameter of Boring 10" to 100' 6" to 210'

Water Level ~13' BGS

Total Length of Well at Installation 202.5

Height of Well Above Ground Level 2.5

Total Depth of Well Below Ground Level 200'

Total Length of Screen	100'	from	100'	BGL to	200'	BGL
Total Length of Riser	102.5	from	100	BGL to	2.5	AGL
Sand Heave. Total Interval	—	from	—	BGL to	—	BGL
Filter Pack Total Interval	104	from	96'	BGL to	200	BGL
Bentonite Seal Total Interval	5	from	91'	BGL to	96'	BGL
Grout Total Interval	[illegible]	from	0	BGL to	72'	BGL
Protective Casing Total Interval	5'	from	2.3	BGL to	2.7	AGL

Well Screen Dia. 2" Schedule 40 Slot Size 0.010

Well Riser Dia. 2" Schedule 40

Filter Material 20-30 silica

Seal Bentonite pellets

Backfill natural sand to 72' Cement ✓ Bentonite____ Water____

Protective Casing Dia. 4 Material Steel

Well Development

Date 3/30 Time 0915 Start 0930 Complete 1300

Water Level at Start____ Finish____

Conductivity Start____ Finish____

Water Color Start cloudy gray Finish sl cloudy

Bail Start____ Finish____

Surge Start____ Finish____

Pump Start____ Finish____ Volume____

Type Centrifugal Rate____

APPENDIX F

Each boring was advanced to a depth of 100 feet (ft) below land surface by mud rotary using a 10-inch tri-cone roller bit. A 6-inch temporary polyvinyl chloride (PVC) surface casing was set to a depth of 100 ft to prevent the collapse of shallow sands into the borehole. The boring was then advanced to its completion depth (200 ft) by mud rotary using a 6-inch tri-cone bit. Lithologic samples were collected from the drilling fluid during borehole advancement. Each well was constructed using 2-inch inside-diameter (ID) Schedule PVC flush-threaded well casing and screen. Screen lengths of 100 ft (0.010-inch slot size) were used for each well. Filter sand (20- to 30-mesh silica sand) was installed around the well screen to a point approximately 2 ft above the top of the well screen. A 5-ft bentonite seal, composed of bentonite pellets, was placed on top of the filter pack. At this point, the temporary PVC casing was pulled from the borehole, and the natural sediments were allowed to collapse. The remaining annular space was then filled using neat cement tremied into place.

Initially, these wells were designated as temporary wells that were to be removed following completion of the aquifer testing program. After discussion with Naval Facilities Engineering Command, Atlantic Division (LANTDIV), the decision was made to complete these borings as permanent wells. Following this decision, 4-inch protective steel casings were placed around each well casing, and a concrete pad with three protective posts was installed.

After installation, each well was developed using a centrifugal pump. Development continued until the well was as clear and sediment free as practicable.

Each well was clearly marked with a sign designating the well as a nonpotable well for groundwater monitoring purposes only.

Both observation wells, the pumped well (Water Supply Well 642), and an existing observation well (90-ft total depth) were surveyed to an accuracy of 0.01 ft by a surveyor registered in the State of North Carolina. This provided an accurate datum (mean sea level) from which to evaluate the drawdown resulting from the pump test.

DOC. NO: CLEJ-00258-1.02-05/01/88

DOC NO: CLEJ-00258-1.02-05/01/88

ENVIRONMENTAL SCIENCE & ENGINEERING 12/01/87 STATUS: FINAL PAGE# 1

PROJECT NUMBER 86447 0400 PROJECT NAME NAVY - LEJEUNE
FIELD GROUP LJHP-1 LAB COORDINATOR J.D. SHAMIS

SAMPLE ID/#

PARAMETERS / UNITS	STORET # / METHOD	22GW1 LJHP-1 1	22GW2 LJHP-1 2	HPGW1 LJHP-1 3	HPGW2 LJHP-1 4	HPGW3 LJHP-1 5	HPGW4 LJHP-1 6	HPGW5 LJHP-1 7	HPGW6 LJHP-1 8	HPGW7 LJHP-1 9	HPGW8 LJHP-1 10	HPGW9 LJHP-1 11	HPGW10 LJHP-1 12	HPGW11 LJHP-1 13	HPGW12 LJHP-1 14	HPGW13 LJHP-1 15
DATE		01/09/87	01/09/87	01/09/87	01/09/87	01/09/87	01/12/87	01/12/87	01/12/87	01/12/87	01/13/87	01/14/87	01/14/87	01/14/87	01/14/87	01/14/87
TIME		11:02	10:05	12:05	13:20	14:25	10:00	12:05	14:08	16:40	14:55	10:25	11:45	12:55	13:59	15:55
LEAD, TOTAL UG/L	1051 ICAP	33.0	28.0	27.0	<27.0	40.0	29.0	<27.0	<27.0	<27.0	<27.0	130	29.0	<27.0	<27.0	<27.0
OIL&GR, IR MG/L	560 1	7	0.8	0.7	0.7	0.8	0.3	0.9	0.2	3	0.1	32	0.4	0.3	0.2	0.2
BENZENE UG/L	34030 GMS	12000	<1.0	43	12	1.4	25	<1.0	<1.0	<1.0	<1.0	<100	<1.0	<1.0	<1.0	<1.0
BROMODICHLOROMETHANE UG/L	32101 GMS	<22	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<220	<2.2	<2.2	<2.2	<2.2
BROMOFORM UG/L	32104 GMS	<47	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<470	<4.7	<4.7	<4.7	<4.7
BROMOMETHANE UG/L	34413 GMS	<58	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<580	<5.8	<5.8	<5.8	<5.8
CARBON TETRACHLORIDE UG/L	32102 GMS	<28	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<2.8	<2.8	<2.8	<2.8
CHLOROBENZENE UG/L	34301 GMS	<60	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<6.0	<6.0	<6.0	<6.0
CHLOROETHANE UG/L	34311 GMS	<82	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<820	<8.2	<8.2	<8.2	<8.2
2-CHLOROETHYLVINYL ETHER UG/L	34576 GMS	<150	<26	<15	<15	<15	<15	<15	<15	<15	<15	<1500	<15	<15	<15	<15
CHLOROFORM UG/L	32106 GMS	<16	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<160	<1.6	3.2	<1.6	<1.6
CHLOROMETHANE UG/L	34418 GMS	<43	<4.3	<4.3	5.0	<4.3	<4.3	<4.3	<4.3	<4.3	7.2	<430	<4.3	<4.3	<4.3	<4.3
DIBROMOCHLOROMETHANE UG/L	32105 GMS	<31	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<310	<3.1	<3.1	<3.1	<3.1
1,1-DICHLOROETHANE UG/L	34496 GMS	<47	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<470	<4.7	<4.7	<4.7	<4.7
1,2-DICHLOROETHANE UG/L	34531 GMS	<28	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<2.8	<2.8	<2.8	<2.8
1,1-DICHLOROETHYLENE UG/L	34501 GMS	<28	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<2.8	<2.8	<2.8	<2.8
TRANS-1,2-DICHLORO ETHENE UG/L	34546 GMS	<16	<1.6	<1.6	<1.6	<1.6	1.9	<1.6	<1.6	<1.6	<1.6	740	<1.6	13	<1.6	<1.6
1,2-DICHLOROPROPANE UG/L	34541 GMS	<60	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<6.0	<6.0	<6.0	<6.0
CIS-1,3-DICHLORO PROPENE UG/L	34704 GMS	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<500	<5.0	<5.0	<5.0	<5.0
TRANS-1,3-DICHLORO PROPENE UG/L	34699 GMS	<64	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<640	<6.4	<6.4	<6.4	<6.4

