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PROJECT COMPLETION REPORT FOR REMEDIATION ACTIVITIES AT SITE 45 DRY CLEANING FACILITY SPILL AREA MCRD PARRIS ISLAND SC

8/1/2000

BECHTEL

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PROJECT COMPLETION REPORT FOR REMEDIATION ACTIVITIES UNDER DELIVERY ORDER 0048 AT SITE 45/SWMU 45 DRY CLEANERS FACILITY MARINE CORPS RECRUITING DEPOT PARRIS ISLAND, SOUTH CAROLINA

Prepared for

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Under Contract No. N62467-93-D-0936

Prepared by

BECHTEL ENVIRONMENTAL, INC.
OAK RIDGE, TENNESSEE

BECHTEL JOB NO. 22567

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145-000179

COMPLETION REPORT
FOR
DELIVERY ORDER 48

SITE 45/SWMU 45
DRY CLEANERS FACILITY
BUILDING 193

MARINE CORPS RECRUITING DEPOT
PARRIS ISLAND, SOUTH CAROLINA
EPA I. D. No. SC6 170 022 762

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ACRONYMS AND ABBREVIATIONS

1,2-DCE	1,2 Dichloroethene
AC	alternating current
AS	air sparging
Bechtel	Bechtel Environmental, Inc.
BOD5	Biological Oxygen Demand (5-day)
EE/WP	Engineering Evaluation and Interim Remedial Work Plan/Interim Measure Work Plan
EPA	U.S. Environmental Protection Agency
FOTW	federally owned treatment works
I/O	input/output
IRA	interim removal action
MCL	maximum containment level
MCRD	Marine Corps Recruit Depot
O&M	operation and maintenance
PC	personal computer
PCE	tetrachloroethene
PVC	polyvinyl chloride
QC	quality control
RAC	Response Action Contractor
RCRA	Resource Conservation and Recovery Act
ROICC	Resident Officer in Charge of Construction
RTU	Remote Telemetry Unit
SCADA	Supervisory Control and Data Acquisition
SCDHEC	South Carolina Department of Health and Environmental Control
SOUTHDIV	Naval Facilities Engineering Command, Southern Division
SVE	soil vapor extraction
SWMU	Solid Waste Management Unit
TCE	trichloroethene
USGS	United States Geological Survey
VAC	volts alternating current
VOC	volatile organic compounds

UNITS OF MEASURE

cm/sec	centimeter per second
ft	foot (feet)
gal	gallon/gallons
hp	horsepower
in.	inch (inches)
ma	milliampere
mg/L	milligrams per liter
mil	1/1,000 of an inch
mm	millimeters
MSL	mean sea level
ppb	parts per billion
psi	pounds per square inch
scfm	standard cubic feet per minute

1.0 INTRODUCTION

Bechtel Environmental, Inc. (Bechtel) was contracted by the Department of the Navy, Naval Facilities Engineering Command, Southern Division (SOUTHDIV), to provide remedial services as the Navy's Environmental Response Action Contractor (RAC). Under Delivery Order 48 of Prime Contract N62467-93-D-0936, Bechtel prepared an Engineering Evaluation and Interim Removal Work Plan/Interim Measures Work Plan (EE/WP) to implement an interim removal action (IRA) at Site 45/SWMU 45, the Dry Cleaners Facility, Building 193, Marines Corps Recruit Depot (MCRD), Parris Island, South Carolina. This is an active recruit basic training facility located in southeast South Carolina (Figure 1.1).

A spill of tetrachloroethlene (PCE) occurred at the dry cleaning facility on March 11, 1994. This spill occurred due to inadvertent overfilling of the above ground storage tank located adjacent to the north side of the Dry Cleaners Facility. A contamination assessment was performed in the summer of 1994 to evaluate the impact of the reported spill. This initial assessment concluded that soil and groundwater in the vicinity of the dry cleaning facility had been adversely affected due to the spill (Reference 1).

During the summer of 1996, groundwater samples were collected by Bechtel to determine the extent of the contamination at the site. This sampling effort was performed using direct push technology. Analytical results of these samples indicated that a plume of groundwater contaminated with PCE; trichloroethene (TCE); 1,2-Dichloroethene (1,2-DCE); and vinyl chloride existed at concentrations exceeding the regulatory levels at the site. Based on this information, a decision was made to conduct an IRA to remove the source of contamination to minimize further degradation of the groundwater.

2.0 SITE CONDITIONS

The MCRD is located within the Parris Island Quadrangle, S. C., USGS 7.5 min topographic map. The subject Dry Cleaning Facility is bounded between Panama Street to the north, Kyushu Street to the south, and Samoa Street to the east. Immediately to the west of the existing facility (Building 193) is the new Dry Cleaners Facility which also includes a laundry, tailor, and cobbler shops.

2.1 SITE LITHOLOGY/HYDROLOGY

The area in which MCRD is located is characterized by flat terrain dissected by rivers and streams which flow into the Atlantic Ocean. Drainage is provided by the Broad and Beaufort Rivers. The area averages 47 to 50 in. of rainfall per year. Average well yields are reported to be from less than 50 to 1,500 gal per minute from wells in Beaufort County. Soil types in this area are typically clayey and sandy. These are underlain by unconsolidated to poorly consolidated interbedded clays, sands, and marls which range in age from Late Cretaceous to Holocene (Reference 2).

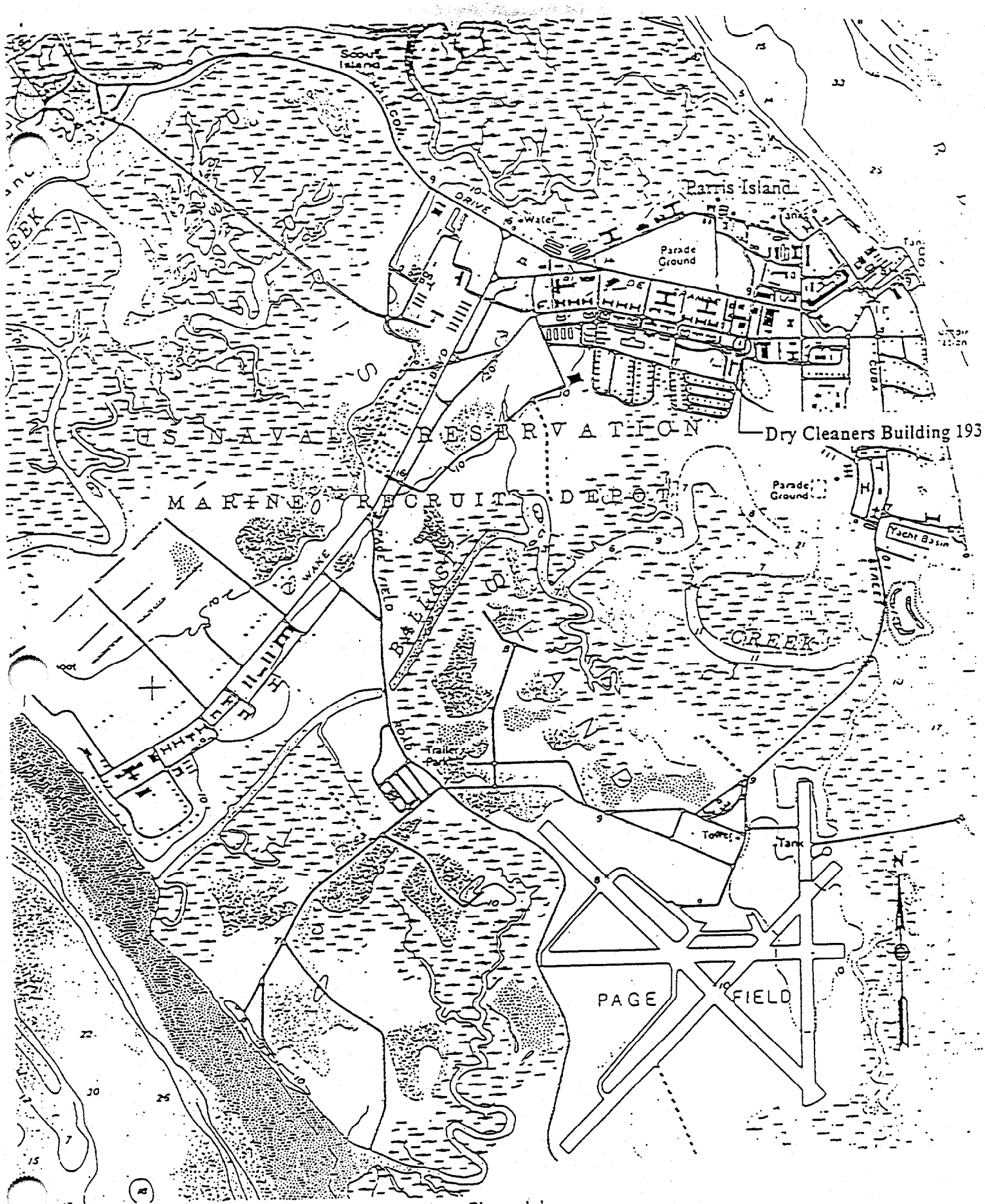


Figure 1.1
Marine Corps Recuit Depot, Parris Island, SC

The upper 30 ft of sediment underlying MCRD consists predominantly of very fine yellow-brown sand containing traces of clay and silt. Occasional thin layers of greenish-gray silty clay occur within the sands. These are the only distinct beds found in the superficial sediments. These layers appear to have prevented the migration of the bulk of the contamination from reaching 22 ft below grade. The IRA focused on the groundwater above the aquitard shown on Figures 1.2, 1.3, and 1.4. Onsite borehole data collected during well installation in December of 1996 confirm these findings as seen in Figures 1.2, 1.3, and 1.4. Water table elevations recorded during the same time period range from a high of 5.02 ft (above MSL) at the northwest to a low of 4.04 ft (above MSL) in the southeast. The general groundwater flow is to the southeast with a gradient of 0.003 ft/ft.

The regional hydrogeology and the data collected during the direct push sampling in the summer of 1996 indicated the bottom of the surfical aquifer at the site coincides with the top of the Hawthorn Formation which is approximately 30 ft below MSL.

2.2 SITE HISTORY

At one time, the Dry Cleaning Facility maintained four above ground storage tanks in a concrete containment basin. These tanks have been in place since 1988 and stored PCE solvent used for dry-cleaning. On March 11, 1994, a reportable spill of PCE occurred at the dry cleaners when one of the tanks was inadvertently overfilled, spilling PCE into the concrete containment basin. It is also reported that the PCE was subsequently released onto the ground when the containment basin was drained following heavy rains. See Figure 1.6 for the location of the spill. The spill was reported to South Carolina Department of Health and Environmental Control (SCDHEC). The use of the tanks for storing PCE was discontinued in the 1994-1996 time frame.

On March 14, 1994, Parris Island personnel collected soil and water samples along Panama Street. The analytical results of these samples indicated elevated levels of PCE in the samples, requiring excavation of the contaminated soils. Parris Island personnel excavated and disposed of PCE-contaminated soils from the area outside the containment basin. These PCE contaminated soils were incinerated by a licensed facility. Following this removal action, an architect/engineer firm (S&ME), under separate contract to the Navy, conducted a PCE-contamination assessment in June, 1994 to determine the extent of contaminated groundwater and to develop a conceptual remediation plan. As part of this effort, S&ME installed temporary piezometers to measure water levels and drilled boreholes to collect soil and groundwater samples (Reference 1).

3.0 REMEDIAL ACTION SERVICES

Site characterization data available at the time Bechtel was issued Delivery Order 48 was not sufficient to allow the selection or the subsequent design of the interim remedial action. Bechtel prepared a technical memorandum outlining additional site characterization work that would include cone penetrometer testing, hydraulic conductivity measurements, and groundwater sampling and analysis to better define the horizontal and vertical extent of contamination in the shallow aquifer as well as specific geotechnical properties. This effort was termed the Phase II Sampling.

3.1 PHASE II SAMPLING

In the summer of 1996, Bechtel conducted a site investigation of the groundwater to define the current extent of contamination at the site. Groundwater samples were collected with direct push technology and analyzed with a field gas chromatograph. Results of these tests indicated that a plume of PCE, TCE,

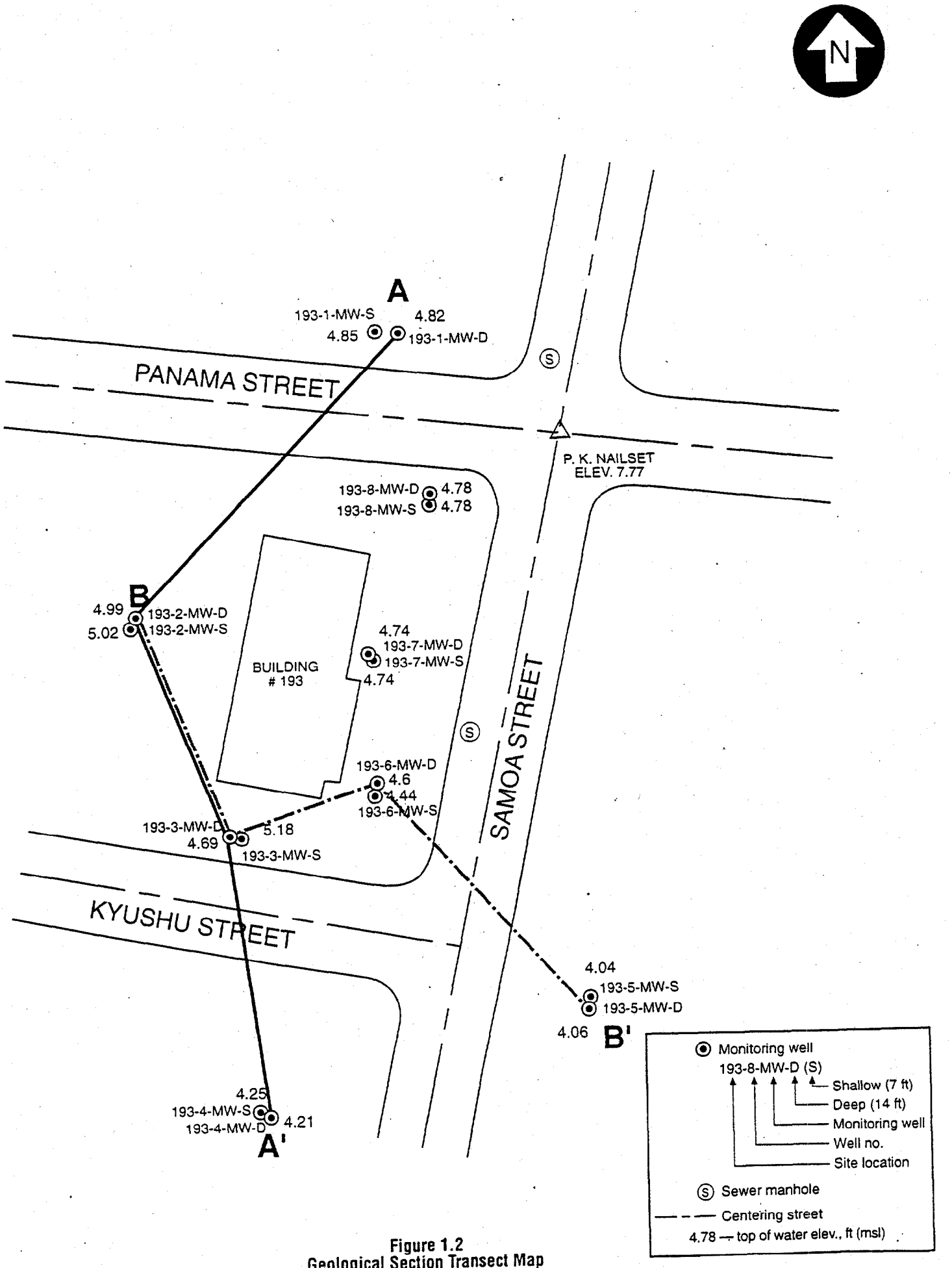
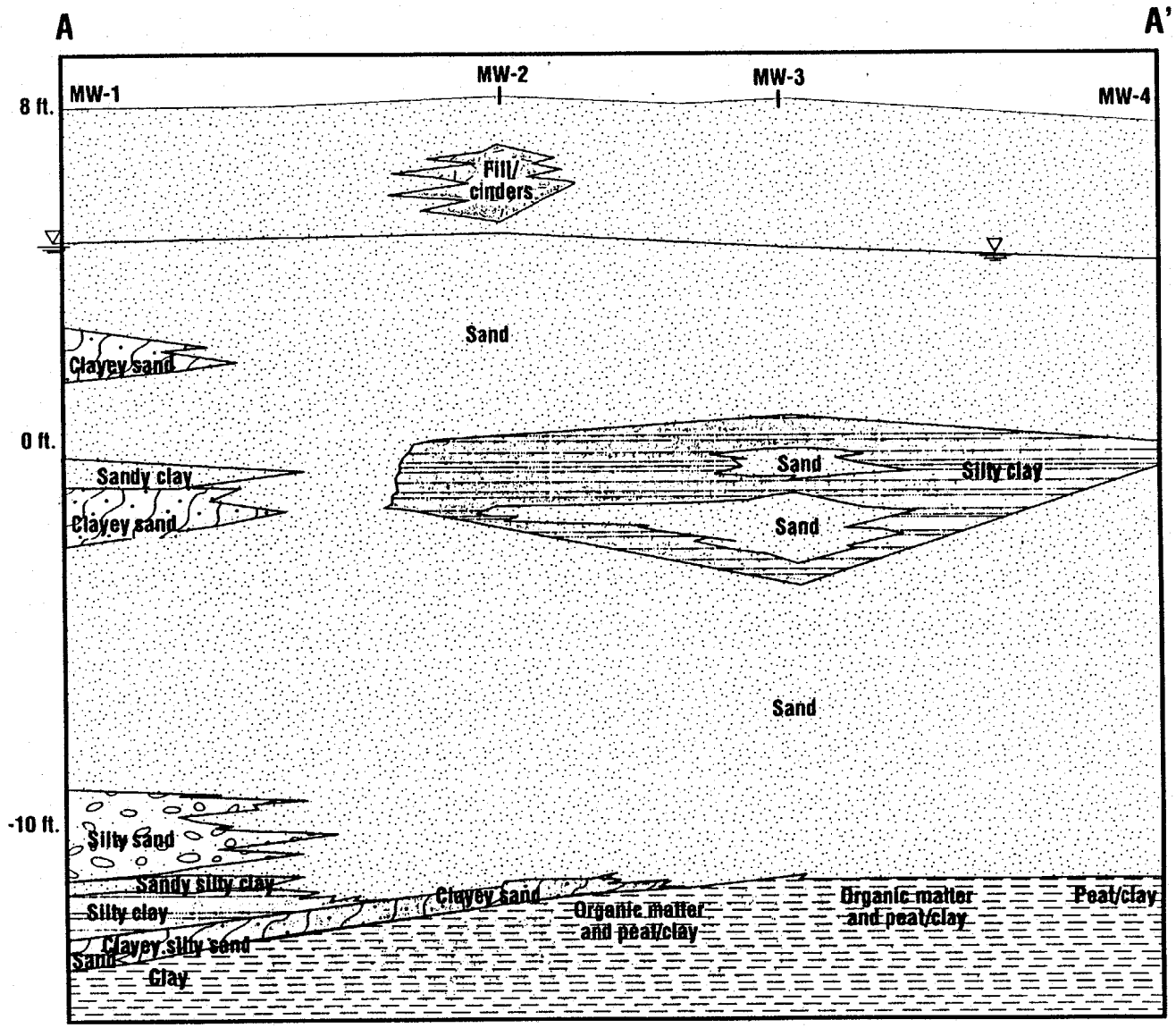