DOC NO: CLEJ-00258-1.02-05/01/88

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PROJECT NUMBER 86447 0400 PROJECT NAME NAVY - LEJEUNE
FIELD GROUP, LJHP-1 LAB COORDINATOR J.D. SHAMIS

SAMPLE ID/#

PARAMETERS / UNITS	STORET # / METHOD	22GW1 LJHP-1 1	22GW2 LJHP-1 2	HPGW1 LJHP-1 3	HPGW2 LJHP-1 4	HPGW3 LJHP-1 5	HPGW4 LJHP-1 6	HPGW5 LJHP-1 7	HPGW6 LJHP-1 8	HPGW7 LJHP-1 9	HPGW8 LJHP-1 10	HPGW9 LJHP-1 11	HPGW10 LJHP-1 12	HPGW11 LJHP-1 13	HPGW12 LJHP-1 14	HPGW13 LJHP-1 15
DATE		01/09/87	01/09/87	01/09/87	01/09/87	01/09/87	01/12/87	01/12/87	01/12/87	01/12/87	01/13/87	01/14/87	01/14/87	01/14/87	01/14/87	01/14/87
TIME		11:02	10:05	12:05	13:20	14:25	10:00	12:05	14:08	16:40	14:55	10:25	11:45	12:55	13:59	15:55
ETHYLBENZENE UG/L	34371 GMS	1800	<7.2	12	<7.2	8.2	<7.2	<7.2	<7.2	<7.2	<7.2	1100	<7.2	<7.2	<7.2	<7.2
METHYLENE CHLORIDE UG/L	34423 GMS	<28	7.3	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	20	<280	<2.8	<2.8	<2.8	<2.8
1,1,2,2-TETRACHLORO ETHANE UG/L	34516 GMS	<41	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<410	<4.1	<4.1	<4.1	<4.1
TETRACHLOROETHENE UG/L	34475 GMS	<30	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<300	<3.0	<3.0	<3.0	<3.0
TOLUENE UG/L	34010 GMS	15000	<6.0	100	38	<6.0	35	<6.0	<6.0	<6.0	<6.0	<600	<6.0	<6.0	<6.0	<6.0
1,1,1-TRICHL'ETHANE UG/L	34506 GMS	<38	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<380	<3.8	<3.8	<3.8	<3.8
1,1,2-TRICHL'ETHANE UG/L	34511 GMS	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<500	<5.0	<5.0	<5.0	<5.0
TRICHLOROETHENE UG/L	39180 GMS	<30	<1.0	<3.0	<3.0	<3.0	3.4	<3.0	<3.0	<3.0	<3.0	5000	7.4	49	<3.0	<3.0
TRICHLOROFLUORO-METHANE UG/L	34488 GMS	<32	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	14	<320	<3.2	<3.2	<3.2	<3.2
VINYL CHLORIDE UG/L	39175 GMS	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<100	<1.0	<1.0	<1.0	<1.0
ACROLEIN UG/L	34210 GMS	<1000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<10000	<100	<100	<100	<100
ACRYLONITRILE UG/L	34215 GMS	<1000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<10000	<100	<100	<100	<100
DICHLORODIFLUORO-METHANE UG/L	34668 GMS	<100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1000	<10	<10	<10	<10
M-XYLENE UG/L	98553 GMS	4400	<12	30	14	<12	<12	<12	<12	<12	<12	2400	<12	<12	<12	<12
O-AND/OR-P XYLENE UG/L	98554 GMS	4600	<12	32	14	<12	<12	<12	<12	<12	<12	2100	<12	<12	<12	<12
METHYL ETHYL KETONE UG/L	81595 GMS	<480	<48	<48	<48	<48	<48	<48	<48	<48	<48	<4800	<48	<48	<48	<48
METHYL ISOBUT'KETONE UG/L	81596 GMS	<120	<12	<12	<12	<12	<12	<12	<12	<12	<12	<1200	<12	<12	<12	<12

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PROJECT NUMBER 86447 0400 · PROJECT NAME NAVY - LEJEUNE
FIELD GROUP LJHP-1 LAB COORDINATOR J.D. SHAMIS

SAMPLE ID/#

PARAMETERS UNITS	STORET # METHOD	HPGW14 LJHP-1 16	HPGW15 LJHP-1 17	HPGW16 LJHP-1 18	HPGW17 LJHP-1 19	HPGW18 LJHP-1 20	HPGW19 LJHP-1 21	HPGW20 LJHP-1 22	HPGW21 LJHP-1 23	HPGW22 LJHP-1 24	HPGW23 LJHP-1 25	HPGW24 LJHP-1 26	HPGW25 LJHP-1 27	HPGW26 LJHP-1 28	HPGW29 LJHP-1 31
DATE		01/14/87	01/15/87	01/15/87	01/15/87	01/15/87	01/16/87	01/16/87	01/16/87	01/19/87	01/19/87	01/19/87	01/19/87	01/19/87	01/20/87
TIME		17:37	10:46	12:27	13:56	17:25	10:12	11:50	14:35	10:20	11:30	14:00	14:50	16:30	11:20
LEAD, TOTAL UG/L	1051 ICAP	<27.0	46.0	45.0	<27.0	<27.0	<27.0	46.0	<27.0	27.0	38.0	<27.0	<27.0	31.0	<27.0
OIL&GR, IR MG/L	560 1	0.2	<0.1	0.2	<0.1	<0.1	0.2	<0.1	0.2	1	0.6	0.1	0.2	0.2	0.2
BENZENE UG/L	34030 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	2.0	<1.0	<1.0	<1.0
BROMODICHLOROMETHANE UG/L	32101 GMS	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<22	<220	<2.2	<2.2	<2.2
BROMOFORM UG/L	32104 GMS	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<47	<470	<4.7	<4.7	<4.7
BROMOMETHANE UG/L	34413 GMS	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<58	<580	<5.8	<5.8	<5.8
CARBON TETRACHLORIDE UG/L	32102 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<28	<280	<2.8	<2.8	<2.8
CHLOROBENZENE UG/L	34301 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<60	<600	<6.0	<6.0	<6.0
CHLOROETHANE UG/L	34311 GMS	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<82	<820	<8.2	<8.2	<8.2
2-CHLOROETHYLVINYL ETHER UG/L	34576 GMS	<15	<15	<15	<15	<26	<15	<15	<15	<15	<150	<1500	<15	<15	<15
CHLOROFORM UG/L	32106 GMS	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<16	<160	<1.6	<1.6	<1.6
CHLOROMETHANE UG/L	34418 GMS	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<43	<430	<4.3	<4.3	<4.3
DIBROMOCHLOROMETHANE UG/L	32105 GMS	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<31	<310	<3.1	<3.1	<3.1
1,1-DICHLOROETHANE UG/L	34496 GMS	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<47	12	<4.7	<4.7	<4.7
1,2-DICHLOROETHANE UG/L	34531 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<28	<280	<2.8	<2.8	<2.8
1,1-DICHLOROETHYLENE UG/L	34501 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<28	<280	<2.8	<2.8	<2.8
TRANS-1,2-DICHLORO ETHENE UG/L	34546 GMS	<1.6	<1.6	<1.6	<1.6	<1.6	2.5	<1.6	<1.6	<1.6	830	6400	<1.6	<1.6	<1.6
1,2-DICHLOROPROPANE UG/L	34541 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<60	<600	<6.0	<6.0	<6.0
CIS-1,3-DICHLORO PROPENE UG/L	34704 GMS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<50	<500	<5.0	<5.0	<5.0
TRANS-1,3-DICHLORO PROPENE UG/L	34699 GMS	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<64	<640	<6.4	<6.4	<6.4

PROJECT NUMBER 86447 0400 PROJECT NAME NAVY - LEJEUNE
FIELD GROUP LJHP-1 LAB COORDINATOR J.D. SHAMIS

SAMPLE ID/#

PARAMETERS / UNITS	STORET # / METHOD	HPGW14 LJHP-1 16	HPGW15 LJHP-1 17	HPGW16 LJHP-1 18	HPGW17 LJHP-1 19	HPGW18 LJHP-1 20	HPGW19 LJHP-1 21	HPGW20 LJHP-1 22	HPGW21 LJHP-1 23	HPGW22 LJHP-1 24	HPGW23 LJHP-1 25	HPGW24 LJHP-1 26	HPGW25 LJHP-1 27	HPGW26 LJHP-1 28	HPGW29 LJHP-1 31
DATE		01/14/87	01/15/87	01/15/87	01/15/87	01/15/87	01/16/87	01/16/87	01/16/87	01/19/87	01/19/87	01/19/87	01/19/87	01/19/87	01/20/87
TIME		17:37	10:46	12:27	13:56	17:25	10:12	11:50	14:35	10:20	11:30	14:00	14:50	16:30	11:20
ETHYLBENZENE UG/L	34371 GMS	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<72	<720	<7.2	<7.2	<7.2
METHYLENE CHLORIDE UG/L	34423 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<28	<280	<2.8	<2.8	<2.8
1,1,2,2-TETRACHLORO ETHANE UG/L	34516 GMS	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<41	<410	<4.1	<4.1	<4.1
TETRACHLOROETHENE UG/L	34475 GMS	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<30	<300	<3.0	<3.0	<3.0
TOLUENE UG/L	34010 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<60	<600	<6.0	<6.0	<6.0
1,1,1-TRICHL'ETHANE UG/L	34506 GMS	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<38	<380	<3.8	<3.8	<3.8
1,1,2-TRICHL'ETHANE UG/L	34511 GMS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<50	<500	<5.0	<5.0	<5.0
TRICHLOROETHENE UG/L	39180 GMS	<3.0	<3.0	<3.0	<3.0	<1.0	6.0	<3.0	<3.0	<3.0	830	57	<3.0	<3.0	<3.0
TRICHLOROFLUORO-METHANE UG/L	34488 GMS	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<32	<320	<3.2	<3.2	<3.2
VINYL CHLORIDE UG/L	39175 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	190	<1.0	<1.0	<1.0
ACROLEIN UG/L	34210 GMS	<100	<100	<100	<100	<100	<100	<100	<100	<100	<1000	<10000	<100	<100	<100
ACRYLONITRILE UG/L	34215 GMS	<100	<100	<100	<100	<100	<100	<100	<100	<100	<1000	<10000	<100	<100	<100
DICHLORODIFLUORO-METHANE UG/L	34668 GMS	<10	<10	<10	<10	<10	<10	<10	<10	<10	<100	<1000	<10	<10	<10
M-XYLENE UG/L	98553 GMS	<12	<12	<12	<12	<12	<12	<12	<12	<12	<120	<1200	<12	<12	<12
O-AND/OR-P XYLENE UG/L	98554 GMS	<12	<12	<12	<12	<12	<12	<12	<12	<12	<120	<1200	<12	<12	<12
METHYL ETHYL KETONE UG/L	81595 GMS	<48	<48	<48	<48	<48	<48	<48	<48	<48	<480	<4800	<48	<48	<48
METHYL ISOBUT'KETONE UG/L	81596 GMS	<12	<12	<12	<12	<12	<12	<12	<12	<12	<120	<1200	<12	<12	<12

Doc No: CLEJ-00358-1.02-05/01/88

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PROJECT NUMBER 86447 0404 PROJECT NAME NAVY - LEJEUNE HP2
FIELD GROUP, LJHP-2 LAB COORDINATOR J.D. SHAMIS