Figure 1.2
Geological Section Transect Map

Z1.9 0545.1



Vertical scale: 1" = 4'
Horizontal scale: 1" = 75'

Figure 1.3
Generalized Geological Section of Site 193 "Dry Cleaners"; A - A'

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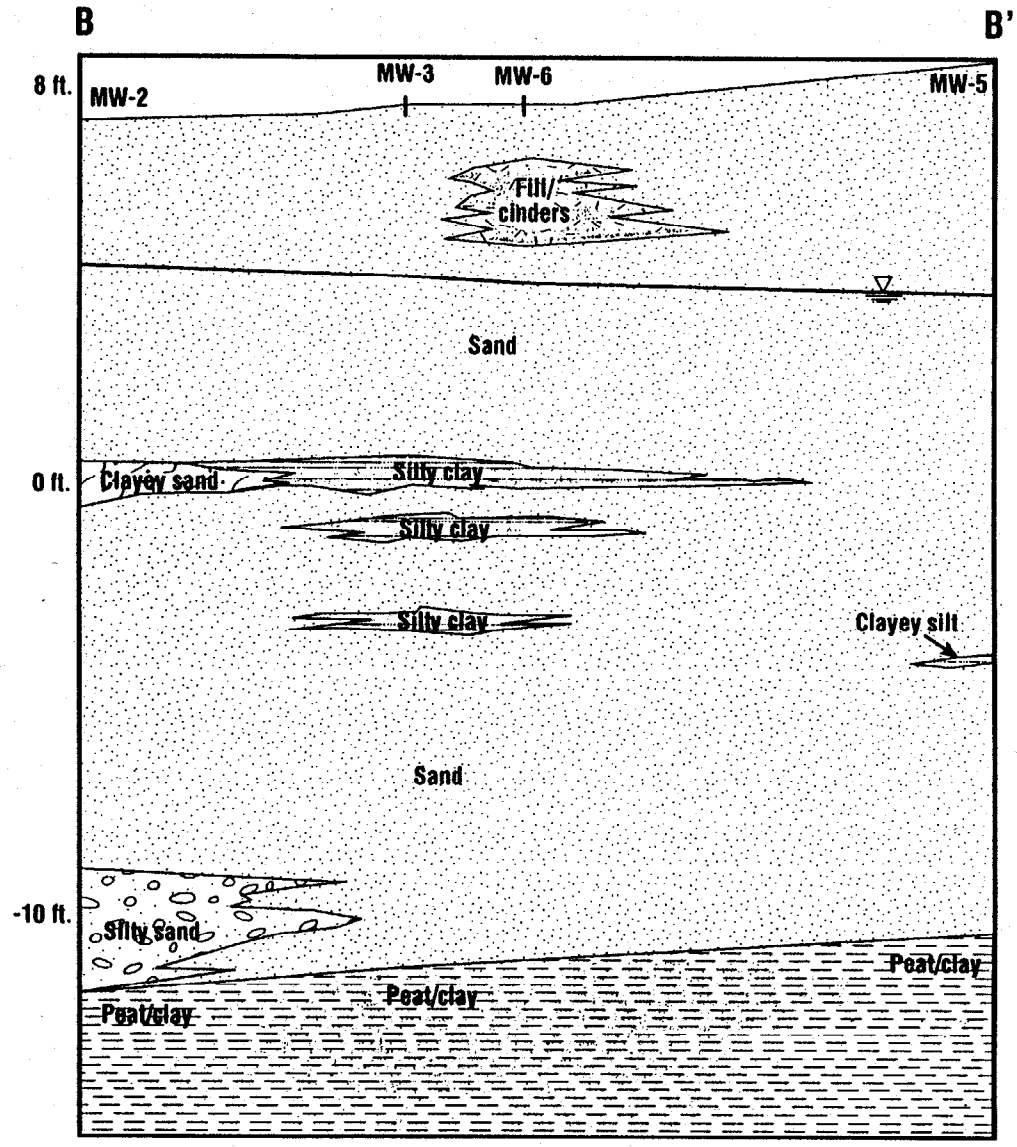


Vertical scale: 1" = 4'
Horizontal scale: 1" = 75'

Figure 1.4
Generalized Geological Section of Site 193 "Dry Cleaners"; B - B'

Z1.9 0545.2

1,2 DCE, and vinyl chloride contaminated groundwater existed with concentrations exceeding the regulatory limits. The results of this screening effort were presented in the report "Phase Two Sampling Effort" which was submitted as an attachment to the EE/WP issued in December of 1997.

3.2 AIR SPARGING PILOT TEST

Based on the analysis of the data from the Phase II Sampling, monitoring wells were installed and an air sparging (AS) pilot test was conducted as presented in the "Technical Memorandum For Well Installation and Air Sparging Pilot Test" (Reference 3). The objectives of this investigation conducted in December 1996 were as follows:

- Installing a well monitoring network
- Soil sampling to determine lithology and geological stratigraphy
- Sampling and analysis to establish baseline soil and groundwater contamination levels
- Conducting an AS pilot study

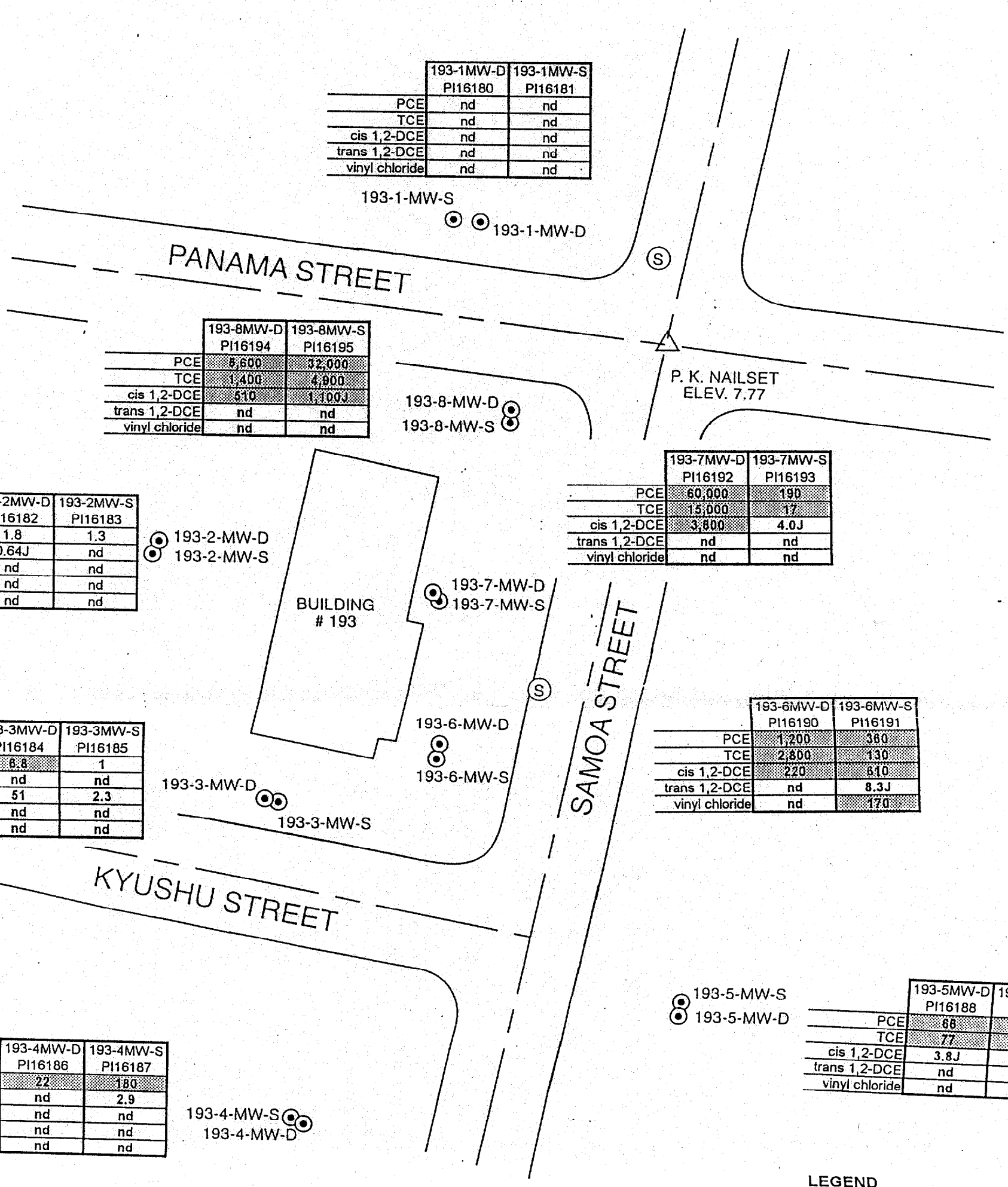
The well monitoring network was comprised of sixteen wells placed at eight locations around the Dry Cleaners Facility. At each location, a shallow well was installed to a depth of 7 ft and a deep well was installed to a depth of 14 ft. Figure 1.5 shows the locations of these monitoring wells. Details of this investigation and the findings are presented in the "Technical Memorandum For Groundwater Evaluation and Air Sparging Pilot Study, Building 193, Parris Island, SC". This technical memorandum was incorporated as an attachment to the EE/WP.

3.3 EE/WP

After the completion of the Phase II Sampling and the Air Sparging Pilot Test, Bechtel elected to combine the engineering evaluation/cost analysis into the remedial action work plan. The ensuing document titled *Engineering Evaluation and Interim Removal Remedial Work Plan/Interim Measure Work Plan, Site 45/SWMU 45, Dry Cleaning Facility, Building 193, MCRD Parris Island, South Carolina* (reference 4) was issued in its final form in December of 1997. This single document satisfied the requirements of both state and federal regulatory agencies as well as the Navy. It provided a comprehensive summary of the studies completed by Bechtel, an engineering evaluation/cost analysis, and design details for the proposed groundwater extraction and treatment system. Additional information concerning Bechtel's evaluation of the data and process for selection of the preferred IRA is provided in the following sections.

3.3.1 Soil Sampling Results

Soil samples were collected from 1-3 ft and 5-7 ft intervals during drilling for monitoring wells 193-6MW-D, 193-7MW-D, and 193-8MW-D and were analyzed for volatile organic compounds (VOCs). These three wells were placed within the highest concentration of the contaminated groundwater based on the direct-push technology results. The analytical results of the soil samples (except for one) indicate that no significant concentrations of the contaminants of concern are present in the soil matrix. However, a soil sample collected from 5-7 ft interval at monitoring well 193-8MW-D was found contaminated with PCE at 1,100 ppb. This location is to the north of the dry cleaner in the area of the reported spill.



	193-1MW-D PI16180	193-1MW-S PI16181
PCE	nd	nd
TCE	nd	nd
cis 1,2-DCE	nd	nd
trans 1,2-DCE	nd	nd
vinyl chloride	nd	nd

	193-8MW-D PI16194	193-8MW-S PI16195
PCE	5,600	12,000
TCE	1,400	4,900
cis 1,2-DCE	510	1,100J
trans 1,2-DCE	nd	nd
vinyl chloride	nd	nd

	193-7MW-D PI16192	193-7MW-S PI16193
PCE	60,000	190
TCE	15,000	17
cis 1,2-DCE	3,800	4.0J
trans 1,2-DCE	nd	nd
vinyl chloride	nd	nd

	193-2MW-D PI16182	193-2MW-S PI16183
PCE	1.8	1.3
TCE	0.64J	nd
cis 1,2-DCE	nd	nd
trans 1,2-DCE	nd	nd
vinyl chloride	nd	nd

	193-6MW-D PI16190	193-6MW-S PI16191
PCE	1,200	360
TCE	2,800	130
cis 1,2-DCE	220	610
trans 1,2-DCE	nd	8.3J
vinyl chloride	nd	170

	193-3MW-D PI16184	193-3MW-S PI16185
PCE	6.8	1
TCE	nd	nd
cis 1,2-DCE	51	2.3
trans 1,2-DCE	nd	nd
vinyl chloride	nd	nd

	193-5MW-D PI16188	193-5MW-S PI16189
PCE	66	52
TCE	77	84
cis 1,2-DCE	3.8J	2.6J
trans 1,2-DCE	nd	nd
vinyl chloride	nd	nd

	193-4MW-D PI16186	193-4MW-S PI16187
PCE	22	180
TCE	nd	2.9
cis 1,2-DCE	nd	nd
trans 1,2-DCE	nd	nd
vinyl chloride	nd	nd

LEGEND

Monitoring well

193-8-MW-D (S)

- Shallow
- Deep
- Monitoring well
- Well no.
- Site location

MCLs	Well ID Sample ID
PCE	5
TCE	5
cis 1,2-DCE	70
trans 1,2-DCE	100
vinyl chloride	2

All detections above MCLs are shaded.

Figure 1.5
Groundwater Analytical Results (ppb)

229A012

3.3.2 Groundwater Sample Results

The direct push sampling indicated that low levels of groundwater contamination had spread down to the Hawthorn, but the groundwater contamination levels at the 22-ft level were several orders of magnitude lower than those at 14-ft level. Monitoring wells were not installed through the aquitard to avoid creating a pathway for possible migration of contamination deeper into the surficial aquifer.

Groundwater samples were collected from each monitoring well and analyzed for VOCs, chloride, sulfate, and nitrate. Figure 1.5 shows the sampling results and the extent of the solvent contamination at the site. The results from this phase of the investigation correlated closely with the results from the direct push sampling. Figure 1.6 combines the results from the direct push sampling and the monitoring wells.

3.3.3 Identification of Interim Removal Action Objectives

Determination of Scope

Chlorinated aliphatic compounds, including PCE; TCE; 1,2-DCE; and vinyl chloride pose a risk to human and ecological receptors at their elevated concentrations in the groundwater in the vicinity of the Dry Cleaning Facility at the Parris Island MCRD. The scope of the IRA at the Dry Cleaners is to minimize further degradation to the groundwater and treat the source of contamination at the center of the plume. The IRA will gain control over the groundwater contaminant source loading and reduce the concentrations of contaminants in the groundwater.

Interim Removal Action Objectives

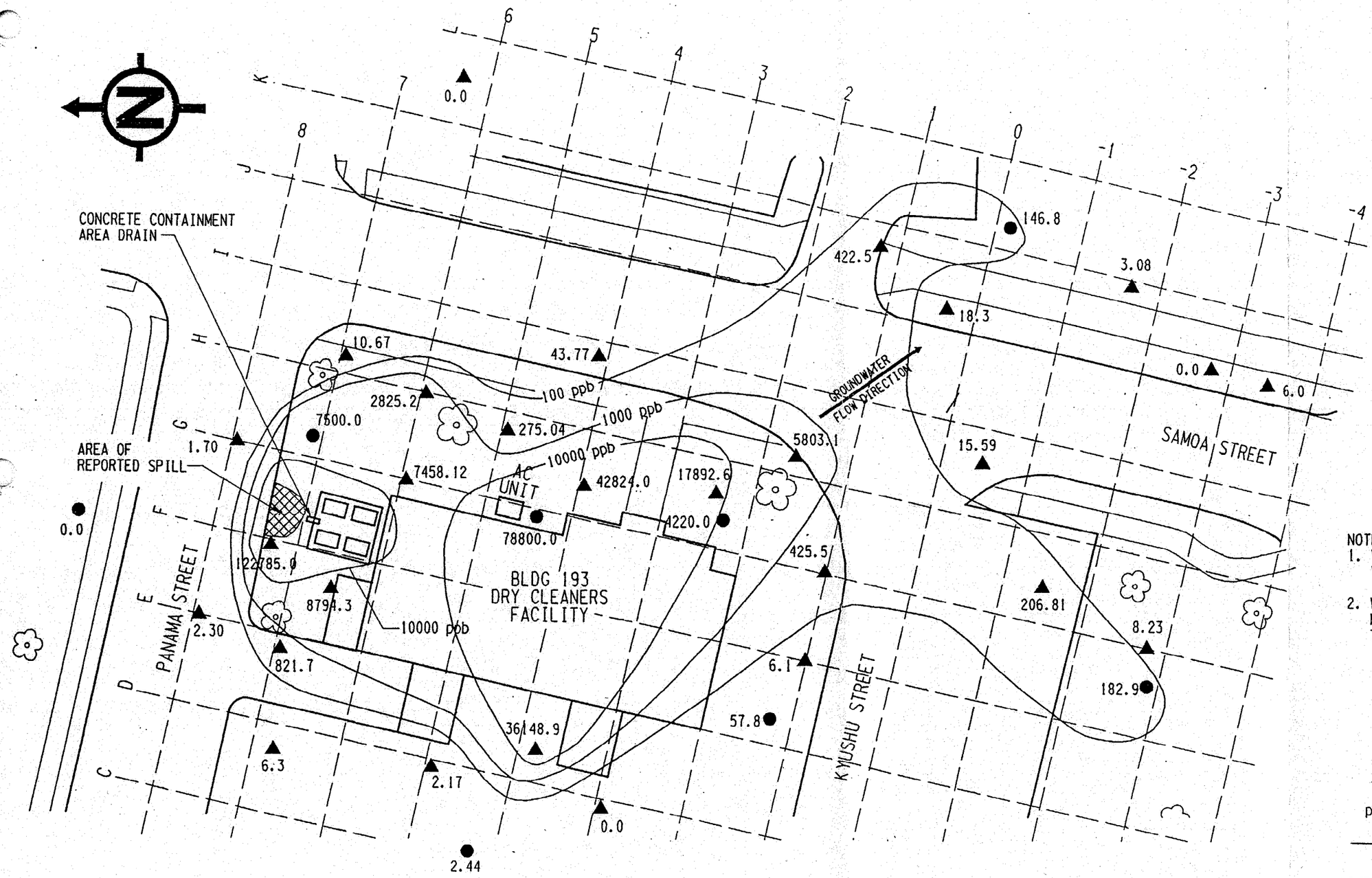
The objectives of the interim removal action were as follows:

- Minimize further migration of groundwater containing solvents by providing hydraulic control of the site.
- Reduce elevated concentrations of the contaminants in groundwater in the area of concern.
- Operate the remedial system until the equilibrium is reached. Equilibrium is defined as 3 month's recovery well groundwater samples without a significant (10%) decrease in groundwater concentrations.
- Allow an orderly transition to any required final remedy at the site.