SAMPLE ID/#

PARAMETERS UNITS	STORET # METHOD	22GW1 LJHP-2 1	22GW2 LJHP-2 2	HPGW1 LJHP-2 3	HPGW2 LJHP-2 4	HPGW3 LJHP-2 5	HPGW4 LJHP-2 6	HPGW5 LJHP-2 7	HPGW6 LJHP-2 8	HPGW7 LJHP-2 9	HPGW8 LJHP-2 10	HPGW9 LJHP-2 11	HPGW10 LJHP-2 12	HPGW11 LJHP-2 13	HPGW12 LJHP-2 14	HPGW13 LJHP-2 15
DATE		03/08/87	03/08/87	03/08/87	03/08/87	03/08/87	03/08/87	03/08/87	03/08/87	03/09/87	03/09/87	03/09/87	03/09/87	03/09/87	03/09/87	03/09/87
TIME		11:03	11:30	12:45	16:18	14:20	15:12	16:55	17:10	10:05	11:10	10:30	11:20	12:19	12:33	13:45
LEAD, TOTAL UG/L	1051 ICAP	29.0	<27.0	<27.0	<27.0	<27.0	<27.0	<27.0	<27.0	29.0	<27.0	92.0	<27.0	<27.0	<27.0	<27.0
OIL&GR, IR MG/L	560 I	11	<0.1	<0.1	<0.1	0.2	0.3	<0.1	<0.1	0.2	<0.1	11	<0.1	0.6	<0.1	<0.1
BENZENE UG/L	34030 GMS	10000	<1.0	3.9	<1.0	<1.0	3.2	<1.0	<1.0	<1.0	<1.0	<250	<1.0	<1.0	<1.0	<1.0
BROMODICHLOROMETHANE UG/L	32101 GMS	<2200	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<550	<2.2	<2.2	<2.2	<2.2
BROMOFORM UG/L	32104 GMS	<4700	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<1200	<4.7	<4.7	<4.7	<4.7
BROMOMETHANE UG/L	34413 GMS	<5800	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<1500	<5.8	<5.8	<5.8	<5.8
CARBON TETRACHLORIDE UG/L	32102 GMS	<2800	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<700	<2.8	<2.8	<2.8	<2.8
CHLOROBENZENE UG/L	34301 GMS	<6000	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<1500	<6.0	<6.0	<6.0	<6.0
CHLOROETHANE UG/L	34311 GMS	<8200	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<2100	<8.2	<8.2	<8.2	<8.2
2-CHLOROETHYLVINYL ETHER UG/L	34576 GMS	<15000	<15	<15	<15	<15	<15	<15	<15	<15	<15	<3800	<15	<15	<15	<15
CHLOROFORM UG/L	32106 GMS	<1600	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<400	<1.6	2.2	<1.6	<1.6
CHLOROMETHANE UG/L	34418 GMS	<4300	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<1100	<4.3	<4.3	<4.3	<4.3
DIBROMOCHLOROMETHANE UG/L	32105 GMS	<3100	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<780	<3.1	<3.1	<3.1	<3.1
1,1-DICHLOROETHANE UG/L	34496 GMS	<4700	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<1200	<4.7	<4.7	<4.7	<4.7
1,2-DICHLOROETHANE UG/L	34531 GMS	<2800	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<700	<2.8	<2.8	<2.8	<2.8
1,1-DICHLOROETHYLENE UG/L	34501 GMS	<2800	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<700	<2.8	<2.8	<2.8	<2.8
TRANS-1,2-DICHLORO ETHENE UG/L	34546 GMS	<1600	<1.6	<1.6	<1.6	<1.6	2.2	<1.6	<1.6	<1.6	<1.6	<400	<1.6	7.2	<1.6	<1.6
1,2-DICHLOROPROPANE UG/L	34541 GMS	<6000	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<1500	<6.0	<6.0	<6.0	<6.0
CIS-1,3-DICHLORO PROPENE UG/L	34704 GMS	<5000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<1300	<5.0	<5.0	<5.0	<5.0
TRANS-1,3-DICHLORO PROPENE UG/L	34699 GMS	<6400	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<1600	<6.4	<6.4	<6.4	<6.4

DOC NO: CLEJ-00258-1.02-05/01/88

PROJECT NUMBER 86447 0404 PROJECT NAME NAVY - LEJEUNE HP2
FIELD GROUP LJHP-2 LAB COORDINATOR J.D. SHAMIS

SAMPLE ID/#

PARAMETERS UNITS	STORET # METHOD	22GW1	22GW2	HPGW1	HPGW2	HPGW3	HPGW4	HPGW5	HPGW6	HPGW7	HPGW8	HPGW9	HPGW10	HPGW11	HPGW12	HPGW13
		LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2	LJHP-2
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DATE		03/08/87	03/08/87	03/08/87	03/08/87	03/08/87	03/08/87	03/08/87	03/08/87	03/09/87	03/09/87	03/09/87	03/09/87	03/09/87	03/09/87	03/09/87
TIME		11:03	11:30	12:45	16:18	14:20	15:12	16:55	17:10	10:05	11:10	10:30	11:20	12:19	12:33	13:45
ETHYLBENZENE UG/L	34371 GMS	<7200	<7.2	<7.2	<7.2	9.0	<7.2	<7.2	<7.2	<7.2	<7.2	<1800	<7.2	<7.2	<7.2	<7.2
METHYLENE CHLORIDE UG/L	34423 GMS	<2800	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<700	<2.8	<2.8	<2.8	<2.8
1,1,2,2-TETRACHLORO ETHANE UG/L	34516 GMS	<4100	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<1000	<4.1	<4.1	<4.1	<4.1
TETRACHLOROETHENE UG/L	34475 GMS	<2000	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<750	<3.0	<3.0	3.6	<3.0
TOLUENE UG/L	34010 GMS	18000	<6.0	12	<6.0	<6.0	8.2	<6.0	<6.0	<6.0	<6.0	<1500	<6.0	<6.0	<6.0	<6.0
1,1,1-TRICHL'ETHANE UG/L	34506 GMS	<3800	<3.8	<3.8	<3.8	13	<3.8	<3.8	<3.8	<3.8	<3.8	<950	<3.8	<3.8	<3.8	<3.8
1,1,2-TRICHL'ETHANE UG/L	34511 GMS	<5000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<1300	<5.0	<5.0	<5.0	<5.0
TRICHLOROETHENE UG/L	39180 GMS	<1000	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	6100	8.6	34	<3.0	<3.0
TRICHLOROFLUORO- METHANE UG/L	34488 GMS	<3200	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	96	<800	<3.2	<3.2	<3.2	<3.2
VINYL CHLORIDE UG/L	39175 GMS	<1000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<250	<1.0	<1.0	<1.0	<1.0
ACROLEIN UG/L	34210 GMS	<100000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<25000	<100	<100	<100	<100
ACRYLONITRILE UG/L	34215 GMS	<100000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<25000	<100	<100	<100	<100
DICHLORODIFLUORO- METHANE UG/L	34668 GMS	<10000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<2500	<10	<10	<10	<10
M-XYLENE UG/L	98553 GMS	<12000	<12	<12	<12	<12	<12	<12	<12	<12	<12	<3000	<12	<12	<12	<12
O-AND/OR-P XYLENE UG/L	98554 GMS	<12000	<12	<12	<12	<12	<12	<12	<12	<12	<12	<3000	<12	<12	<12	<12
METHYL ETHYL KETONE UG/L	81595 GMS	<48000	<48	<48	<48	<48	<48	<48	<48	<48	<48	<12000	<48	<48	<48	<48
METHYL ISOBUT'KETONE UG/L	81596 GMS	<12000	<12	<12	<12	<12	<12	<12	<12	<12	<12	<3000	<12	<12	<12	<12

PROJECT NUMBER 86447 0404 PROJECT NAME NAVY - LEJEUNE HP2
FIELD GROUP LJHP-2 LAB COORDINATOR J.D. SHAMIS

SAMPLE ID/#

PARAMETERS / UNITS	STORET # / METHOD	HPGW14 LJHP-2 16	HPGW15 LJHP-2 17	HPGW16 LJHP-2 18	HPGW17 LJHP-2 19	HPGW18 LJHP-2 20	HPGW19 LJHP-2 21	HPGW20 LJHP-2 22	HPGW21 LJHP-2 23	HPGW22 LJHP-2 24	HPGW23 LJHP-2 25	HPGW24 LJHP-2 26	HPGW25 LJHP-2 27	HPGW26 LJHP-2 28	HPGW29 LJHP-2 29
DATE		03/09/87	03/09/87	03/10/87	03/10/87	03/10/87	03/10/87	03/10/87	03/10/87	03/11/87	03/11/87	03/11/87	03/11/87	03/12/87	03/12/87
TIME		13:55	15:10	12:07	12:26	11:40	13:35	13:50	16:26	10:42	10:25	12:01	12:15	13:10	14:00
LEAD, TOTAL UG/L	1051 ICAP	<27.0	<27.0	41.0	<27.0	<27.0	<27.0	33.0	<27.0	<27.0	<27.0	<27.0	<27.0	<27.0	52.0
OIL&GR, IR MG/L	560 1	<0.1	<0.1	3	3	2	2	3	2	2	3	2	0.3	2	<0.1
BENZENE UG/L	34030 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<100	<100	<1.0	<1.0	<1.0
BROMODICHLOROMETHANE UG/L	32101 GMS	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<220	<220	<2.2	<2.2	<2.2
BROMOFORM UG/L	32104 GMS	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<470	<470	<4.7	<4.7	<4.7
BROMOMETHANE UG/L	34413 GMS	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<580	<580	<5.8	<5.8	<5.8
CARBON TETRACHLORIDE UG/L	32102 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<280	<2.8	<2.8	<2.8
CHLOROBENZENE UG/L	34301 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<600	<6.0	<6.0	<6.0
CHLOROETHANE UG/L	34311 GMS	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<820	<820	<8.2	<8.2	<8.2
2-CHLOROETHYLVINYL ETHER UG/L	34576 GMS	<15	<15	<15	<15	<15	<15	<26	<26	<26	<1500	<1500	<26	<26	<15
CHLOROFORM UG/L	32106 GMS	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<160	<160	<1.6	<1.6	<1.6
CHLOROMETHANE UG/L	34418 GMS	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<430	<430	<4.3	<4.3	<4.3
DIBROMOCHLOROMETHANE UG/L	32105 GMS	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<310	<310	<3.1	<3.1	<3.1
1,1-DICHLOROETHANE UG/L	34496 GMS	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<470	<470	<4.7	<4.7	<4.7
1,2-DICHLOROETHANE UG/L	34531 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<280	<2.8	<2.8	<2.8
1,1-DICHLOROETHYLENE UG/L	34501 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<280	<2.8	<2.8	<2.8
TRANS-1,2-DICHLORO ETHENE UG/L	34546 GMS	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	6100	4300	<1.6	<1.6	<1.6
1,2-DICHLOROPROPANE UG/L	34541 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<600	<6.0	<6.0	<6.0
CIS-1,3-DICHLORO PROPENE UG/L	34704 GMS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<500	<500	<5.0	<5.0	<5.0
TRANS-1,3-DICHLORO PROPENE UG/L	34699 GMS	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<640	<640	<6.4	<6.4	<6.4

Doc No: CLEJ-00258-1.02-05/01/88

PROJECT NUMBER 86447 0404 PROJECT NAME NAVY - LEJEUNE HP2
FIELD GROUP LJHP-2 LAB COORDINATOR J.D. SHAMIS

SAMPLE ID/#

PARAMETERS / UNITS	STORET # / METHOD	HPGW14 LJHP-2 16	HPGW15 LJHP-2 17	HPGW16 LJHP-2 18	HPGW17 LJHP-2 19	HPGW18 LJHP-2 20	HPGW19 LJHP-2 21	HPGW20 LJHP-2 22	HPGW21 LJHP-2 23	HPGW22 LJHP-2 24	HPGW23 LJHP-2 25	HPGW24 LJHP-2 26	HPGW25 LJHP-2 27	HPGW26 LJHP-2 28	HPGW29 LJHP-2 29
DATE		03/09/87	03/09/87	03/10/87	03/10/87	03/10/87	03/10/87	03/10/87	03/10/87	03/11/87	03/11/87	03/11/87	03/11/87	03/12/87	03/12/87
TIME		13:55	15:10	12:07	12:26	11:40	13:35	13:50	16:26	10:42	10:25	12:01	12:15	13:10	14:00
ETHYLBENZENE UG/L	34371 GMS	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<720	<720	<7.2	<7.2	<7.2
METHYLENE CHLORIDE UG/L	34423 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	3.4	<2.8	<2.8	300	<280	2.9	6.5	<2.8
1,1,2,2-TETRACHLORO ETHANE UG/L	34516 GMS	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<410	<410	<4.1	<4.1	<4.1
TETRACHLOROETHENE UG/L	34475 GMS	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<200	<200	<3.0	<3.0	<3.0
TOLUENE UG/L	34010 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<600	<6.0	<6.0	<6.0
1,1,1-TRICHL'ETHANE UG/L	34506 GMS	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<380	<380	<3.8	<3.8	<3.8
1,1,2-TRICHL'ETHANE UG/L	34511 GMS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<500	<500	<5.0	<5.0	<5.0
TRICHLOROETHENE UG/L	39180 GMS	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0	13000	<100	<1.0	<1.0	<3.0
TRICHLOROFLUORO-METHANE UG/L	34488 GMS	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<320	<320	<3.2	<3.2	<3.2
VINYL CHLORIDE UG/L	39175 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<100	<100	<1.0	<1.0	<1.0
ACROLEIN UG/L	34210 GMS	<100	<100	<100	<100	<100	<100	<100	<100	<100	<10000	<10000	<100	<100	<100
ACRYLONITRILE UG/L	34215 GMS	<100	<100	<100	<100	<100	<100	<100	<100	<100	<10000	<10000	<100	<100	<100
DICHLORODIFLUORO-METHANE UG/L	34668 GMS	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1000	<1000	<10	<10	<10
M-XYLENE UG/L	98553 GMS	<12	<12	<12	<12	<12	<12	<12	<12	<12	<1200	<1200	<12	<12	<12
O-AND/OR-P XYLENE UG/L	98554 GMS	<12	<12	<12	<12	<12	<12	<12	<12	<12	<1200	<1200	<12	<12	<12
METHYL ETHYL KETONE UG/L	81595 GMS	<48	<48	<48	<48	<48	<48	<48	<48	<48	<4800	<4800	<48	<48	<48
METHYL ISOBUT'KETONE UG/L	81596 GMS	<12	<12	<12	<12	<12	<12	<12	<12	<12	<1200	<1200	<12	<12	<12

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PROJECT NUMBER 86447 0405 PROJECT NAME NAVY - LEJEUNE HP3
FIELD GROUP LJHP-3 PROJECT MANAGER J.D. SHAMIS
LAB COORDINATOR JEFF SHAMIS