3.3.4 Comparative Analysis of Interim Removal Action Alternatives

Based on the objectives of the interim removal action, several alternatives were considered at the Dry Cleaners Facility. Each alternative was evaluated based on effectiveness, implementability, and qualitative review of cost. Remedial action alternatives evaluated included:

- Institutional Controls
- Naturals Attenuation
- Containment
  - Vertical barrier
  - Cap
  - Hydraulic control



NOTES:
1. VALUES POSTED ARE MAXIMUM TOTAL VOC'S FROM MONITORING WELL CLUSTER.
2. WHERE SAMPLES WERE COLLECTED AT MORE THAN ONE DEPTH, THE MAXIMUM TOTAL VOC'S VALUE IS REPORTED.

LEGEND

- ● MONITORING WELL LOCATION (SEE NOTE 1)
- ▲ DIRECT PUSH SAMPLE LOCATION (SEE NOTE 2)
- ppb PARTS PER BILLION
- —— CONTAMINATION CONTOURS
- - — GRID LINES (25'x25')

0 30 60 90

1"=30'

22567/145/FIG1.6.DGN

Figure 1.6
Groundwater VOC Isopleths (ppb)

229A022

- In Situ Treatment
  - Air sparging (AS)
  - Soil vapor extraction (SVE)
  - Microbial filter
  - In-well air stripping
  - Reactive metal wall
- Groundwater Removal with Ex Situ Treatment
  - Air Stripping
  - Carbon adsorption
  - Chemical oxidation
  - Anaerobic/aerobic biological process

Of the technologies noted above, three were considered as viable alternatives for the IRA:

- AS and SVE
- In-well vapor stripping
- Pump and treat

Although the AS pilot test showed promise, some mounding of groundwater was observed in at least one observation well. Given the shallow depth to groundwater, the potential for groundwater breaching the surface was of concern. Additionally, the collection of vapors generated by the sparge system was an area of uncertainty. Site conditions such as the high water table and the presence of fine, layered silts imposed a challenge to the design of an effective soil vapor collection system. The risk of exposure of base personnel to emissions that might not be captured by a collection system was too high in consideration that other, safer technologies could be deployed.

In-well vapor stripping was also considered, but there were practical limitations on the use of this emerging technology. An extremely shallow recovery/recirculation well would not develop a sizeable radius of influence and multiple wells might be necessary. The maintainability of wells used for in-well AS was an unknown. There was concern about the well screens being clogged due to biological fouling or mineral precipitation. The proposed system was not acceptable to SCDHEC because if could not meet maximum contaminant levels (MCLs) based on a single pass of groundwater through the well. Finally, the estimated cost of this option was high at approximately $300,000 for the installation only.

The preferred technology was groundwater removal followed by ex-situ treatment with an air stripper. The advantages of this approach were,

- providing hydraulic control to limit the spread of contamination,
- achieving hydraulic control with low groundwater extraction rates,
- discharging the treated groundwater to the Depot's federally owned treatment works (FOTW), and
- applying proven technologies with minimum risk of failure.

3.4 PERMITTING

Permits were obtained for several activities conducted under Delivery Order 48. A brief summary of the permits is provided below:

- Permits were obtained from SCDHEC to construct and to operate a Class VA-I (Aquifer Remediation) injection well as part of the Air Sparging Pilot Study.

- Approval was obtained from SCDHEC to install three groundwater recovery wells (R-1, R-2, and R-3) as part of the IRA (ref. approval number: HW-98-011).

- A determination of "no permit required" was obtained from SCDEHC regarding the need to permit toxic air emissions from the air stripper. Predicted emissions of toxic compounds were below the Department's de minimus levels requiring permits.

- All monitoring and/or recovery well installations were performed by a South Carolina-licensed well driller and Water Well Records were submitted to the South Carolina Bureau of Water.

Correspondence with SCDHEC related to each of the permitting activities noted above is included in Appendix A.

4.0 CONSTRUCTION ACTIVITIES

The construction phase of the project lasted approximately three months and included the installation of three groundwater recovery wells; underground piping with secondary containment from the wells to the treatment compound; and an enclosed treatment compound with an air stripper and transfer pump for pumping the treated groundwater into the MCRD sanitary sewer system. The treatment process is controlled by a supervisory control system that is remotely accessible via telemetry. A brief description of the major components of the treatment system is provided in the following sections:

4.1 RECOVERY WELLS

The three recovery wells are constructed of 6-in., schedule 40 PVC. The wells are approximately 18 ft deep with 10 slot screen from 5 to 17 ft below land surface (nominal screened interval). The filter pack is #00 UNIMIN filter sand. Completion records for each well are provided in Appendix B. This appendix also contains completion records for the 16 monitoring wells installed by Bechtel.

4.2 GROUNDWATER RECOVERY PUMPS

Electric submersible pumps are used to transfer the contaminated groundwater from the wells to the air stripper. These are 4-in. pumps with ½ HP, 230V, single phase motors. There have been specified for a flow range of 2-5 gpm. The contaminated water is conveyed from each well head using ¾-in. polyethylene tubing contained in 4-in., schedule 40 PVC pipe. The submersible pumps are controlled (i.e., cycled on and off) using the analog input signal from a pressure transducer located near the bottom of the well. The flow rate for pumps RW-1 and RW-2 is adjusted by flow regulating valves. The flow rate for pump RW-3 is controlled by an AC frequency controller which varies the pump's motor speed. Each pump system has independent flow measurement capability.

4.3 MULTI-TRAY AIR STRIPPER

The air stripper is a 4-tray, positive pressure unit designed for a groundwater processing rate of 6 to 15 gpm. The system is skid-mounted with a 3 HP blower and 1 HP discharge pump. The treated groundwater is collected in an integral sump at the base of the stripper and is pumped to the MCRD sanitary sewer system. Vapor from the blower is discharged without further treatment from a vent at the

top of the treatment system building. Modeling of possible air contaminant levels confirmed that under a worst case scenario, emissions levels of chlorinated solvents would be below regulatory limits.

4.4 SUBMERSIBLE PUMP

A ½ HP submersible effluent pump is installed in a 2 ft x 2 ft x 20 in. deep sump located inside the equipment building. The sump pump is rated for 12 gpm at 55 ft of total dynamic head. This pump discharges through a Y-strainer and check valve into a 1-in. schedule 40 PVC line near the inlet to the air stripper. All water collected in the floor sump is processed through the air stripper prior to discharge.

4.5 EQUIPMENT BUILDING

The air stripper skid, submersible pump, electrical distribution panels and control panel are all located inside a 10-ft. x 14-ft prefabricated, fiberglass building. The building consists of 1-in. thick, molded fiberglass roof and wall panels with an R-8 insulating capacity. The building was furnished with a 6-ft wide double door, a powered ventilation fan, and an electric resistance heater. The building is anchored to a 6-in. thick, reinforced concrete slab. This slab was poured as a monolith and has a 3-in. high continuous curb.

4.6 INSTRUMENTATION AND CONTROLS

The SWMU 45 Treatment System operates in a fully automatic mode and may be remotely monitored and controlled using telemetry. The control function is accomplished through the Supervisory Control and Data Acquisition (SCADA) System. The SCADA system is an integrated concept using remote telemetry units (RTU), analog and digital input/output (I/O) modules, and remote laptop personal computers (PC). Equipment can be both controlled and monitored from remote locations or locally at the treatment site. Major components of the instrumentation and controls systems, including the SCADA system, are briefly described in the following sections.

4.6.1 OPTO 22 Control System

The SCADA system is based on a commercially available control system with the trade name OPTO 22. This system is capable of providing local and remote control of treatment system equipment status, including start/stop functions. The system also provides indication of operating parameters such as pressure, flow, or level. Additionally, the system supports alarming, trending, and data logging functions. The primary components in the system are the laptop PC monitor, the RTU modular electronic control device, and the digital and analog I/O hardware. All other instrumentation in the treatment system was selected for compatibility with the OPTO 22 controls and I/O configuration.

4.6.2 Pressure Transducers

All recovery wells use an In-Situ, Inc. model PXD-261 analog pressure transducer capable of providing a 4-20 ma output signal to the OPTO 22 control system. This device allows continuous monitoring of water level in the recovery wells via the OPTO 22 graphical user interface.

4.6.3 Flow Meters

The three groundwater recovery wells have an ARMOR-FLO series 3600/3700 flow meter with 4-20 ma transmitter. These units measure a flow range of 0.7 to 7 gpm and provide a direct input to the OPTO 22 control system for either remote or local site monitoring of the flow rates from each well. The treated groundwater being discharged to the Depot's sanitary sewer system is measured by a flow meter with totalizing capability. This meter is a Carlon model JSJ Electric Contacting Meter. It is rated for accurate measurement of flows ranging from 15 to 30 gpm. This meter also provides a 4-20 ma output signal for monitoring total gallons processed via the OPTO 22 System.

4.6.4 Motor Operated Flow Valve

A 1-in. ball valve, with quarter-turn actuator, is used for shut-off control on the discharge of treated water to the sanitary sewer. The valve is a Hayward true-union, ball valve and the actuator a Hayward model EVR2, 115 VAC. This valve is operated via the OPTO 22 control system.

4.6.5 Level Switches

Level switches are provided for control of the submersible pump in the Equipment Building floor sump and in the air stripper sump. The level switches installed in the air stripper sump are mechanically activated float switches and were factory installed by the air stripper manufacturer. The high level switch controls cycling of the 1-HP discharge pump and the high-high level switch initiates an alarm condition. A switch of similar design is employed for control of the ½ HP submersible pump.

4.6.6 Pressure Indicator and Transmitter

A pressure indicator and transmitter is provided on the discharge duct from the rotary blower to monitor the discharge pressure. This unit provides a 4-20 ma output signal to the OPTO 22 control system.

4.6.7 As-built Drawings

Copies of the as-built drawings for the treatment system are provided in Appendix C.

5.0 WASTE MANAGEMENT

Investigation derived wastes and wastes generated during the construction and startup of the groundwater treatment system were managed in accordance with the EE/WP. Investigation derived wastes included well development water and soil cuttings from the installation of the 16 monitoring wells and the AS pilot test wells. Other investigation derived wastes were generated during the installation and development of the three groundwater recovery wells. Per agreements with the environmental compliance department at MCRD, drill cuttings and development water from the monitoring wells believed to be located in areas of groundwater contamination were segregated from the potentially clean drill cuttings and development water. During the installation of the 16 monitoring wells, three drums of drill cuttings and three drums of development water were generated during the installation of wells 193-6MW, 193-7MW, and 193-8MW. These wastes were sampled and both the drums and the analytical data turned over to MCRD for disposition. Drill cuttings from the remaining monitoring wells were spread on-site. An additional seven drums of development water from the installation of the monitoring wells were also sampled and turned over to MCRD personnel for final disposition.

During the installation of the three recovery wells, eight drums of drill cuttings were generated. The drill cuttings were tested and approval was provided by the SCDHEC Waste Assessment Section to dispose of this waste as "non-hazardous" at the Southeastern Soil Recovery Incinerator in Dorchester County. These eight drums were the only wastes treated and disposed off-site. Appendix A provides copies of correspondence concerning the management of this waste. Additionally, the well development water and well purge water associated with sampling activities for the recovery wells was placed into a 500 gallon polyethylene tank at Site 45. After verification of the treatment efficiency of the groundwater treatment system, the development water was processed through the air stripper and discharged into the MCRD sanitary sewer system.

Limited quantities of excess soil generated during trenching operations was stockpiled and sampled. Analytical data indicated this material was not contaminated and permission was received from the MCRD environmental department to spread the soil in several low-lying areas within the Site 45 boundaries.

During the startup of the groundwater treatment system, the first 1000 gallons of treated groundwater was collected in a 1,500 gal polyethylene tank. This was water was tested in accordance with the analytical parameters and concentrations limits prescribed by the MRCD environmental department for discharge to the sanitary sewer system. All limits for discharge were met and approval was received to discharge the contents into the sewer system.

6.0 STARTUP, OPERATIONS, AND MAINTENANCE

6.1 STARTUP PHASE

The treatment system startup occurred in April of 1998. Subsequent to the completion of all pre-operation tests and quality inspections, the initial volume of groundwater was processed through the system. During the first week of operation and system de-bugging, approximately 1,000 gal of groundwater were treated and collected in a holding tank. This water was tested for compliance with the MRCD established discharge limits prior to discharge to the sanitary sewer. The limits specified by MCRD were as follows:

Table 6.1
MCRD Pre-treatment Requirements Discharge to Sanitary Sewer

Analyte	Discharge Limit
pH	6.0 – 8.5
BOD_5	10 mg/l
tetrachloroethylene (PCE)	0.005 mg/l
trichloroethylene (TCE)	0.005 mg/l
cis-1,2-dichloroethylene	0.070 mg/l
trans-1,2-dichloroethylene	0.100 mg/l
vinyl chloride	0.002 mg/l
total suspended solids	No limit specified – test only

Approximately two weeks after the startup, laboratory data verified the treated water to meet the discharge limits and the system was placed into continuous operation with direct discharge to the MCRD sanitary sewer system. he startup phase continued through May of 1998 with corrections of minor problems and programming changes to the OPTO 22 control system. The treatment system operated

intermittently during this period. All punch list items were completed by the end of May and an acceptance letter was received from the Resident Office in Charge of Construction on May 29, 1998.

Table 6.2 provides a summary of the analytical results for the influent and effluent during the startup period.

6.2 OPERATIONS AND MAINTENANCE PHASE

In June of 1998 the treatment system was placed into continuous operation with routine maintenance and monitoring being performed by Albrecht & Associates, a subcontractor to Bechtel. Routine operations and maintenance (O&M) activities included monthly visits by Albrecht & Associates. Additionally, Albrecht & Associates performed quarterly sampling of the monitoring well network. Further explanation of the scope of these activities is provided in the following sections.

6.2.1 Monthly Inspections and Sampling

A site trip was conducted each month by a technician from the O&M subcontractor and a checklist completed to ensure a thorough inspection of the facility. Inspections included the following components: well heads for RW-1, 2, and 3; the air stripper module; and the equipment building and its related components. The technicians recorded current flow rates from each of the recovery wells, the discharge pressure on the air stripper blower, and the total gallons of treated groundwater discharged to the sanitary sewer. Samples were collected monthly from the influent groundwater from each recovery well and from the treated effluent. Results were recorded on the O&M logsheet and provided to Bechtel for review. Copies of the O&M logsheets are provided in Appendix D. Tabulated analytical results for the influent and effluent sampling are provided in Appendix E.

In addition to the monthly visits by the Albrecht & Associates technicians, the Bechtel engineers in the Oak Ridge, Tennessee office monitored operational parameters on a weekly basis using the remote assess and query capability of the OPTO 22 control system.

6.2.2 Quarterly Sampling

Quarterly sampling of the groundwater monitoring wells was conducted concurrently with a monthly O&M site trip. The scope of the sampling activities included collection of groundwater samples from 16 groundwater monitoring wells installed by Bechtel. A groundwater sampling record was completed for each well and provided details on site/well conditions, weather, field analytical parameter measured, well purge data, and sample container identification. Quarterly sampling events were conducted on the following dates:

- April 1-2, 1998 (baseline sampling event)
- July 21-22, 1998
- November 4, 1998
- January 26-27, 1999
- May 18-19, 1999
- August 2-3, 1999
- October 26-27, 1999

These records are being provided to the Navy under separate transmittal due to their volume. Tabulated analytical results from the quarterly sampling events are, however, provided in Appendix E.

Tab. 5.2

ANALYTICAL SUMMARY
EFFLUENT AND INFFLUENT SAMPLING
SITE 45, FORMER DRY CLEANERS, MCRD, PARRIS ISLAND, SOUTH CAROLINA

STATION ID	DATE COLLECTED	ANALYTICAL RESULTS					FIELD PARAMETERS					
		Tetrachloro ethene (PCE) (µg/L)	Trichloro ethene (TCE) (µg/L)	Vinyl Chloride (µg/L)	Biological Oxygen Demand	Total Dissolved Solids (mg/L)	Temp C°	pH	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Oxygen/ Reduction Potential (mV)
EFFLUENT	5/27/98	2.0 U	2.0 U	2.0 U	10	316	26.4	7.9	.354	4.55	143	164
	4/28/98	2.0 U	2.0 U	2.0 U	4	17	NM	NM	NM	NM	NM	NM
INFFLUENT												
193-1-RW	5/27/98				NM	NM	23.4	5.57	.303	.50	57	74
193-1-RW	4/28/98	5.7	39.3	25.8	NM	NM	19.7	6.31	.465	1.4	0	8
193-2-RW	5/27/98				NM	NM	22.2	5.63	.374	.56	5	62
193-2-RW	4/28/98	4140	4630	200 U	NM	NM	20.2	5.94	.325	1.15	0	35
193-3-RW	5/27/98				NM	NM	22.5	5.56	.394	.58	26	72
193-3-RW	4/28/98	56.1	417	20 U	NM	NM	20.4	6.18	.484	1.21	0	-4.5

Notes:
µg/L= Micro grams per liter.
mg/L= Milli grams per liter.
MS/cm= MicroSiemens/centimeter.
MTU= Nephelometric turbidity units.
MV= MilliVolts.
U= None detected, value indicated is the quantitation limit.
J= Estimated value.
NM= Not measured.