PARAMETERS UNITS	STORET # METHOD	22GW1 LJHP-3 1	22GW2 LJHP-3 2	HPGW1 LJHP-3 3	HPGW2 LJHP-3 4	HPGW3 LJHP-3 5	HPGW4 LJHP-3 6	HPGW5 LJHP-3 7	HPGW6 LJHP-3 8	HPGW7 LJHP-3 9	HPGW8 LJHP-3 10	HPGW9 LJHP-3 11	HPGW10 LJHP-3 12	HPGW11 LJHP-3 13	HPGW12 LJHP-3 14	HPGW13 LJHP-3 15
DATE		05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/28/87	05/28/87	05/28/87	05/28/87	05/28/87
TIME		11:20	10:58	12:45	14:30	11:59	13:30	14:55	15:47	16:05	16:45	08:07	09:22	09:59	10:25	11:29
LEAD, TOTAL UG/L	1051 ICAP	78.0	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	70.0	<49.2	<49.2	<49.2	<49.2
OIL&GR, IR MG/L	560 I	9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	6	<0.2	<0.2	<0.2	<0.2
BENZENE UG/L	34030 GMS	13000	<1.0	<1.0	<1.0	<1.0	1.6	<1.0	<1.0	<1.0	<1.0	<100	<1.0	<1.0	<1.0	<1.0
BROMODICHLOROMETHANE UG/L	32101 GMS	<2200	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<220	<2.2	<2.2	<2.2	<2.2
BROMOFORM UG/L	32104 GMS	<4700	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<470	<4.7	<4.7	<4.7	<4.7
BROMOMETHANE UG/L	34413 GMS	<5800	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<580	<5.8	<5.8	<5.8	<5.8
CARBON TETRACHLORIDE UG/L	32102 GMS	<2800	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<2.8	<2.8	<2.8	<2.8
CHLOROBENZENE UG/L	34301 GMS	<6000	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<6.0	<6.0	<6.0	<6.0
CHLOROETHANE UG/L	34311 GMS	<8200	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<820	<8.2	<8.2	<8.2	<8.2
2-CHLOROETHYLVINYL ETHER UG/L	34576 GMS	<15000	<26	<26	<26	<26	<26	<26	<26	<26	<26	<1500	<26	<26	<26	<26
CHLOROFORM UG/L	32106 GMS	<1600	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<160	<1.6	2.6	<1.6	<1.6
CHLOROMETHANE UG/L	34418 GMS	<4300	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<430	<4.3	<4.3	<4.3	<4.3
DIBROMOCHLOROMETHANE UG/L	32105 GMS	<3100	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<310	<3.1	<3.1	<3.1	<3.1
1,1-DICHLOROETHANE UG/L	34496 GMS	<4700	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<470	<4.7	<4.7	<4.7	<4.7
1,2-DICHLOROETHANE UG/L	34531 GMS	<2800	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<2.8	<2.8	<2.8	<2.8
1,1-DICHLOROETHYLENE UG/L	34501 GMS	<2800	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<2.8	<2.8	<2.8	<2.8
TRANS-1,2-DICHLORO ETHENE UG/L	34546 GMS	<1600	<1.6	<1.6	<1.6	<1.6	4.4	<1.6	<1.6	<1.6	<1.6	2700	<1.6	6.0	<1.6	<1.6
1,2-DICHLOROPROPANE UG/L	34541 GMS	<6000	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<6.0	<6.0	<6.0	<6.0
CIS-1,3-DICHLORO PROPENE UG/L	34704 GMS	<5000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<500	<5.0	<5.0	<5.0	<5.0
TRANS-1,3-DICHLORO PROPENE UG/L	34699 GMS	<6400	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<640	<6.4	<6.4	<6.4	<6.4

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PROJECT NUMBER 86447 0405 PROJECT NAME NAVY - LEJEUNE HP3
FIELD GROUP LJHP-3 PROJECT MANAGER J.D. SHAMIS
LAB COORDINATOR JEFF SHAMIS

PARAMETERS UNITS	STORET # METHOD	22GW1 LJHP-3 1	22GW2 LJHP-3 2	HPGW1 LJHP-3 3	HPGW2 LJHP-3 4	HPGW3 LJHP-3 5	HPGW4 LJHP-3 6	HPGW5 LJHP-3 7	HPGW6 LJHP-3 8	HPGW7 LJHP-3 9	HPGW8 LJHP-3 10	HPGW9 LJHP-3 11	HPGW10 LJHP-3 12	HPGW11 LJHP-3 13	HPGW12 LJHP-3 14	HPGW13 LJHP-3 15
		SAMPLE ID/#														
DATE		05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/27/87	05/28/87	05/28/87	05/28/87	05/28/87	05/28/87
TIME		11:20	10:58	12:45	14:30	11:59	13:30	14:55	15:47	16:05	16:45	08:07	09:22	09:59	10:25	11:29
ETHYLBENZENE UG/L	34371 GMS	<7200	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<720	<7.2	<7.2	<7.2	<7.2
METHYLENE CHLORIDE UG/L	34423 GMS	<50000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<280	<50	<50	<50	<50
1,1,2,2-TETRACHLORO ETHANE UG/L	34516 GMS	<4100	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<410	<4.1	<4.1	<4.1	<4.1
TETRACHLOROETHENE UG/L	34475 GMS	<2000	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<200	<3.0	<3.0	<3.0	<3.0
TOLUENE UG/L	34010 GMS	24000	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<6.0	<6.0	<6.0	<6.0
1,1,1-TRICHL'ETHANE UG/L	34506 GMS	<3800	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<380	<3.8	<3.8	<3.8	<3.8
1,1,2-TRICHL'ETHANE UG/L	34511 GMS	<5000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<500	<5.0	<5.0	<5.0	<5.0
TRICHLOROETHENE UG/L	39180 GMS	<1000	<1.0	<1.0	<1.0	<1.0	7.7	<1.0	<1.0	<1.0	<1.0	<100	<1.0	24	<1.0	<1.0
TRICHLOROFLUORO-METHANE UG/L	34488 GMS	<3200	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<320	<3.2	<3.2	<3.2	<3.2
VINYL CHLORIDE UG/L	39175 GMS	<1000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<100	<1.0	<1.0	<1.0	<1.0
ACROLEIN UG/L	34210 GMS	<100000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<10000	<100	<100	<100	<100
ACRYLONITRILE UG/L	34215 GMS	<100000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<10000	<100	<100	<100	<100
DICHLORODIFLUORO-METHANE UG/L	34668 GMS	<10000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1000	<10	<10	<10	<10
M-XYLENE UG/L	98553 GMS	<12000	<12	<12	<12	<12	<12	<12	<12	<12	<12	2000	<12	<12	<12	<12
O-AND/OR-P XYLENE UG/L	98554 GMS	<12000	<12	<12	<12	<12	<12	<12	<12	<12	<12	2000	<12	<12	<12	<12
METHYL ETHYL KETONE UG/L	81595 GMS	<48000	<48	<48	<48	<48	<48	<48	<48	<48	<48	<4800	<48	<48	<48	<48
METHYL ISOBUT'KETONE UG/L	81596 GMS	<12000	<12	<12	<12	<12	<12	<12	<12	<12	<12	<1200	<12	<12	<12	<12

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PROJECT NUMBER 86447 0405 PROJECT NAME NAVY - LEJEUNE HP3
FIELD GROUP LJHP-3 PROJECT MANAGER J.D. SHAMIS
LAB COORDINATOR JEFF SHAMIS