Analytical Limitations

PCE	5 µg/L
TCE	5 µg/L
VC	2 µg/L
PH	6.0 – 8.5
BOD	10 mg/L

7.0 COST AND SCHEDULE PERFORMANCE

Delivery Order 48 involved several phases of work including site studies and characterization; pilot tests; design; construction; and O&M. Table 7.1 provides a summary of the funding received for each phase and the actual expenditures based on Bechtel's invoiced costs.

Figure 7.1 provides a summary schedule for the construction and operation phase of the Delivery Order

8.0 REFERENCES

1. S&ME, "Tetrachloroethylene Contamination Assessment and Conceptual Corrective Action Plan, US Marine Corps Recruit Depot Dry Cleaning Facility," June 1994

2. RUST Environment, "Remedial Action Plan - MCRD Parris Island South Carolina," August 1993

3. Bechtel, "Technical Memorandum For Well Installation and Air Sparging Pilot Test," December, 1996

4. Bechtel, "Engineering Evaluation and Interim Removal Remedial Work Plan, Site 45/SWMU 45, Dry Cleaners Facility, Building 193, MCRD, Parris Island, South Carolina," December, 1997

5. Wisconsin Department of Natural Resources "Guidance for Design, Installation and Operation of In Situ Air Sparging Systems," Publ-SW186-93 September 1993 and Errata Sheet dated August 11, 1995

TABLE 7.1
D.O. 048, PARRIS ISLAND, SITE 45
COST SUMMARY

TOTALS IN 1000'S:

PRE-CONSTRUCTION SUBMITTALS AND WORK / IMPLEMENTATION PLANS:

BUDGET:	$275
COSTS:	$275
DIFFERENCE:	$0

DIRECT PUSH EFFORT:

BUDGET:	$83
COSTS:	$83
DIFFERENCE:	$0

PILOT TEST:

BUDGET:	$69
COSTS:	$67
DIFFERENCE:	$2

TREATMENT SYSTEM INSTALLATION:

BUDGET:	$431
COSTS:	$379
DIFFERENCE:	$52

O&M:

BUDGET:	$183
COSTS:	$201
DIFFERENCE:	($18)

TOTAL D.O. 048:

BUDGET:	$1,041
ACTUALS:	$1,005
DIFFERENCE:	$36

Activity ID	E[illegible] S[illegible]	Early Finish
1000	04MAR98A	06MAR98A
1010	10MAR98A	23MAR98A
1020	09MAR98A	09MAR98A
1030	26MAR98A	26MAR98A
1040	19MAR98A	19MAR98A
2000	06MAR98A	27MAR98A
2100	23MAR98A	26MAR98A
2200	06MAR98A	19MAR98A
2210	09MAR98A	17MAR98A
2220	09MAR98A	01APR98A
2230	11MAR98A	17MAR98A
2240	30MAR98A	27MAY98A
2250	31MAR98A	31MAR98A
2260	26MAR98A	27MAR98A
3000	26MAR98A	06MAY98A
3010	01APR98A	15APR98A
3020	26MAR98A	14APR98A
3025	06APR98A	06APR98A
3030	24MAR98A	15APR98A
3040	27APR98A	06MAY98A
4000	23MAR98A	30APR98A
4010	01APR98A	03APR98A
4020	16APR98A	28APR98A
4030	23MAR98A	01APR98A
4040	13APR98A	30APR98A
5000	30APR98A	30APR98A
5010	30APR98A	30APR98A
5020	16APR98A	30APR98A
5030	30JUN98A	30MAR00A

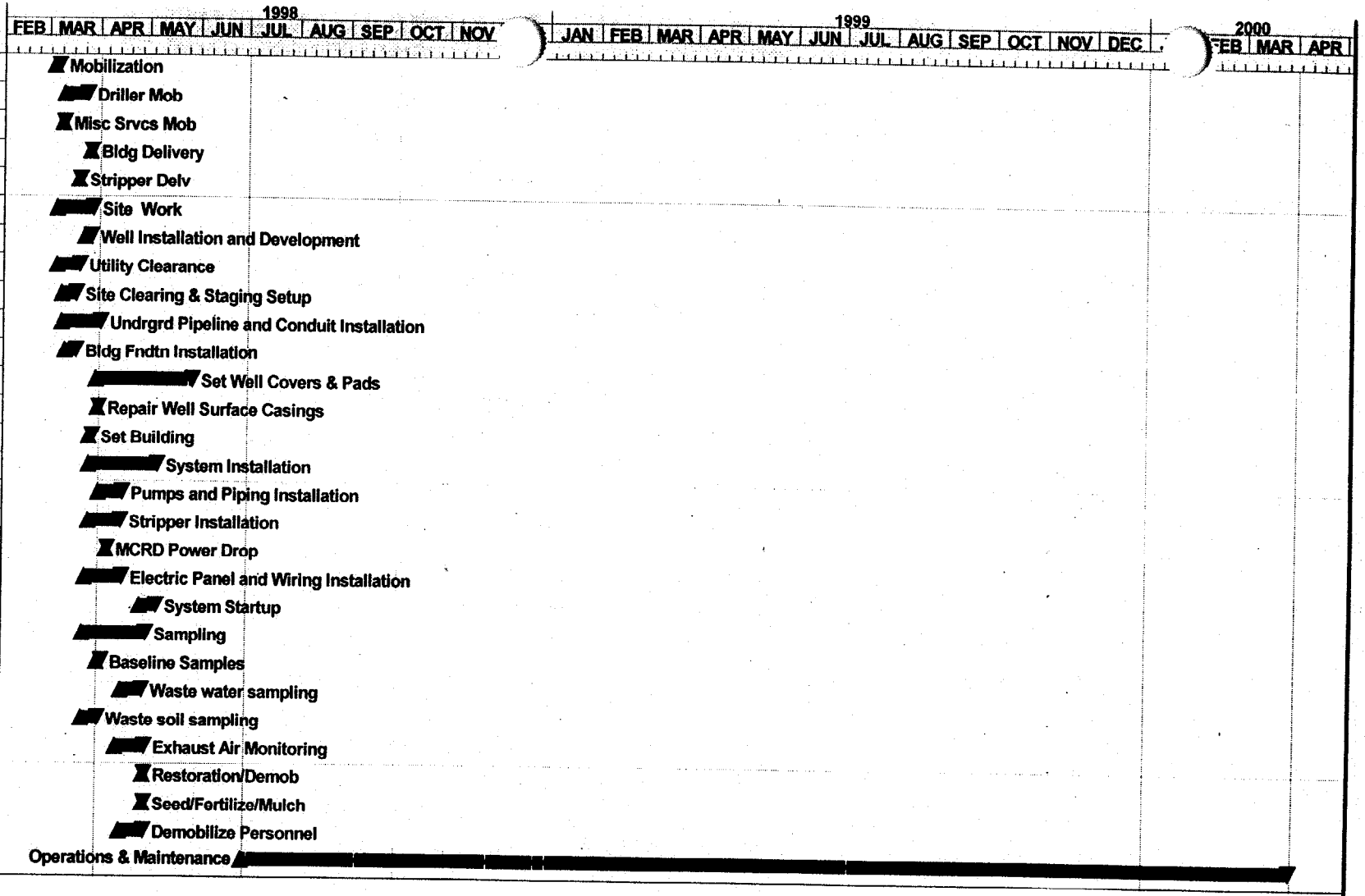


Figure 7.1

Project Start	02MAR98
Project Finish	30MAY00
Data Date	31MAY00
Run Date	27JUN00

Early Bar
Float Bar
Progress Bar
Critical Activity

© Primavera Systems, Inc.

145G

Sheet 1 of 1

MCRD PARRIS ISLAND - D.O. 0048
Dry Cleaner Building 193
Project Schedule

APPENDIX A

PERMITS AND REGULATORY CORRESPONDENCE

Bechtel

Oak Ridge Corporate Center
151 Lafayette Drive
P.O. Box 350
Oak Ridge, Tennessee 37831-0350

Telephone: (423) 220-2000

DEC 12 1996

Mr. Rob Devlin
South Carolina Department of Health
& Environmental Control
Division of Groundwater Protection
2600 Bull Street
Columbia, SC 29201

SUBJECT: Bechtel Job No. 22567
Department of the Navy Contract No. N62467-93-D-0936
DO#48, UNDERGROUND INJECTION CONTROL PERMIT APPLICATION FOR THE AIR SPARGING PILOT STUDY TEST, DRY CLEANING FACILITY, MARINE CORPS RECRUIT DEPOT (MCRD) PARRIS ISLAND, SC
Subject Code: 7550/145

Dear Mr. Devlin:

Enclosed is the signed Underground Injection Control Permit Application for the air sparging pilot study test being conducted at the MCRD Dry Cleaning Facility, Parris Island, SC. The faxed version was sent to you on Thursday, December 12, 1996. The additional information requested in the instructions to Form 1 was sent to you by fax last week but is also attached for completeness.

If you require any further explanation or additional information, please call me at (423) 220-2167.

Sincerely,

Karen S. Atchley
Project Manager

KSA:rcs:LR1032:
Enclosure: As stated

cc: Scott Glass, SouthDiv
Tim Harrington, MCRD Parris Island, SC

000061

Form 1 UIC	South Carolina Department of Health and Environmental Control Ground-Water Protection Division **Underground Injection Control Permit Application** (Collected under the authority of Title 48 Chapter 1 of the 1976 South Carolina Code of Laws)	I. EPA ID NUMBER U

Read attached instructions before starting.
For Official Use Only

Application Approved month day year	Date Received month day year	Permit/Well Number

Comments

II. Facility Name and Address	III. Owner/Operator and Address
Facility Name: DRY CLEANER FACILITY	Owner/Operator Name: MARINE CORPS RECRUIT DEPOT
Street Address: SAMOA STREET	Street Address:
City State Zip Code: PARRIS ISLAND S.C. 29905	City State Zip Code: PARRIS ISLAND S.C. 29905

IV. Ownership Status (Mark "x")

☒ A. Federal ☐ B. State ☐ C. Private
☐ D. Public ☐ E. Other (Explain)

V. SIC Codes

VI. Well Status (Mark "x")

☐ A. Operating — Date Started month day year

☐ B. Modification/Conversion ☒ C. Proposed

VII. Type of Permit Requested - Class and Type of Well (see reverse)

A. Class(es) enter code(s)	B. Type(s) enter code(s)	C. If class is "other" or type is code "x", explain	D. Number of wells per type (if area permit)

VIII. Location of Well(s) or Approximate Center of Field or Project

C	A. Latitude				B. Longitude			
I		Deg	Min	Sec		Deg	Min	Sec

IX. Attachments

Complete the following questions on a separate sheet(s) and number accordingly; see instructions.
For Classes II, III and V, complete and submit on separate sheet(s) Attachments A-U (pp) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.

X. Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. Name and Title (Type or print)	B. Phone No.
KAREN S. ATCHLEY	(423) 220-2167
C. Signature: Karen S. Atchley	D. Date Signed: 12/12/96

4.1 INSTALLATION OF MONITORING WELLS

Eight pairs of monitoring wells will be installed and developed at 7 and 14 ft depths at locations shown on Figure 1. Well construction details are shown in Figure 2. The locations are based on groundwater flow and contaminant migration obtained from the field screening phase conducted during the summer of 1996. The upgradient well cluster located to the north will provide background data for comparison with other wells and will be used to determine groundwater flow direction.

The four downgradient well clusters, located to the south will provide surveillance on the contaminant migration pathways and the horizontal extent of contamination. The three well clusters located in the potential source area will be used to verify the results from the direct push sampling and provide information on extent of soil contamination to fully evaluate technology options.

Each well cluster will consist of two wells, one screened at the 7 ft layer and one screened at the 14 ft layer installed in a single borehole. The maximum contamination found at any level below 14 ft was several orders of magnitude less than the levels detected at the 7 and 14 ft layers. The contamination observed at the deeper layers will not be included in this network. Long term monitoring at the site may require additional deeper wells. These would not be necessary as part of this interim action.

4.2 GROUNDWATER SAMPLING

Groundwater samples will be collected from all the monitoring wells and analyzed for the parameters listed on Table 1.

4.3 SOIL SAMPLING

During the installation of the monitoring wells, soil samples will be collected on a continuous basis. This sampling information will provide lithology information about the substrata. Samples collected from the vadose zone from the three wells in the higher contamination zone will be sent to an offsite laboratory for VOC analysis. Geotechnical samples will be analyzed for soil properties by an offsite laboratory.

Additional vadose zone soil samples will be collected using split spoon samplers. These samples will be analyzed for parameters identified in Table 2. Shelby tube samples will also be collected in the 7 ft. vadose zone and tested for permeability.

4.4 AIR SPARGING PILOT STUDY SYSTEM DESCRIPTION

The air sparging pilot study system will consist of the following:

- One sparging well and five observation wells
- An air compressor and air filter
- Valves, gages, and flow meters for controlling and monitoring the system
- Pressure transducers, datalogger, and air sampling equipment
- Peristaltic pump for collecting groundwater samples
- Helium tracer gas cylinder and controls

See Figure 3 for details of the air sparging pilot system.

4.4.1 Air Sparging And Observation Well Descriptions

The 14-ft. deep upgradient well located to the north will be used as the air sparging well. The actual depth will be determined in field before installation of the well. Four observation wells will be constructed with PVC casing as shown on Figure 2. These wells are temporary and will be abandoned upon completion of the pilot test. The observation wells will be clustered similar to the monitoring wells, and will be located at 10 ft. and 20 ft. from the air sparging well. The 7 ft. deep well cluster with the upgradient well will be used as an observation well during the pilot test.

4.4.2 Air Compressor And Associated Equipment

The air compressor that will provide the air for the pilot study will be capable of generating air flows in the ranges of 5 to 30 scfm with accompanying pressures of 5 to 10 psi. The air flow will be monitored by a pressure indicator and a flow meter. The total flow will be controlled by a gate valve. The compressed air will be filtered to remove particles and oil before injection into the sparging well.

4.4.3 Tracer Gas

Helium will be used as a tracer gas in the pilot study and will be injected into the air sparging well. Helium is an inert gas that is ready available and is easy to detect with field instruments. Helium is not a toxic material and is an ideal candidate for use as a tracer gas.

4.4.4 System Operation

The pilot study will establish the following parameters:

- Radius of influence of the air sparging well
- Optimum flow rate and pressure
- Oxygen levels in the groundwater
- Oxygen and carbon dioxide levels in the vadose zone directly above the groundwater

The system will be operated with increasing pressures. Pressures will be adjusted between 5 and 10 psi. The corresponding flow rates will be recorded. The system will be operated at least 4 hours at each flow rate. Flow rates, pressures, and operation times will be adjusted in the field as necessary.

4.4.5 System Monitoring

The five observation wells will be monitored or sampled for the following attributes during system operation:

- Water level changes in the wells will be measured and recorded before, during and after system operation. This data will be collected with a datalogger and transducers in each well. Water levels will be measured for two hours after system shut down.
- Air pressure changes in the observation wells will be measured with magnehelic differential pressure gages or other comparable equipment. These levels will be measured every one-half hour from start up until 2 hours after system shutdown.
- Air samples will be collected from the observation wells and analyzed for oxygen, carbon dioxide, and helium. These levels will be measured prior to start up and every one-half hour from start up until 2 hours after system shutdown.
- Groundwater samples will be collected and analyzed for dissolved oxygen levels. These levels will be measured prior to start up and every one-half hour from start up until 2 hours after system shutdown.

Figure 4 details the monitoring well configuration.

~~4.5 VAPOR EXTRACTION DESIGN PARAMETERS~~

A vapor extraction system ~~has been~~ operational at ~~Parris Island~~ for over one year. Operation ~~data from that system will be reviewed to determine if enough data exists to design the vapor~~ extraction system portion ~~of the~~ removal action at the Dry ~~Cleaners.~~ If this data is inconclusive, a pilot study ~~will need~~ to be performed at the Dry Cleaners. This pilot ~~study could~~ use the same ~~wells~~ and equipment as the air sparging pilot study.

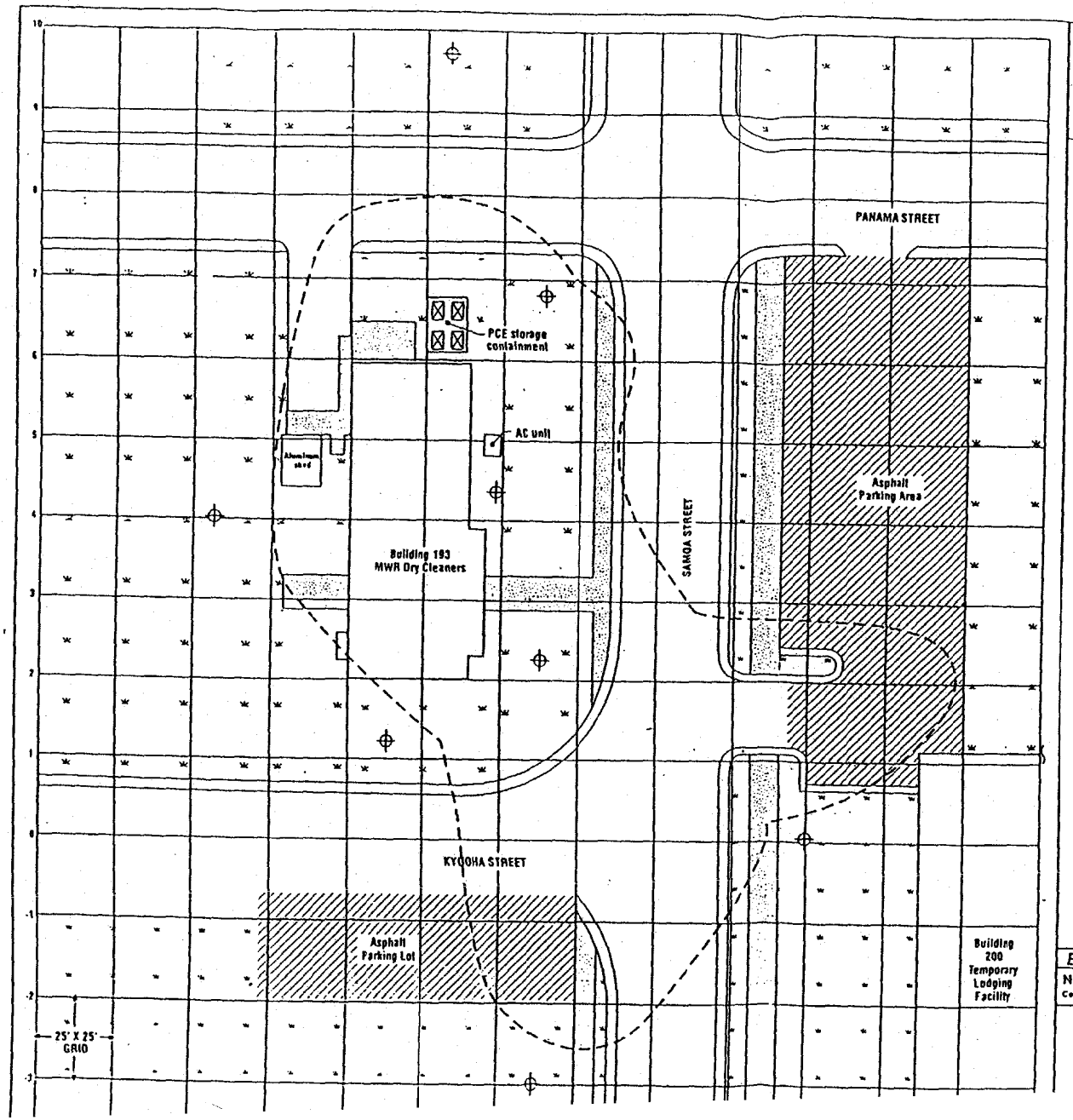
~~5.0 WASTE MANAGEMENT~~

Waste minimization will be an ongoing part of the field effort as a means to reduce or eliminate the generation of investigation-derived waste that would require special handling. Investigation-derived waste will be managed on the principle that to the extent possible, no contamination will be added or taken from the site.

Disposable plastic (sheeting, gloves, personal protective equipment, etc.) that is soiled or visibly ~~contaminated from a location within the contaminated area will be decontaminated and reused or~~ disposed as garbage.

The drill cuttings and development water from the three wells inside the plume is a hazardous waste. They will be drummed, sampled and analyzed for waste profile; and stored at the Parris Island Waste Storage Facility. The base will dispose of the waste.

Drill cuttings and development water from the five remaining wells outside the plume will be disposed of on base.



LEGEND

- Combined 7' and 14' >MCLs
- PCE Tetrachloroethylene
- ppb parts per billion
- ppm parts per million
- Well cluster with 7' & 14' deep wells

Bechtel

Navy Rac Project

Contract No. N62467-93-D-0936

MCRD Parris Island, SC
Groundwater

Proposed Monitoring Well Network

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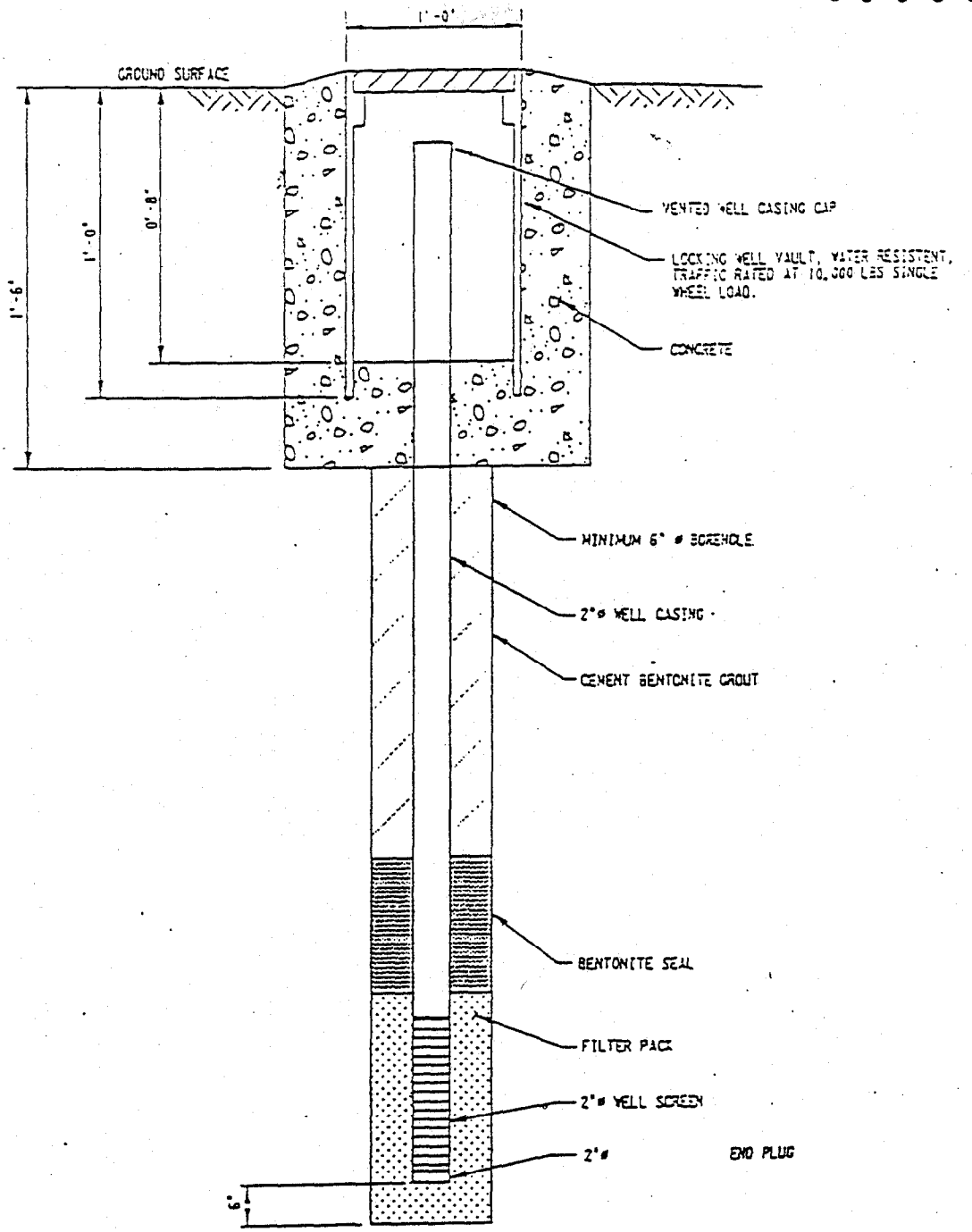

WELL ID #
DATE CONSTRUCTED
DRILLER NAME
DRILLER CERT. NO.
WELL DEPTH (bgs)
ELEV. T.O.C.
STATIC WATER LEVEL

BECHTEL

Typical Monitoring Well
with Below Ground Completion

Figure 2

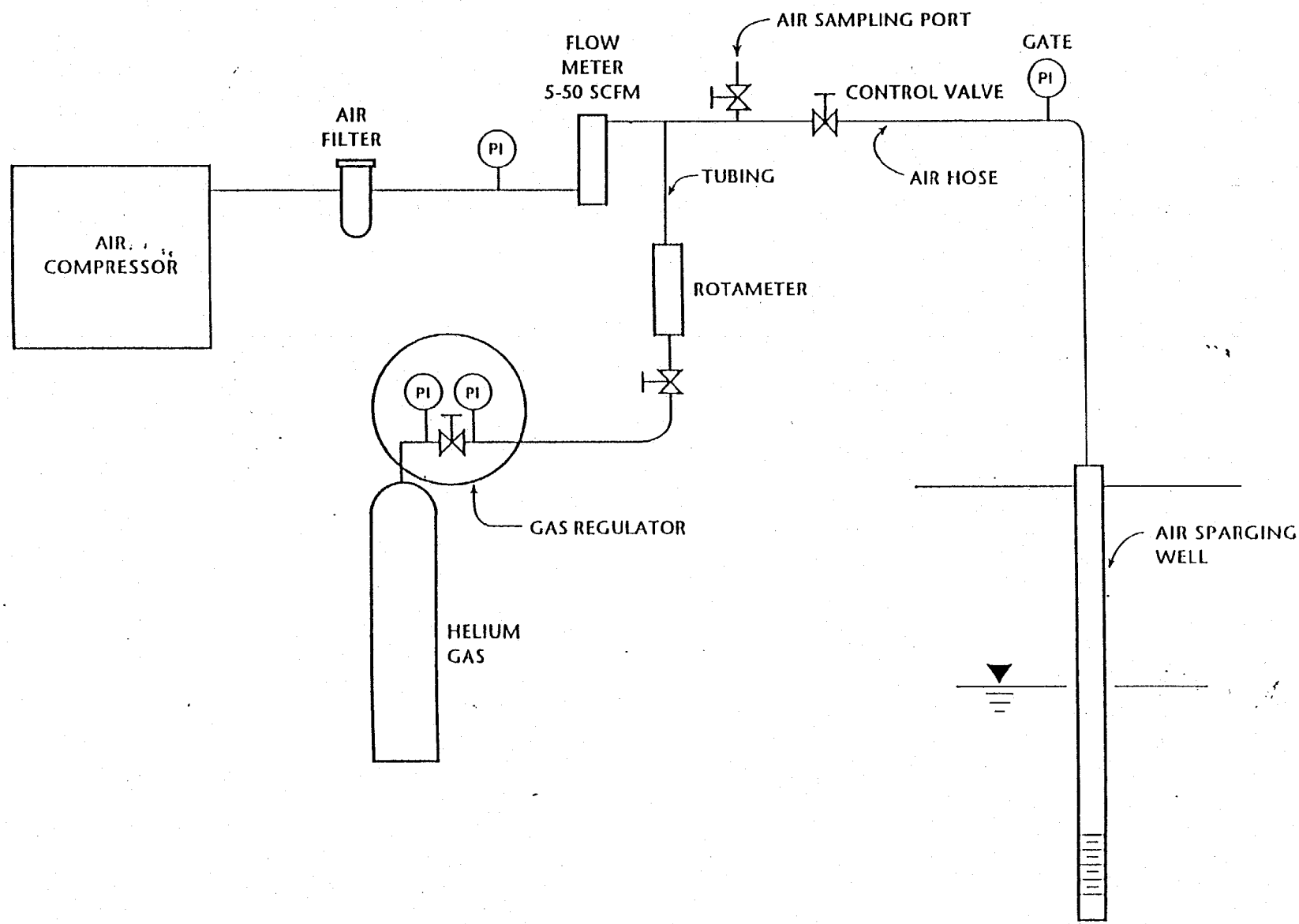

FIGURE 3. AIR SPARGING SYSTEM

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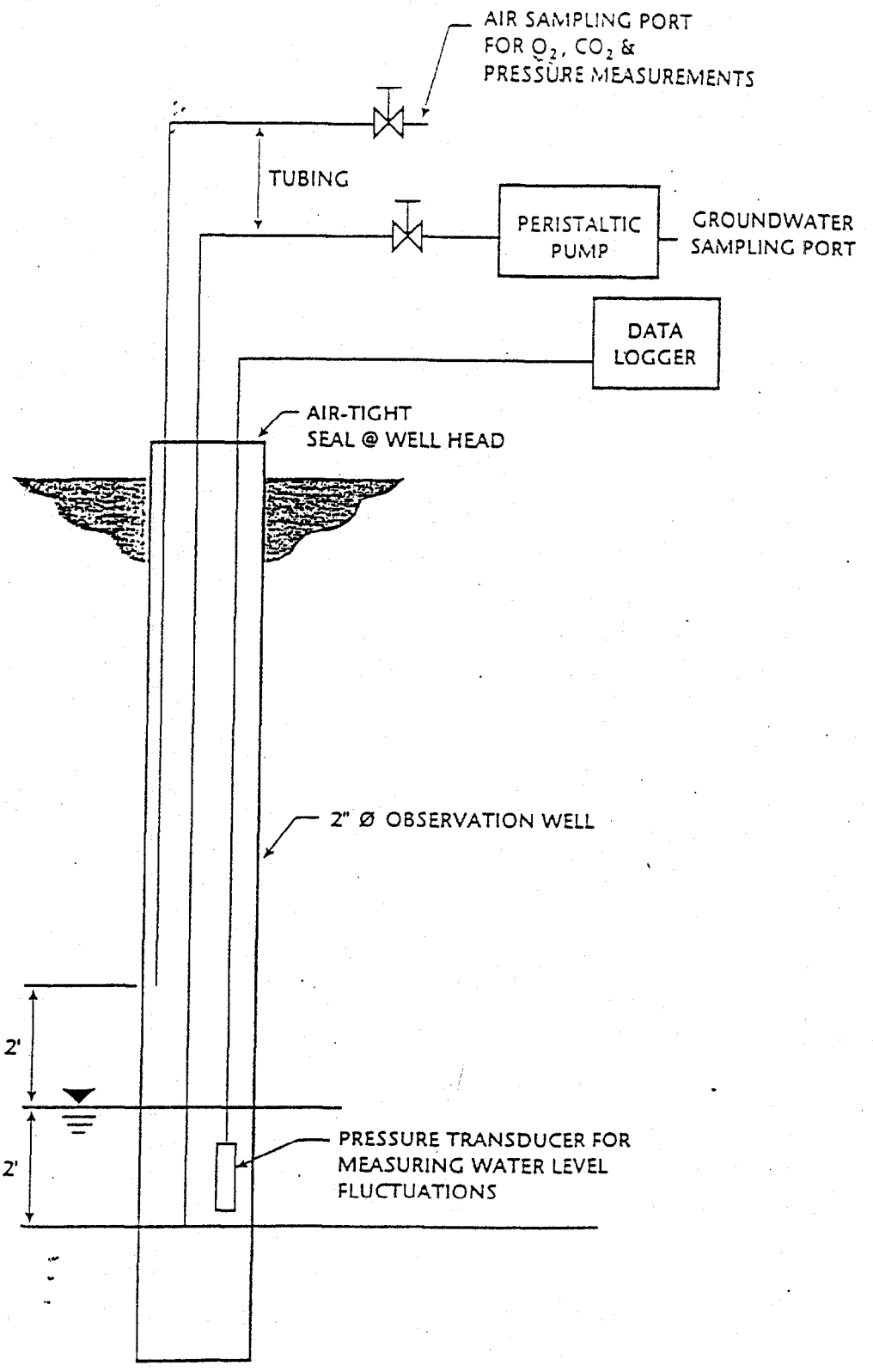

FIGURE 4. AIR SPARGING OBSERVATION WELL MONITORING DETAILS

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201-1708

Commissioner: Douglas E. Bryant

Board: John H. Burriss, Chairman
William M. Hull, Jr., MD, Vice Chairman
Roger Leaks, Jr., Secretary
Richard E. Jabbour, DDS
Cyndi C. Mosteller
Brian K. Smith
Rodney L. Grandy

Promoting Health, Protecting the Environment

December 12, 1996

Karen Atchley
Bechtel Environmental
151 Lafayette Drive
Oak Ridge, TN 37831-0350

Re: Underground Injection Control Permit Application
MCRD Dry Cleaner Facility
Beaufort County

Dear Ms. Atchley

Enclosed is an Permit to Construct for one (1) Class VA-I (Aquifer Remediation) injection well at the MCRD Dry Cleaner Facility facility as per your application dated December 12, 1996. An inspection of the UIC system must be conducted by the Department prior to operation. Please call my office to schedule a time and date for the inspection.

If you have any questions, please feel free to call me at (803) 734-4672.

Sincerely,

Robert J Devlin, Hydrogeologist
Ground Water Assessment & Development Section
Water Monitoring, Assessment & Protection Division
Bureau of Water

cc: Don Hargrove, BSHWM

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South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201-1708

Commissioner: Douglas E. Bryant

Board: John H. Burriss, Chairman
William M. Hull, Jr., MD, Vice Chairman
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Promoting Health, Protecting the Environment

Richard E. Jabbour, DDS
Cyndi C. Mosteller
Brian K. Smith
Rodney L. Grandy

GROUND-WATER PROTECTION DIVISION

Injection Well Construction Permit
for

Class II, III, and V.A. Injection Well(s)

Permit #268 Date Issued: December 12, 1996

For (Operator): MCRD Dry Cleaner Facility

In accordance with provisions of Title 48, Chapter 1, South Carolina Code of Laws, 1976, as amended, permission is granted for construction of one (1) Class V.A.-I injection well with a true diameter of 2 inches, a total depth ranging from 15 feet to 35 feet and having a cased depth ranging from 10 feet to 15 feet located at the MCRD Dry Cleaner Facility facility,Marine Corps Recruit Depot, South Carolina with the following provisions:

1) The operator shall submit completed SCDHEC well record forms to the Department's Ground-Water Protection Division after the completion of the injection well.

2) Upon completion of construction, injection activities shall not commence prior to receiving approval from the Department to operate these injection well.

3) When the injection well(s) is no longer in use, or upon request by the Department, within 60 days all injection well must be permanently abandoned in accordance with the South Carolina Well Standards and Regulations (R.61-71.10).

Robert Devlin, Hydrogeologist
Assessment & Development Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

December 12, 1996
Date

DHEC 2104 (6/88)

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STATEMENT OF BASIS - UIC DRAFT PERMIT #268

In accordance with the South Carolina Underground Injection Control Regulations, Section R61-87.12,J., this "Statement of Basis" has been prepared for the MCRD Dry Cleaner Facility Underground Injection Control permit application dated December 12, 1996.

Ownership of the proposed injection well(s) is MCRD Dry Cleaner Facility, Marine Corps Recruit Depot. The permit (UIC #268) is for the construction of one (1) injection well for an air sparging pilot test at the MCRD Dry Cleaner Facility facility. The intent of the injection well is to determine a radius of influence by the injection of ambient atmospheric air and a helium tracer into the subsurface. The draft permit for the underground injection proposal has been prepared based on staff review and the application of the Pollution Control Act of South Carolina and the Underground Injection Control Regulations of South Carolina.

Conditions of the permit issuance include the submittal of well records for all injection well installed and the inspection of well construction by the Department prior to injection.