PARAMETERS / UNITS	STORET # / METHOD	HPGW14 LJHP-3 16	HPGW15 LJHP-3 17	HPGW16 LJHP-3 18	HPGW17 LJHP-3 19	HPGW18 LJHP-3 20	HPGW19 LJHP-3 21	SAMPLE ID/# HPGW20 LJHP-3 22	HPGW21 LJHP-3 23	HPGW22 LJHP-3 24	HPGW23 LJHP-3 25	HPGW24 LJHP-3 26	HPGW25 LJHP-3 27	HPGW26 LJHP-3 28	HPGW29 LJHP-3 29
DATE		05/28/87	05/28/87	05/28/87	05/28/87	05/28/87	05/28/87	05/28/87	05/28/87	05/29/87	05/29/87	05/29/87	05/29/87	05/29/87	05/29/87
TIME		11:45	13:00	13:20	14:14	13:57	15:10	15:50	18:12	10:03	09:35	11:05	11:23	12:45	13:05
LEAD,TOTAL UG/L	1051 ICAP	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2	<49.2
OIL&GR,IR MG/L	560 1	<0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BENZENE UG/L	34030 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<100	<100	<1.0	<1.0	<1.0
BROMODICHLOROMETHANE UG/L	32101 GMS	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<220	<220	<2.2	<2.2	<2.2
BROMOFORM UG/L	32104 GMS	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<470	<470	<4.7	<4.7	<4.7
BROMOMETHANE UG/L	34413 GMS	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8	<580	<580	<5.8	<5.8	<5.8
CARBON TETRACHLORIDE UG/L	32102 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<280	<2.8	<2.8	<2.8
CHLOROBENZENE UG/L	34301 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<600	<6.0	<6.0	<6.0
CHLOROETHANE UG/L	34311 GMS	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2	<820	<820	<8.2	<8.2	<8.2
2-CHLOROETHYLVINYL ETHER UG/L	34576 GMS	<26	<26	<26	<26	<26	<26	<26	<26	<26	<1500	<1500	<26	<26	<26
CHLOROFORM UG/L	32106 GMS	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<160	<160	<1.6	<1.6	<1.6
CHLOROMETHANE UG/L	34418 GMS	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<430	<430	<4.3	<4.3	<4.3
DIBROMOCHLOROMETHANE UG/L	32105 GMS	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<310	<310	<3.1	<3.1	<3.1
1,1-DICHLOROETHANE UG/L	34496 GMS	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7	<470	<470	<4.7	<4.7	<4.7
1,2-DICHLOROETHANE UG/L	34531 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<280	<2.8	<2.8	<2.8
1,1-DICHLOROETHYLENE UG/L	34501 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<280	<280	<2.8	<2.8	<2.8
TRANS-1,2-DICHLORO ETHENE UG/L	34546 GMS	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	7100	4000	<1.6	<1.6	<1.6
1,2-DICHLOROPROPANE UG/L	34541 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<600	<6.0	<6.0	<6.0
CIS-1,3-DICHLORO PROPENE UG/L	34704 GMS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<500	<500	<5.0	<5.0	<5.0
TRANS-1,3-DICHLORO PROPENE UG/L	34699 GMS	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4	<640	<640	<6.4	<6.4	<6.4

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PROJECT NUMBER 86447 0405 PROJECT NAME NAVY - LEJEUNE HP3
FIELD GROUP LJHP-3 PROJECT MANAGER J.D. SHAMIS
LAB COORDINATOR JEFF SHAMIS

SAMPLE ID/#

PARAMETERS / UNITS	STORET # / METHOD	HPGW14 LJHP-3 16	HPGW15 LJHP-3 17	HPGW16 LJHP-3 18	HPGW17 LJHP-3 19	HPGW18 LJHP-3 20	HPGW19 LJHP-3 21	HPGW20 LJHP-3 22	HPGW21 LJHP-3 23	HPGW22 LJHP-3 24	HPGW23 LJHP-3 25	HPGW24 LJHP-3 26	HPGW25 LJHP-3 27	HPGW26 LJHP-3 28	HPGW29 LJHP-3 29
DATE		05/28/87	05/28/87	05/28/87	05/28/87	05/28/87	05/28/87	05/28/87	05/28/87	05/29/87	05/29/87	05/29/87	05/29/87	05/29/87	05/29/87
TIME		11:45	13:00	13:20	14:14	13:57	15:10	15:50	18:12	10:03	09:35	11:05	11:23	12:45	13:05
ETHYLBENZENE UG/L	34371 GMS	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2	<720	<720	<7.2	<7.2	<7.2
METHYLENE CHLORIDE UG/L	34423 GMS	<50	<50	<50	<50	<50	<50	<50	<50	<50	<5000	<5000	<50	<50	<50
1,1,2,2-TETRACHLORO ETHANE UG/L	34516 GMS	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<410	<410	<4.1	<4.1	<4.1
TETRACHLOROETHENE UG/L	34475 GMS	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<200	<200	<3.0	<3.0	<3.0
TOLUENE UG/L	34010 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<600	<600	<6.0	<6.0	<6.0
1,1,1-TRICHL'ETHANE UG/L	34506 GMS	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<380	<380	<3.8	<3.8	<3.8
1,1,2-TRICHL'ETHANE UG/L	34511 GMS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<500	<500	<5.0	<5.0	<5.0
TRICHLOROETHENE UG/L	39180 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4300	<100	<1.0	<1.0	<1.0
TRICHLOROFLUORO-METHANE UG/L	34488 GMS	<3.2	7.1	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<320	<320	<3.2	<3.2	<3.2
VINYL CHLORIDE UG/L	39175 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<100	250	<1.0	<1.0	<1.0
ACROLEIN UG/L	34210 GMS	<100	<100	<100	<100	<100	<100	<100	<100	<100	<10000	<10000	<100	<100	<100
ACRYLONITRILE UG/L	34215 GMS	<100	<100	<100	<100	<100	<100	<100	<100	<100	<10000	<10000	<100	<100	<100
DICHLORODIFLUORO-METHANE UG/L	34668 GMS	<10	<10	<10	<10	<10	<10	<10	<10	<10	<1000	<1000	<10	<10	<10
M-XYLENE UG/L	98553 GMS	<12	<12	<12	<12	<12	<12	<12	<12	<12	<1200	<1200	<12	<12	<12
O-AND/OR-P XYLENE UG/L	98554 GMS	<12	<12	<12	<12	<12	<12	<12	<12	<12	<1200	<1200	<12	<12	<12
METHYL ETHYL KETONE UG/L	81595 GMS	<48	<48	<48	<48	<48	<48	<48	<48	<48	<4800	<4800	<48	<48	<48
METHYL ISOBUT'KETONE UG/L	81596 GMS	<12	<12	<12	<12	<12	<12	<12	<12	<12	<1200	<1200	<12	<12	<12

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PROJECT NUMBER 86447 0406 PROJECT NAME NAVY - LEJEUNE HP4
FIELD GROUP LJHP-4 LAB COORDINATOR JEFF SHAMIS