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201-1708

Commissioner: Douglas E. Bryant

Board: John H. Burriss, Chairman
William M. Hull, Jr., MD, Vice Chairman
Roger Leaks, Jr., Secretary
Richard E. Jabbour, DDS
Cyndi C. Mosteller
Brian K. Smith
Rodney L. Grandy

Promoting Health, Protecting the Environment

December 17, 1996

Karen Atchley
Bechtel Environmental
151 Lafayette Drive
Oak Ridge, TN 37831-0350

Re: Underground Injection Control Approval to Operate
Marine Corps Recruit Depot MCRD-Dry Cleaner
Beaufort County

Dear Ms. Atchley:

Enclosed is an Approval to Operate for one (1) Class VA-I (Aquifer Remediation) injection wells at the referenced site as per our inspection on December 12, 1996.

If you have any questions, please feel free to call me at (803) 734-4672.

Sincerely,

Robert Devlin, Hydrogeologist
Water, Monitoring, Assessment, & Protection Section
Ground Water Protection Division
Bureau of Drinking Water Protection

CC: Jim White, Low Country District EQC

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Department of Health and Environmental Control
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Promoting Health, Protecting the Environment

Richard E. Jabbour, DDS
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Brian K. Smith
Rodney L. Grandy

GROUND-WATER PROTECTION DIVISION

Injection Well Operating Approval
for

Class II, III, and V.A. Injection Well(s)

Permit #268

Date of Issue: December 12, 1996

In accordance with the provisions of Title 48, Chapter 1, South Carolina Code of Laws, 1976, as amended, and pursuant to receiving a Permit to Construct one (1) Class V.A.-I (Aquifer Remediation) injection well, authorization is granted to Marine Corps Recruit Depot to operate (1) Class V.A.-I injection well located at the MCRD-Dry Cleaner Site, Parris Island, South Carolina, is subject to the attached provisos noted for the operator.

Pursuant to Title 48, Chapter 1, South Carolina Code of Laws, 1976, as amended, this authorization may be rescinded if these injection well should, at any time, contaminate, pollute, or otherwise adversely affect other water in the vicinity or for any other conditions contained in R61-87, Title 48, Chapter 1, South Carolina Code of Laws, 1976, as amended.

Expires: January 12, 1997

Robert Devlin

Robert J. Devlin, Hydrogeologist
Groundwater Assessment & Development
Water Monitoring, Assessment, & Protection Division
Bureau of Water

December 12, 1996
Date

DHEC 2104 (6/88)

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Provisos to the Injection Well Operating Approval
for
Underground Injection Well Permit #268
Marine Corps Recruit Depot
Beaufort County, S.C.
December 12, 1996

1) Construction of new or abandonment of existing wells must be reported to the Department within thirty (30) days of completion.

2) Only clean ambient atmospheric air may be injected into the subsurface. Any changes in the system operation other than as presented in the UIC Permit Application must be reported to the Department prior to implementation.

145 - 00 - 97

Bechtel

Oak Ridge Corporate Center
151 Lafayette Drive
P.O. Box 350
Oak Ridge, Tennessee 37831-0350
Telephone: (423) 220-2000

NOV 10 1997

Ken Dantzler
Bureau of Air Quality
SCDHEC
2600 Bull St.
Colombia, SC 29201

SUBJECT: Bechtel Job No. 22567
Department of the Navy Contract No. N62467-93-D-0936
DO 0048: SITE 45/SWMU45, DRY CLEANERS FACILITY, INTERIM REMOVAL ACTION AIR PERMITTING REQUIREMENTS, MARINE CORPS RECRUITING DEPOT, PARRIS ISLAND, SOUTH CAROLINA
Subject Code: 7510

Dear Mr. Dantzler:

I spoke to you briefly a couple weeks ago to discuss the air permitting requirements for a pump and treat system that is being planned for the dry cleaner's facility at MCRD, Parris Island. You suggested that I gather the pertinent information and submit it to you for a determination if an air permit would be required.

A spill of tetrachloroethlene (PCE) occurred at this site in March 1994, when the storage tanks were overfilled. The Depot removed the contaminated soils, but the groundwater is contaminated at the site. An Interim Removal Action has been proposed to install a pump and treat groundwater remediation system to remove the central portion of the plume. The groundwater will be pumped from three wells and treated by air stripping prior to discharge to the Depot's wastewater treatment plant.

Enclosed, please find some very conservative calculations on the amount of air emissions that this system could generate (2.91 lbs/day or 87.3 lbs/month). These calculations are based on the latest groundwater sampling data. Normally, when systems like this start operation, the emissions will be the highest at the start and drop quickly with time. Also enclosed is Figure 1.5 detailing the latest groundwater data and the drawing showing the proposed recovery well locations.

If you have any questions, please feel free to call me at (423) 220-2271 or Karen Atchley at (423) 220-2167.

Sincerely,

Roy Hoekstra
Project Engineer

REH:dcm:LR1437
Enclosure: As stated

cc: A. Sanford (SouthDiv) w/enc.
T. Harrington (MCRD) w/enc.

Bechtel Environmental, Inc.

Estimate of Air Emissions from Pump and Treat Air Stripper - Dry Cleaners Facility - Parris Island

Levels of Contaminants in the monitoring wells in the center of the plume (ppb)

Contaminant	Well 8-MW	Well 7-MW	Well 6-MW
PCE	32,000	60,000	1,200
TCE	4,800	15,000	2,800
cis 1,2 DCE	1,100	3,800	220
trans 1,2 DCE	nd	nd	8.3
vinyl chloride	nd	nd	170
Total Solvents	37,900	78,800	4,398

avg = 40,400ppb or 40.4 ppm

Assume pump and treat contamination levels to be the same as the monitoring wells.

Assume pumping rate of 2 gpm per well

Weight of water pumped in 24 hours at 6 gpm

6gpm x 8.34 lbs/gal x 60 minutes x 24 hours/day = 72,060 lbs/day

Air emissions per day = 72060 x 40.4/1,000,000 = 2.91 lbs/day or 87.3 lbs/month

D H E C
MOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

145- 00098

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November 14, 1997

Mr. Roy Hoekstra
Bechtel Environmental, Inc.
P.O. Box 350
Oak Ridge, Tennessee 37831-0350

Re: Permit determination for air stripper at the MCRD, Parris Island Dry Cleaning Facility: File 0360-0002

Dear Mr. Hoekstra

The Department has received your letter dated November 10, 1997, requesting a permit determination be made for a pump and treat system at the Marine Corps Recruiting Depot, Parris Island Dry Cleaning facility. At this time the Department has determined that a construction permit will not be needed. This determination has been made based upon the information submitted in the above request. All air toxic emissions fall well below modeling and permitting de minimus levels. If there are any changes in the process which might increase the potential release of any regulated air pollutant, the Department must be notified in advance of such change.

If you have any further questions, feel free to contact me at (803) 734-9339.

Sincerely,

Ken Dantzler
Engineering Services Division
Bureau of Air Quality

cc: Commanding General, U.S. Marine Recruit Depot
Jennifer Minor, Low Country EQC District

DEC 1 1997

Electronic File Copy
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by SouthDiv

MONITORING WELL APPROVAL

Approval is hereby granted to: Commanding Officer
Department of the Navy
SOUTHNAVFACENGCOM
ATTN: Art Sanford (Code 1862)
2155 Eagle Drive
N. Charleston, SC 29406

Date of Issue: 12 March 1998

Approval Number: HW-98-011

Facility: Marine Corps Recruit Depot
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

For the installation of up to three (3) groundwater recovery monitoring wells as follows:

1. Three (3) groundwater recovery monitoring wells to be installed at the locations specified on the attached figure.

2. The wells are to be labeled as R-1, R-2, and R-3 as shown on the attached figure.

3. The actual depth for each groundwater recovery monitoring well will be 17 feet below ground surface (bgs) with a screened interval from 4-12 feet bgs.

Conditions:

1) That the monitoring wells be installed by a well driller certified by the state of South Carolina. And that the certified well driller must be present during all phases of drilling, construction, and completion of these monitoring wells.

2) That investigation derived waste including, but not necessarily limited to, drill cuttings, drilling fluids, development and purge water, be managed properly and in compliance with all applicable requirements. If containerized, each vessel shall be clearly labeled with regard to contents, source, and date of activity.

3) That the latitude, longitude and actual construction details be submitted to the Department within 30 days after installation of the last monitoring well.

4) That the monitoring wells be labeled with an identification plate constructed of a durable material affixed to the casing or surface pad where it is readily visible. The plate shall provide the well identification number, date of construction, static water level and driller name and certification number.

5) A minimum of (48) hours prior to initiation of drilling activities, provide notice to James White, District Hydrogeologist, at Low Country District EQC Office (803)522-9097.

22567·145-SC-0801-0011-(1)-1

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the Department of Environmental Control's Regulation R.61-71.

Approval granted by:

_____

Donald C. Hargrove, Hydrogeologist
Bureau of Land and Waste Management
South Carolina Department of Health and
Environmental Control

Attch: Drawing #145-D000-002, Rev.B,
Groundwater Treatment System

cc: Susan Peterson, Corrective Action Engineering
James White, Low Country District EQC
Kenneth Lapierre, Federal Facilities Section, USEPA Region IV

DD980166.DCH

22567-145-SC-0801-0010-(1)-1

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2600 Bull Street
Columbia, SC 29201-1708

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Rodney L. Grandy

145- 00138

27 1998

April 22, 1998
Expiration Date: July 22, 1998

General Engineering, Inc.
Attention: Mr. Richard Garcia
Post Office Box 30712
Charleston South Carolina 29417

RE: Parris Island Soil Disposal
SSR #98105
Beaufort County

Dear Mr. Garcia:

This office hereby grants approval for your company to have non-hazardous waste transported to the Southeastern Soil Recovery incinerator in Dorchester County for thermal treatment. As per the letter dated April 16, 1998, the waste is described as approximately eight (8) drums of soil cuttings from a former dry cleaning facility on Parris Island.

The following restrictions apply to the Southeastern Soil Recovery facility:

1. Prior approval must be obtained from the appropriate facility officials.
2. The District Solid Waste Consultant must be notified of your intent to dispose.
3. Precautions must be taken to prevent spillage or leakage during transport.
4. Weekend or holiday disposals are prohibited without prior notification of the appropriate district representative.

5. The waste stream must be compatible with the facility and not adversely affect the safe and efficient operation of the unit.

6. All State and Federal Air Quality Regulations which are applicable to the facility and its operations, must be strictly compiled with.

7. This approval will be for **ONE TIME ONLY**. The company must notify this office in writing when a new approval letter is to be issued.

Sincerely, for F. M. CARNS

F. M. Carns
Waste Assessment Section
Bureau of Land and Waste Management

FMC:aag
cc: Kirk Schneider, Air Quality Control EQC
Robert K. Willms, Jr., Southeastern Soil Recovery, Inc.
Sue Schweikart, Trident District EQC
Leland McCormick, Low County District EQC
Amy Hafer

APPENDIX B

WELL COMPLETION DIAGRAMS

bhlg

BOREHOLE LOG

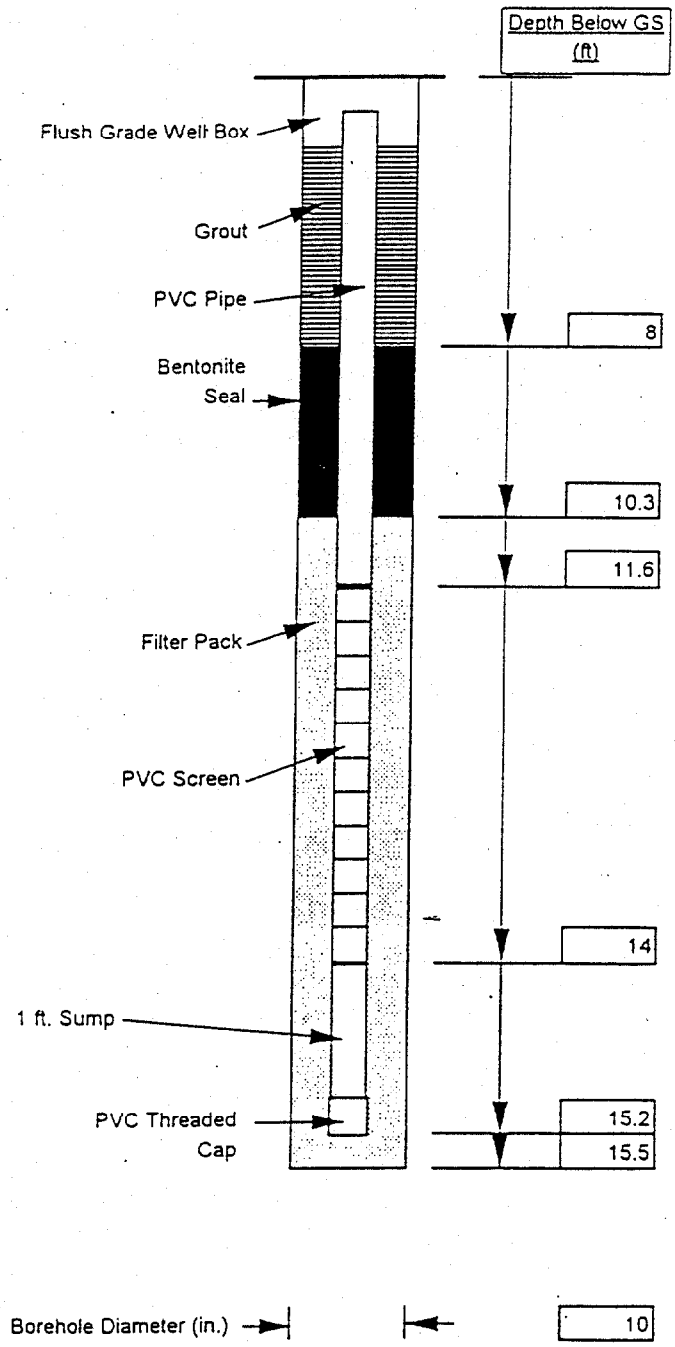
Project Name: Parris Island, SC, MCRD		Borehole No.: 193-1-MW
Project Number: 22567-145	Elevation: 7.81 ft msl	
Location: Bld 193, Dry Cleaners	Date Started: 12/11/96	Date Completed: 12/11/96
Driller: Brian Cornell	Total Depth (ft): 20.0	
Equipment: Mobile B-57	Depth to Bedrock (ft): None	
Drilling Method: Hollow Stem Auger	Hole Diameter (in): 10	
Drilling Fluid: None	Depth to Water (ft): 3.0	
Completion: Completed as Monitoring Well See Well Construction Logs for details	Logged By: P. Linley	Posthole to 4ft BGL

Depth (ft)	Description	Sample Number	Sample Type	% Recovery	Blow Count	Comments
	0-5ft: SAND: *(SP)*, gry blk (N2) to lt brn gry (5YR6/1) to gry org (10YR7/4) to dk yel org (10YR6/6), fine, unconsld, mod well sort, subang to subrd, moist to v moist w/depth.	1	SS	80		2/3/3/5
		2	SS	70		5/6/5/4
5	5-6ft: CLAYEY SAND: *(SC)*, med lt gry (N6) v fine to fine, mod sort, unconsld, subang to subrd, v moist.	3	SS	90		3/2/2/4
	6-8ft: SAND: *(SP)*, lt gry (N7) to gry org (10YR7/4) to dk yel org (10YR6/6) to lt brn (5YR5/6) to med lt gry (N6), fine, mod well sort, unconsld, subang to subrd, wet at 7.5ft.	4	SS	100		5/6/3/2
		5	SS	100		2/2/1/2
10	8ft: SANDY CLAY: *(CL)*, med gry (N5), v fine to fine, unconsld, mod well sort, subang to subrd, v moist to wet.	6	SS	100		6/11/5/3
	8-10ft: CLAYEY SAND: *(SC)*, dk yel org (10YR6/6) to pale yel brn (10YR6/2) to med lt gry (N6), v fine to fine, unconsld, mod poor sort, subang to subrd, v moist to wet, @ 8.5-9ft fine sand lense.	7	SS	100		2/1/2/1
15		8	SS	100		2/2/1/1
	10-15.5ft: SAND: *(SP)*, dk yel org (10YR6/6) to gry org (10YR 7/4) to lt gry (N7) to v lt gry (N8), fine, unconsld, mod well sort, subang to subrd, wet @ 11.5ft, minor silt frac 10%.	9	SS	100		2/1/1/2
	15.5-17.7ft: SILTY SAND: *(SM)*, med dk gry (N4) to v pale org (10YR8/2) to gry org (10YR7/4) to med dk gry (N4), v fine to fine, unconsld, mod sort, subang to subrd, v moist.	10	SS	100		3/2/4/2
20	17.7-18ft: SANDY SILTY CLAY: *(CL)*					
	18-19ft: SILTY CLAY: *(CL)*, pale yel org (10YR6/2), v fine to fine, mod sort, unconsld, subang to subrd, v moist.					
25	19-19.3ft: CLAYEY SILTY SAND: *(SM/SC)*					
	19.3-19.7ft: SAND: *(SP)*, pink gry (5 YR8/1) to v lt gry (N8)					
	19.7-20ft: SANDY SILTY CLAY: *(CL)*, med dk gry (N4)					
	20ft: PEAT: *(Pt)*, dusky yel brn (10YR2/2) to brn blk (5YR2/1)					
30						

RECEIVED
JAN 20 1997
BFCHTEL 22567

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-1-MW-D
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/11/96	Coordinates:	N 187454.710
Drilling Equipment:	Mobile B-57	Date Completed:	12/11/96		E 2099308.355
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.57 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	12.3

Backfill

Type	Grout Seal
Length (ft)	8
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	2.3
Placement	Pour