SAMPLE ID/#

PARAMETERS / UNITS	STORET # / METHOD	HPGW9-2 LJHP-4 1	HPGW9-3 LJHP-4 2	HPGW17-2 LJHP-4 3	HPGW17-3 LJHP-4 4	HPGW24-2 LJHP-4 5	HPGW24-3 LJHP-4 6
DATE		08/06/87	08/06/87	08/05/87	08/05/87	08/06/87	08/06/87
TIME		11:30	12:14	16:13	16:04	13:15	13:28
BENZENE UG/L	34030 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
BROMODICHLOROMETHANE UG/L	32101 GMS	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2
BROMOFORM UG/L	32104 GMS	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7
BROMOMETHANE UG/L	34413 GMS	<5.8	<5.8	<5.8	<5.8	<5.8	<5.8
CARBON TETRACHLORIDE UG/L	32102 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
CHLOROBENZENE UG/L	34301 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
CHLOROETHANE UG/L	34311 GMS	<8.2	<8.2	<8.2	<8.2	<8.2	<8.2
2-CHLOROETHYLVINYL ETHER UG/L	34576 GMS	<15	<15	<15	<15	<15	<15
CHLOROFORM UG/L	32106 GMS	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
CHLOROMETHANE UG/L	34418 GMS	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3
DIBROMOCHLOROMETHANE UG/L	32105 GMS	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1
1,1-DICHLOROETHANE UG/L	34496 GMS	<4.7	<4.7	<4.7	<4.7	<4.7	<4.7
1,2-DICHLOROETHANE UG/L	34531 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
1,1-DICHLOROETHYLENE UG/L	34501 GMS	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
TRANS-1,2-DICHLORO ETHENE UG/L	34546 GMS	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
1,2-DICHLOROPROPANE UG/L	34541 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
CIS-1,3-DICHLORO PROPENE UG/L	34704 GMS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
TRANS-1,3-DICHLORO PROPENE UG/L	34699 GMS	<6.4	<6.4	<6.4	<6.4	<6.4	<6.4
ETHYLBENZENE UG/L	34371 GMS	<7.2	<7.2	<7.2	<7.2	<7.2	<7.2
METHYLENE CHLORIDE UG/L	34423 GMS	<50	<50	<50	<50	<50	<50

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PROJECT NUMBER 86447 0406 PROJECT NAME NAVY - LEJEUNE HP4
FIELD GROUP LJHP-4 LAB COORDINATOR JEFF SHAMIS

SAMPLE ID/#

PARAMETERS UNITS	STORET # METHOD	HPGW9-2 LJHP-4 1	HPGW9-3 LJHP-4 2	HPGW17-2 LJHP-4 3	HPGW17-3 LJHP-4 4	HPGW24-2 LJHP-4 5	HPGW24-3 LJHP-4 6
DATE		08/06/87	08/06/87	08/05/87	08/05/87	08/06/87	08/06/87
TIME		11:30	12:14	16:13	16:04	13:15	13:28
1,1,2,2-TETRACHLORO ETHANE UG/L	34516 GMS	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1
TETRACHLOROETHENE UG/L	34475 GMS	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
TOLUENE UG/L	34010 GMS	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
1,1,1-TRICHL'ETHANE UG/L	34506 GMS	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8
1,1,2-TRICHL'ETHANE UG/L	34511 GMS	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
TRICHLOROETHENE UG/L	39180 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TRICHLOROFLUORO-METHANE UG/L	34488 GMS	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
VINYL CHLORIDE UG/L	39175 GMS	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ACROLEIN UG/L	34210 GMS	<100	<100	<100	<100	<100	<100
ACRYLONITRILE UG/L	34215 GMS	<100	<100	<100	<100	<100	<100
DICHLORODIFLUORO-METHANE UG/L	34668 GMS	<10	<10	<10	<10	<10	<10
M-XYLENE UG/L	98553 GMS	<12	<12	<12	<12	<12	<12
O-AND/OR-P XYLENE UG/L	98554 GMS	<12	<12	<12	<12	<12	<12
METHYL ETHYL KETONE UG/L	81595 GMS	<48	140	<48	290	<48	<48
METHYL ISOBUT'KETONE UG/L	81596 GMS	<12	<12	<12	<12	<12	<12

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K.0 WELL SURVEY AND GROUNDWATER ELEVATION DATA

K.1 WELL SURVEY DATA

Environmental Science and Engineering, Inc. (ESE) field staff surveyed, for vertical control only, the monitor wells installed at the Hadnot Point Industrial Area (HPIA). Vertical control was established on a relative basis only; a single well was assigned an elevation of 100 feet (ft) and elevations for all other wells were established relative to this arbitrary datum. Table K-1 lists the relative top of casing and land surface elevations for the monitor wells. Well HPGW29 is an isolated well situated in the southwest corner of HPIA, and is not tied into the survey loop for the other wells because of its remote location.

K.2 GROUNDWATER ELEVATION DATA

All groundwater elevations were established using the U.S. Geological Survey (USGS) wetted-tape method, to an accuracy of 0.01 ft. Table K-1 lists the relative elevation of the groundwater surface, referenced to the arbitrary datum described in Sec. K.1. All water level measurements presented in Table K-1 and utilized throughout the report were obtained on April 15, 1987.

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Table K-1. Well Survey and Groundwater Elevation Data

Well No.	Top of Casing (TOC) Elevation (Ft)	Land Surface (LS) Elevation (Ft)	Stickup (Ft)	Depth to Water (Ft from TOC)	Depth to Water (Ft from LS)	Water Level Elevation (Ft)
HPGW1	96.88	95.08	1.80	22.36	20.56	74.52
HPGW2	96.89	94.64	2.25	9.26	7.01	87.63
HPGW3	96.56	94.36	2.20	20.69	18.49	75.87
HPGW4	96.22	93.63	2.59	21.38	18.79	74.84
HPGW5	92.78	90.78	2.00	15.25	13.25	77.53
HPGW6	92.22	89.84	2.38	16.19	13.81	76.03
HPGW7	92.45	90.38	2.07	14.87	12.80	77.58
HPGW8	93.31	91.05	2.26	14.24	11.98	79.07
HPGW9	93.68	91.34	2.34	16.43	14.09	77.25
HPGW10	92.79	90.59	2.20	13.42	11.22	79.37
HPGW11	92.75	90.40	2.35	14.37	12.02	78.38
HPGW12	94.75	92.40	2.35	12.79	10.44	81.96
HPGW13	89.93	87.76	2.17	12.35	10.18	77.58
HPGW14	91.16	89.28	1.88	11.72	9.84	79.44
HPGW15	91.72	91.65	0.07	10.17	10.10	81.55
HPGW16	97.14	94.95	2.19	12.84	10.65	84.30
HPGW17	94.78	92.69	2.09	12.02	9.93	82.76
HPGW18	91.76	91.88	-0.12	9.57	9.69	82.19
HPGW19	93.88	91.78	2.10	8.41	6.31	85.47
HPGW20	89.87	87.64	2.23	8.33	6.10	81.54
HPGW21	99.39	97.16	2.23	12.04	9.81	87.35
HPGW22	98.15	96.29	1.86	9.49	7.63	88.66
HPGW23	97.79	95.99	1.80	11.08	9.28	86.71
HPGW24	98.55	96.31	2.24	7.27	5.03	91.28
HPGW25	98.22	96.16	2.06	8.37	6.31	89.85
HPGW26	99.10	96.83	2.27	6.17	3.90	92.93
HPGW29	*	*	2.50	21.09	NA	NA

Note: ft = feet.
NA = not applicable.
HP-18 is constructed below grade.

*No data available.

Source: ESE, 1988.