Filter Pack

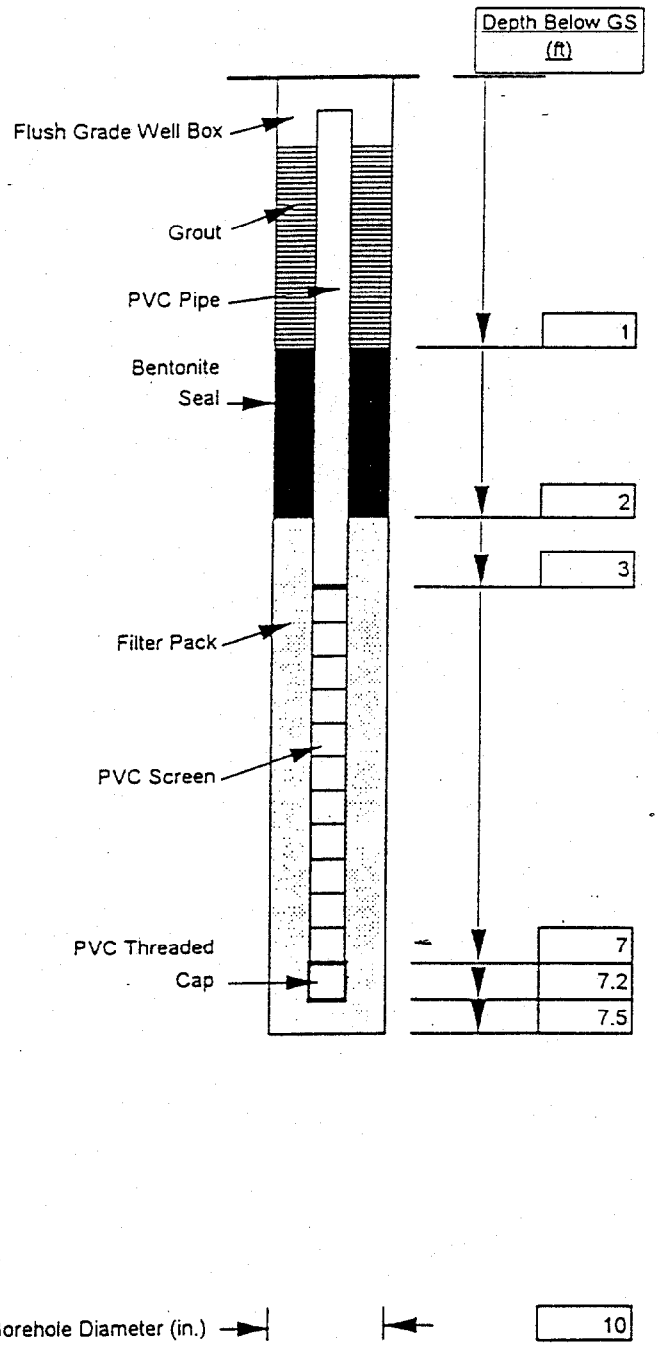
Type	20/30
Length (ft)	5.2
Placement	Pour
Amount Placed	162.5 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	2.4
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-1-MW-S
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/11/96	Coordinates:	N 187455.597
Drilling Equipment:	Mobile B-57	Date Completed:	12/11/96		E 2099298.879
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.6 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	4

Backfill

Type	Grout Seal
Length (ft)	N/A
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	1
Placement	Pour

Filter Pack

Type	20/30
Length (ft)	5.5
Placement	Pour
Amount Placed	325 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	4
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

bhlg

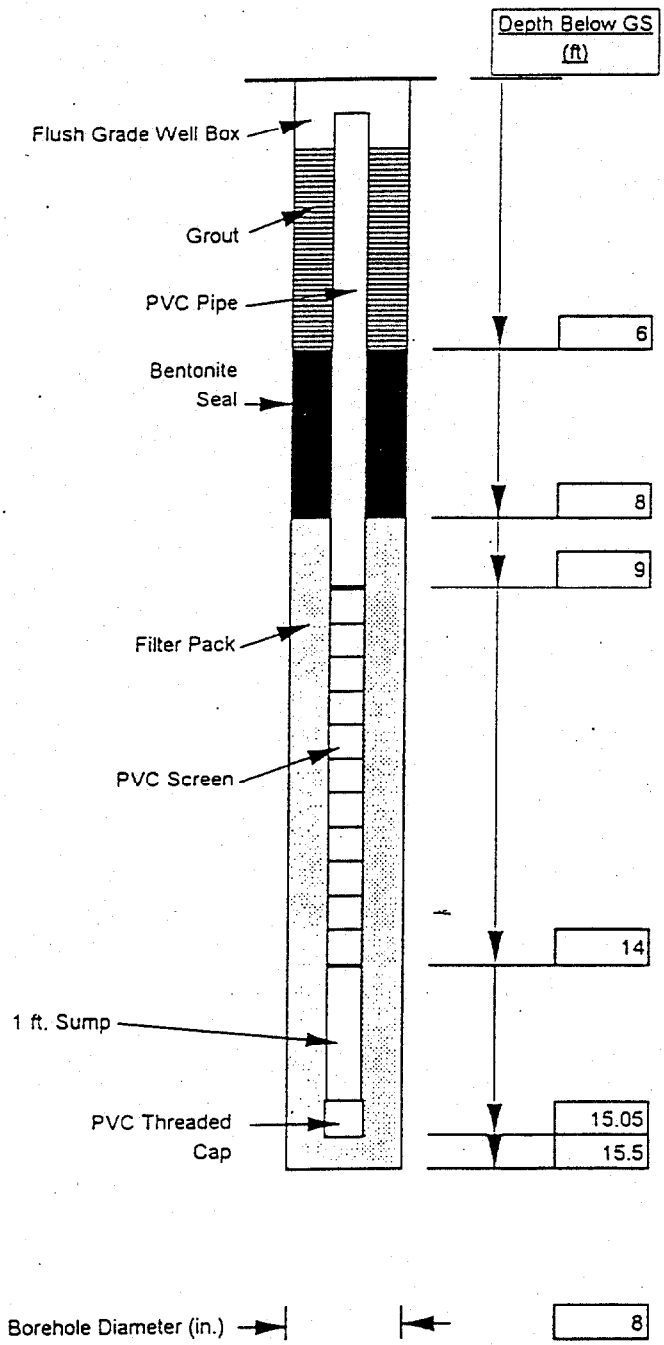
BOREHOLE LOG

Project Name: Parris Island, SC, MCRD		Borehole No.: 193-2-MW
Project Number: 22567-145	Elevation: 7.45 ft msl	
Location: Bldg 193, Dry Cleaners	Date Started: 12/12/96	Date Completed: 12/12/96
Driller: Brian Cornell	Total Depth (ft): 18.0	
Equipment: Mobile B-57	Depth to Bedrock (ft): None	
Drilling Method: Hollow Stem Auger	Hole Diameter (in): 8	
Drilling Fluid: None	Depth to Water (ft): 3.0	
Completion: Completed as Monitoring Well See Well Construction Logs for details	Logged By: P. Linley	Posthole to 4ft BGL

Depth (ft)	Description	Sample Number	Sample Type	% Recovery	Blow Count	Comments
	0-7ft: SAND: *(SP)*, pale yel brn (10YR6/2) to dk gry (N3) to brn gry (5YR4/1) to lt brn gry (5YR6/1) to dk yel org (10YR6/6) fine, unconsld, mod well sort, subang to subrd, moist to v moist, wet at 6ft.	1	SS	40		3/4
5		2	SS	90		9/8/6/7
	7-7.8ft: CLAYEY SAND: *(SC)*, lt gry (N7), v fine to fine, mod sort, subang to subrd, unconsld, wet.	3	SS	100		4/3/3/3
	7.8-15.3ft: SAND: *(SP)*, dk yel org (10YR6/6) to med lt gry (N6) to v lt gry (N8) to pale brn (5YR5/2) to med dk gry (N4) to dk gry (N3), fine, mod sort, subang to subrd, unconsld, wet to saturated, minor silt frac	4	SS	100		2/3/6/4
10		5	SS	100		4/3/3/2
		6	SS	100		3/3/3/2
15		7	SS	100		2/2/2/1
	15.3-18ft: SILTY SAND: *(SM)*, med dk gry (N4) to dk gry (N3) to pale brn (5YR5/2) to pale yel brn (10YR6/2) @ 17ft lt gry (N7) at 17.6ft med dk gry (N4) to dk gry (N3) - clay frac increased to 20%, saturated, note organic matter (wood & roots) at	8	SS	100		1/2/3/3
20	17.8ft: PEAT: *(Pt)*, dusky yel brn (10YR2/2) to brn blk (5YR2/1)					
25						
30						

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-2-MW-D
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/14/96	Coordinates:	N 187341.197
Drilling Equipment:	Mobile B-57	Date Completed:	12/14/96		E 2099201.966
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.23 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	10

Backfill

Type	Grout Seal
Length (ft)	6
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	2
Placement	Pour

Filter Pack

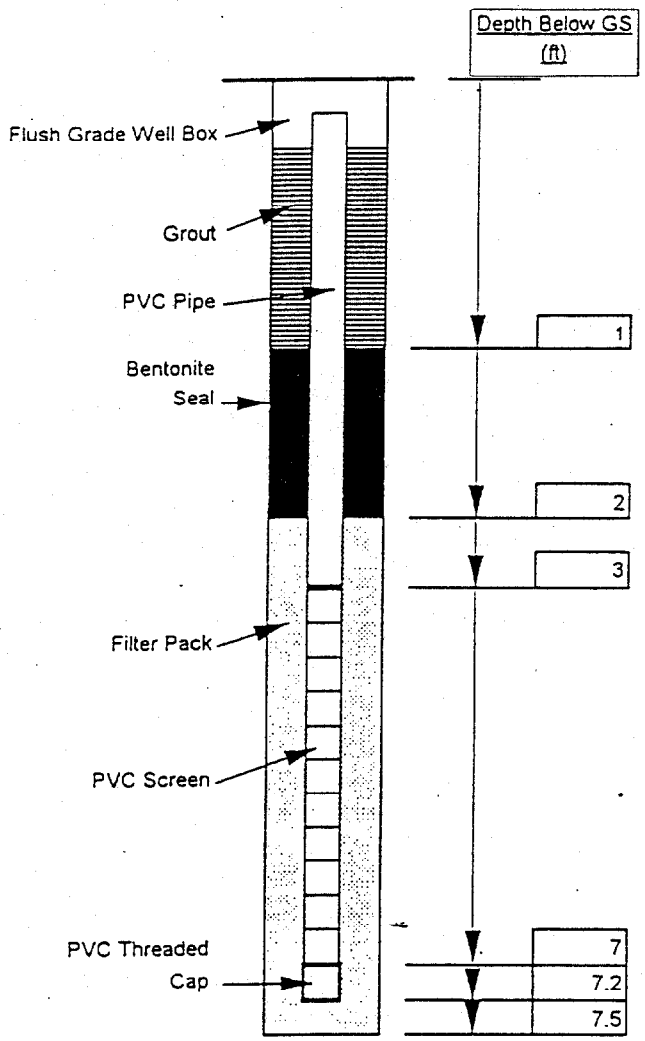
Type	20/30
Length (ft)	7.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	5
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-2-MW-S
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/14/96	Coordinates:	N 187345.032
Drilling Equipment:	Mobile B-57	Date Completed:	12/14/96		E 2099203.731
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.11 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	5

Backfill

Type	Grout Seal
Length (ft)	N/A
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	1
Placement	Pour

Filter Pack

Type	20/30
Length (ft)	5.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	4
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

Borehole Diameter (in.) 8

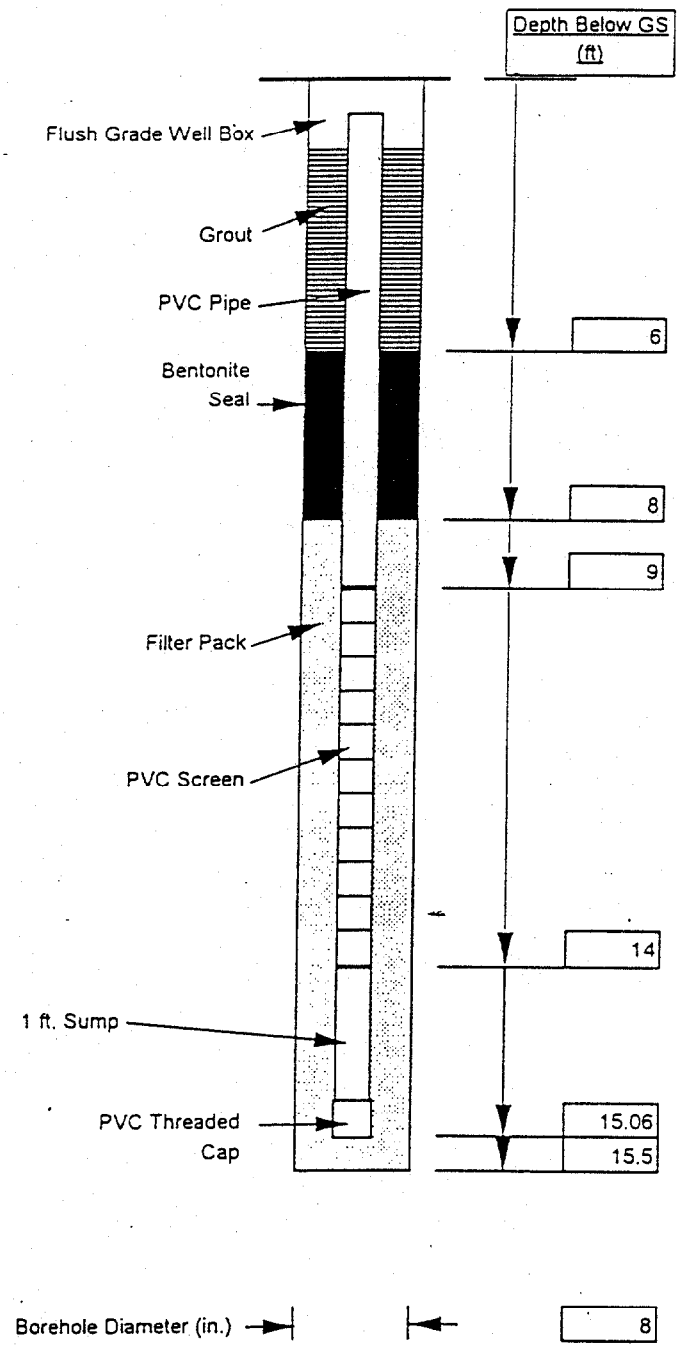
BOREHOLE LOG

Project Name: Parris Island, SC, MCRD		Borehole No.: 193-3-MW
Project Number: 22567-145	Elevation: 7.78 ft msl	
Location: Bldg 193, Dry Cleaners	Date Started: 12/12/96	Date Completed: 12/12/96
Driller: Brian Cornell	Total Depth (ft): 18.0	
Equipment: Moblie B-57	Depth to Bedrock (ft): None	
Drilling Method: Hollow Stem Auger	Hole Diameter (in): 8	
Drilling Fluid: None	Depth to Water (ft): 3.0	
Completion: Completed as Monitoring Well See Well Construction Logs for details	Logged By: P. Linley	Posthole to 4ft BGL

Depth (ft)	Description	Sample Number	Sample Type	% Recovery	Blow Count	Comments
	0-7.3ft: SAND: *(SP)*, gry blk (N2) to brn gry (5YR4/1) to med lt gry (N6) to med dk gry (N4), fine, unconsld, mod well sort, subang to subrd, v lt gry (N8), wet at 3ft, minor silt frac 10%	1	SS	25		1/5
		2	SS	75		4/4/4/5
5		3	SS	100		2/1/0/1
	7.3-8ft: SILTY CLAY: *(CL)*, med gry (N5), v fine, unconsld, mod well sort, subang to subrd, wet.	4	SS	100		1/0/2/7
10	8-10ft: SILTY CLAY/SAND: *(SM)*, lt gry (N6), v fine, unconsld, mod sort, subang to subrd, wet.	5	SS	100		5/14/23/25
	10-17.8ft: SAND: *(SP)*, pale yel brn (10YR6/2) to mod yel brn (10YR5/4) to pale brn (5YR5/2) to lt gry (N7) to v lt gry (N8) to lt olive gry (5Y5/2) to dk yel org (10YR6/6) to lt brn (5YR5/6) to white (N9) to med dk gry (N4) to dk gry (N3), fine, unconsld, mod well sort, subang to subrd, wet, silt frac 10%.	6	SS	100		10/4/5/5
		7	SS	100		3/3/2/2
15	10.6-10.7ft SILTY CLAY: lt gry (N7) lense.	8	SS	100		2/1/3/7
	17.8-18ft: SILTY CLAY: *(CL)*:, dk gry (N3) note ogranic matter (peat) w/in sample, v fine, semiconsld, mod sort, wet.					
20						
25						
30						

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-3-MW-D
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/13/96	Coordinates:	N 187258.713
Drilling Equipment:	Mobile B-57	Date Completed:	12/13/96		E 2099239.820
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.57 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	10

Backfill

Type	Grout Seal
Length (ft)	6
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	2
Placement	Pour

Filter Pack

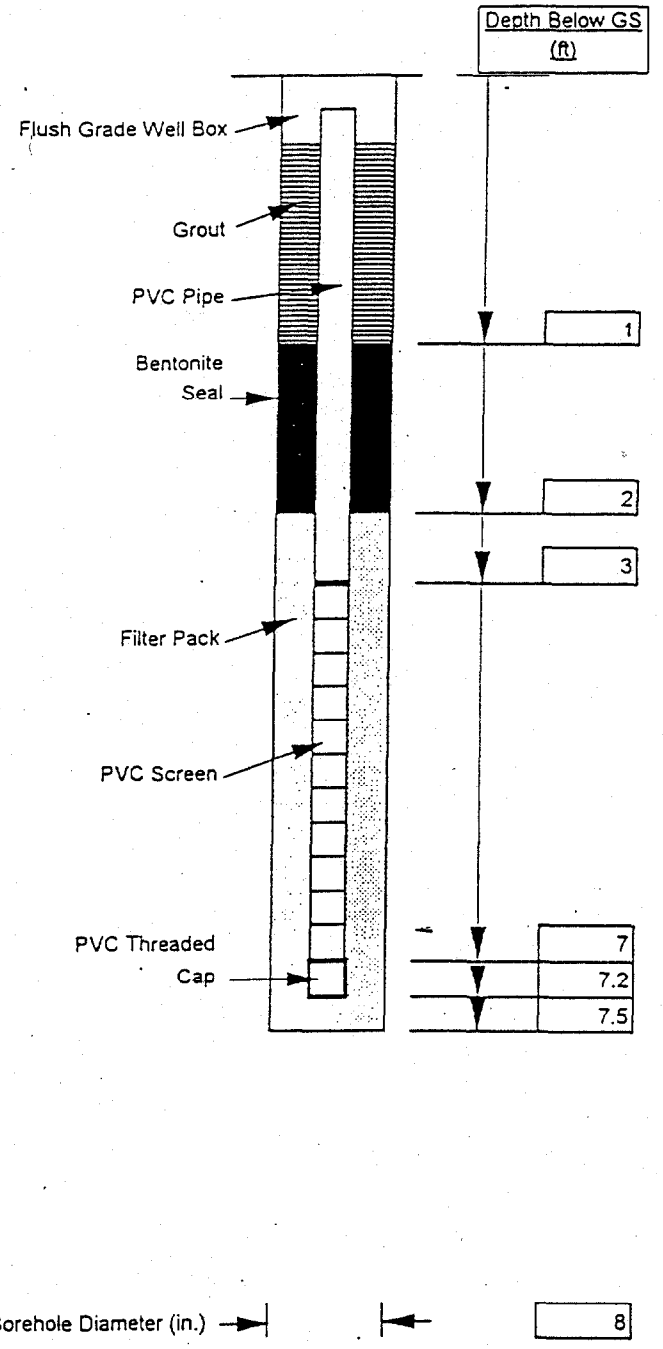
Type	20/30
Length (ft)	7.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	5
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-3-MW-S
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/13/96	Coordinates:	N 187257.657
Drilling Equipment:	Mobile B-57	Date Completed:	12/13/96		E 2099244.001
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.6 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	4.7

Backfill

Type	Grout Seal
Length (ft)	N/A
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	1
Placement	Pour

Filter Pack

Type	20/30
Length (ft)	5.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	4
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

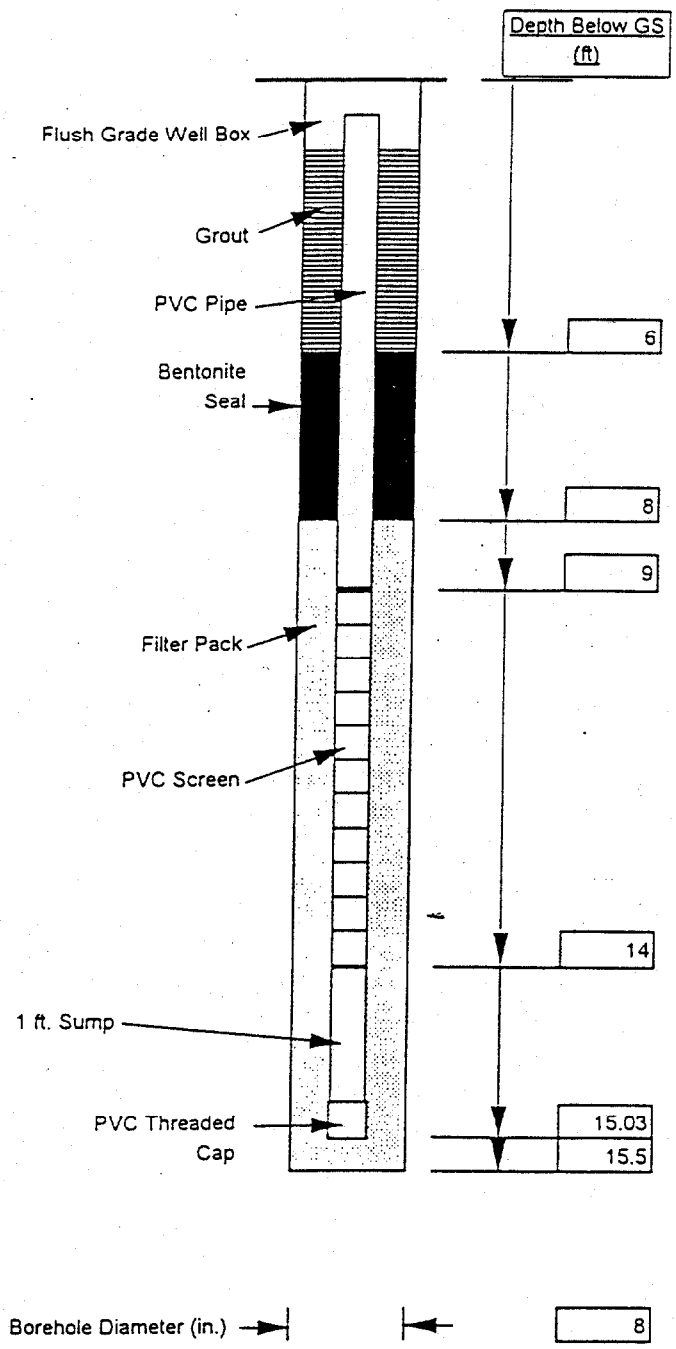
BOREHOLE LOG

Project Name: Parris Island, SC, MCRD		*Borehole No.: 193-4-MW*
Project Number: 22567-145	*Elevation:* 7.14 ft msl	
Location: Bldg 193, Dry Cleaners	*Date Started:* 12/12/96	*Date Completed: 12/12/96*
Driller: Brian Cornell	*Total Depth (ft):* 18.0	
Equipment: Mobile B-57	*Depth to Bedrock (ft):* None	
Drilling Method: Hollow Stem Auger	*Hole Diameter (in):* 8	
Drilling Fluid: None	*Depth to Water (ft):* 3.0	
Completion: Completed as Monitoring Well See Well Construction Logs for details	*Logged By:* P. Linley	*Posthole to 4ft BGL*

Depth (ft)	Description	Sample Number	Sample Type	% Recovery	Blow Count	Comments
	0-7.2ft: SAND: *(SP)*, gry blk (N2) to med lt gry (N6) to dk yel org (10YR6/6) to brn gry (5YR4/1) to lt brn (5YR5/6), fine, mod well sort, unconsld, subang to subrd, wet at 3ft, silt frac 15%.					
		1	SS	50		2/5
5		2	SS	70		2/2/3/6
	7.2-7.9ft: SILTY CLAY: *(CL)*, lt gry (N7), v fine to fine, mod sort, unconsld, subang to subrd, wet.	3	SS	70		5/1/1/2
	7.9-17.2ft: SAND: *(SP)*, lt gry (N7) to v lt gry (N8) to white (N9) to med gry (N5) to gry org (10YR7/4) to pale yel brn (10YR6/2) to med dk gry (N4) to dk gry (N3), fine, unconsld, mod well sort, subang to subrd, silt frac 10-15%, wet to saturated	4	SS	60		5/7/11/15
10		5	SS	75		5/8/7/6
		6	SS	100		1/2/2/3
15		7	SS	100		1/2/1/2
	17.2-18ft: CLAY: *(CL)*, med dk gry (N4) to dk gry (N3), v fine semiconsld, mod well sort, v moist to wet.	8	SS	100		1/3/4/6
	17.4ft: PEAT: *(Pt)*, dusky yel brn (10YR2/2) to brn blk (5YR2/1)					
20						
25						
30						

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-MW-4D
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/12/96	Coordinates:	N 187149.280
Drilling Equipment:	Mobile B-57	Date Completed:	12/12/96		E 2099253.080
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	6.93 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	10

Backfill

Type	Grout Seal
Length (ft)	6
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	2
Placement	Pour

Filter Pack

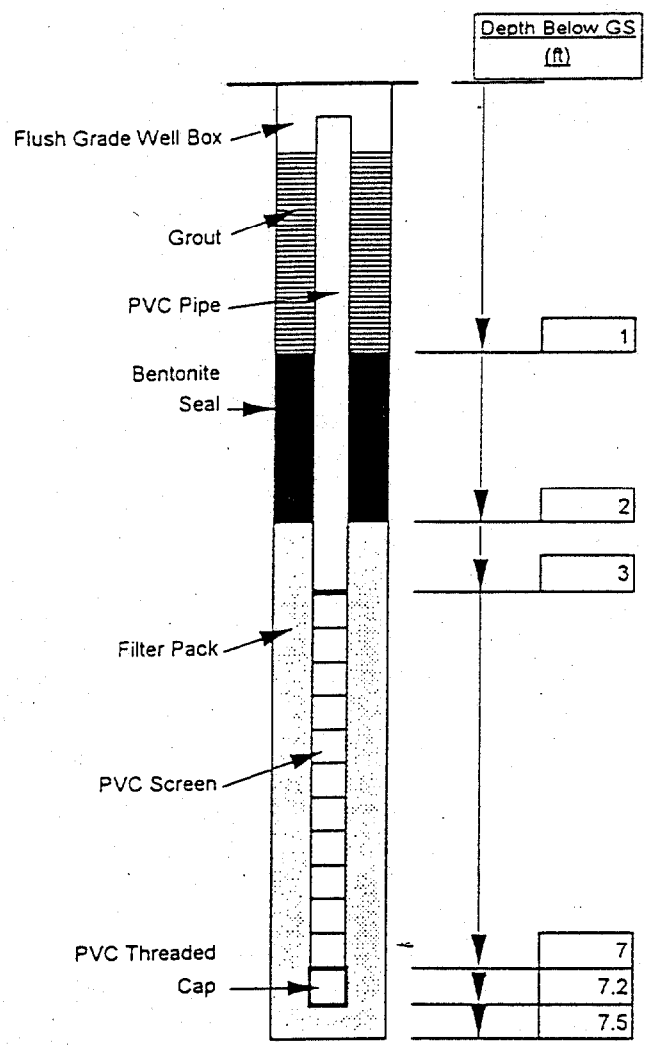
Type	20/30
Length (ft)	7.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	5
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-4-MW-S
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/12/96	Coordinates:	N 187150.910
Drilling Equipment:	Mobile B-57	Date Completed:	12/12/96		E 2099249.096
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	6.98 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	4.7

Backfill

Type	Grout Seal
Length (ft)	N/A
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	1
Placement	Pour

Filter Pack

Type	20/30
Length (ft)	5.5
Placement	Pour
Amount Placed	162.5 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	4
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

Borehole Diameter (in.) .8

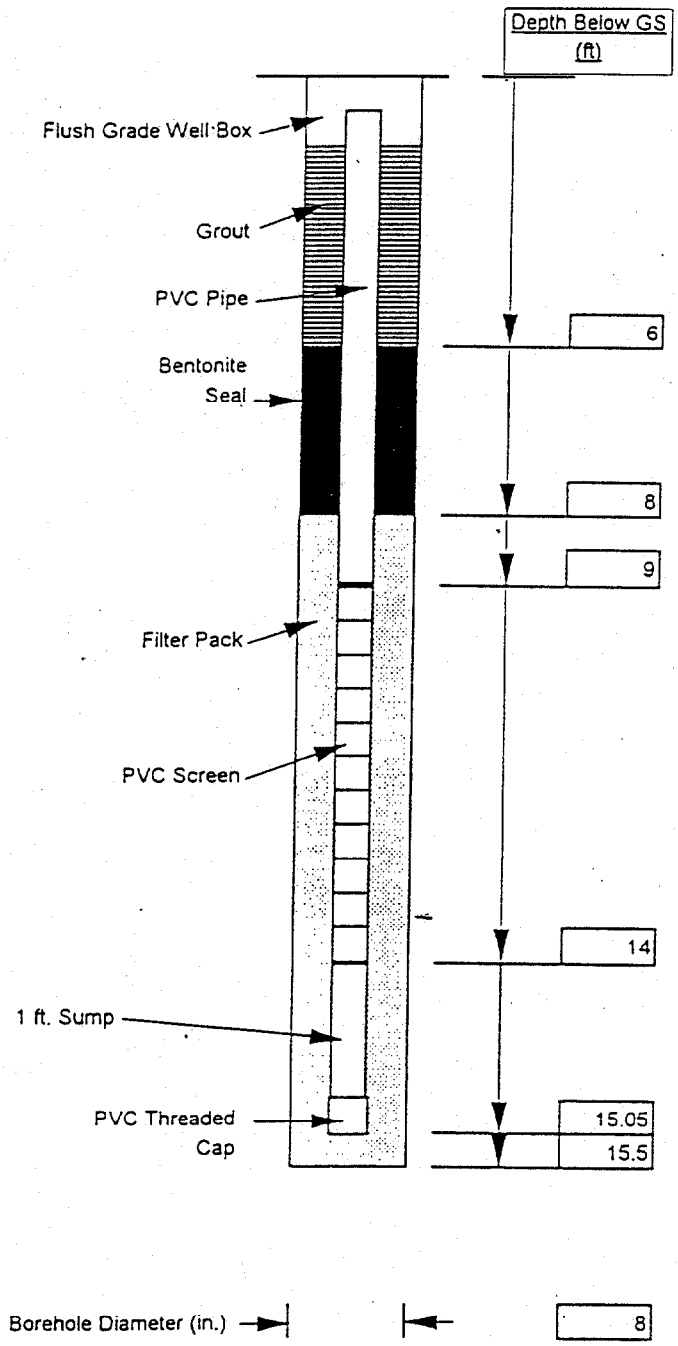
BOREHOLE LOG

Project Name: Parris Island, SC, MCRD		Borehole No.: 193-5-MW
Project Number: 22567-145	Elevation: 8.64 ft msl	
Location: Bldg 193, Dry Cleaners	Date Started: 12/13/96	Date Completed: 12/13/96
Driller: Brian Cornell	Total Depth (ft): 18.0	
Equipment: Mobile B-57	Depth to Bedrock (ft): None	
Drilling Method: Hollow Stem Auger	Hole Diameter (in): 8	
Drilling Fluid: None	Depth to Water (ft): 4.0	
Completion: Completed as Monitoring Well See Well Construction Logs for details	Logged By: P. Linley	Posthole to 4ft BGL

Depth (ft)	Description	Sample Number	Sample Type	% Recovery	Blow Count	Comments
	0-12ft: SAND: *(SP)*, pale brn (5YR5/2) to gry blk (N2) to lt brn gry (5YR6/1) to v lt gry (N8) to lt gry (N7) to med lt gry (N6), fine, unconsld, mod well sort, subang to subrd, wet at 3ft, silt frac 10-15%.					
5		1	SS	60		2/1/4/5
		2	SS	80		5/5/7/9
		3	SS	95		8/8/4/3
10		4	SS	100		1/2/1/1
	12ft: CLAYEY SILT: *(ML)*, dk gry (N3), v fine, unconsld, mod sort, subang to subrd, wet.	5	SS	100		2/2/4/4
	12-17.8ft: SAND: *(SP)*, lt brn gry (5YR6/1) to v lt gry (N8), fine unconsld, mod sort, subang to subrd, wet, silt and clay frac increasing w/depth, 13.5-14ft dk gry (N3).	6	SS	100		2/2/2/2
15		7	SS	100		2/2/2/4
	17.8-18ft: PEAT: *(Pt)*, dusky brn (5YR2/2)					
20						
25						
30						

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-5-MW-D
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/13/96	Coordinates:	N 187187.346
Drilling Equipment:	Mobile B-57	Date Completed:	12/13/96		E 2099376.763
Drilling Method:	HSA	Depth to Water:	4ft bgl		
Drilling Fluid:	None	Elevation:	8.26 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	10

Backfill

Type	Grout Seal
Length (ft)	6
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	2
Placement	Pour

Filter Pack

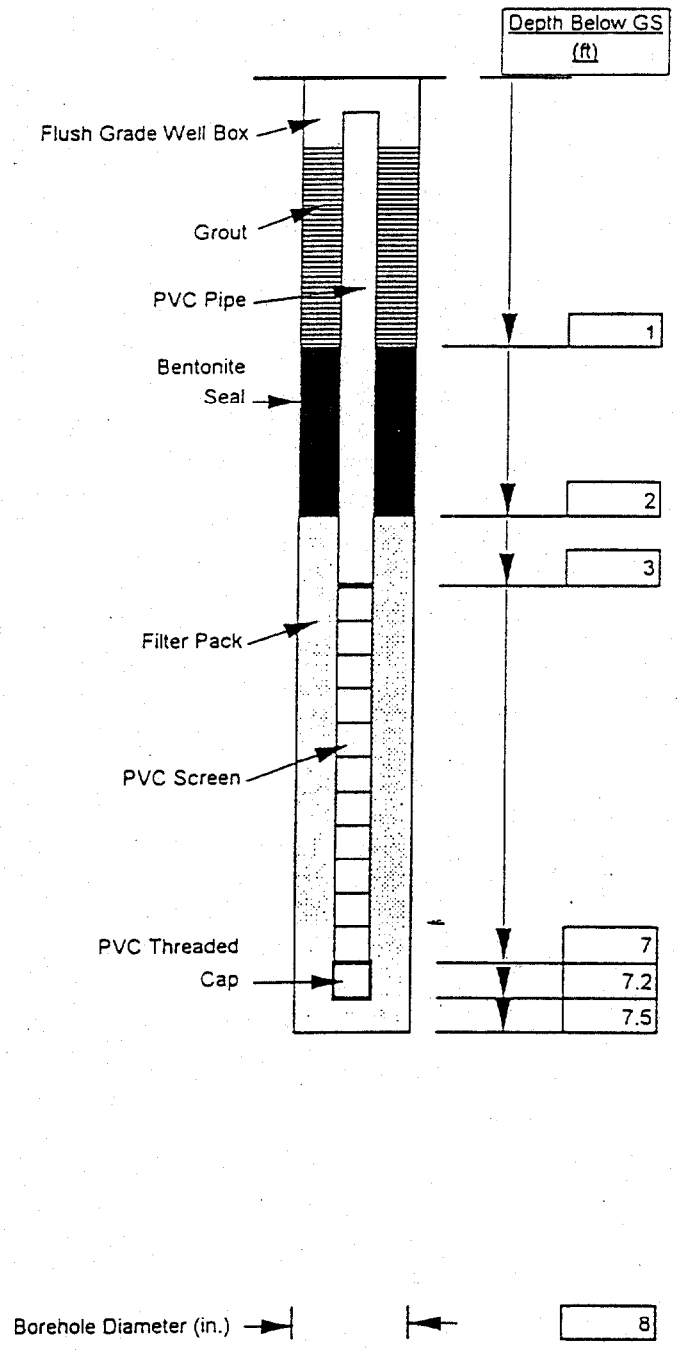
Type	20/30
Length (ft)	7.5
Placement	Pour
Amount Placed	200 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	5
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-5-MW-S
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/13/96	Coordinates:	N 187192.220
Drilling Equipment:	Mobile B-57	Date Completed:	12/13/96		E 2099377.309
Drilling Method:	HSA	Depth to Water:	4ft bgl		
Drilling Fluid:	None	Elevation:	8.6 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	4.7

Backfill

Type	Grout Seal
Length (ft)	N/A
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	1
Placement	Pour

Filter Pack

Type	20/30
Length (ft)	5.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	4
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

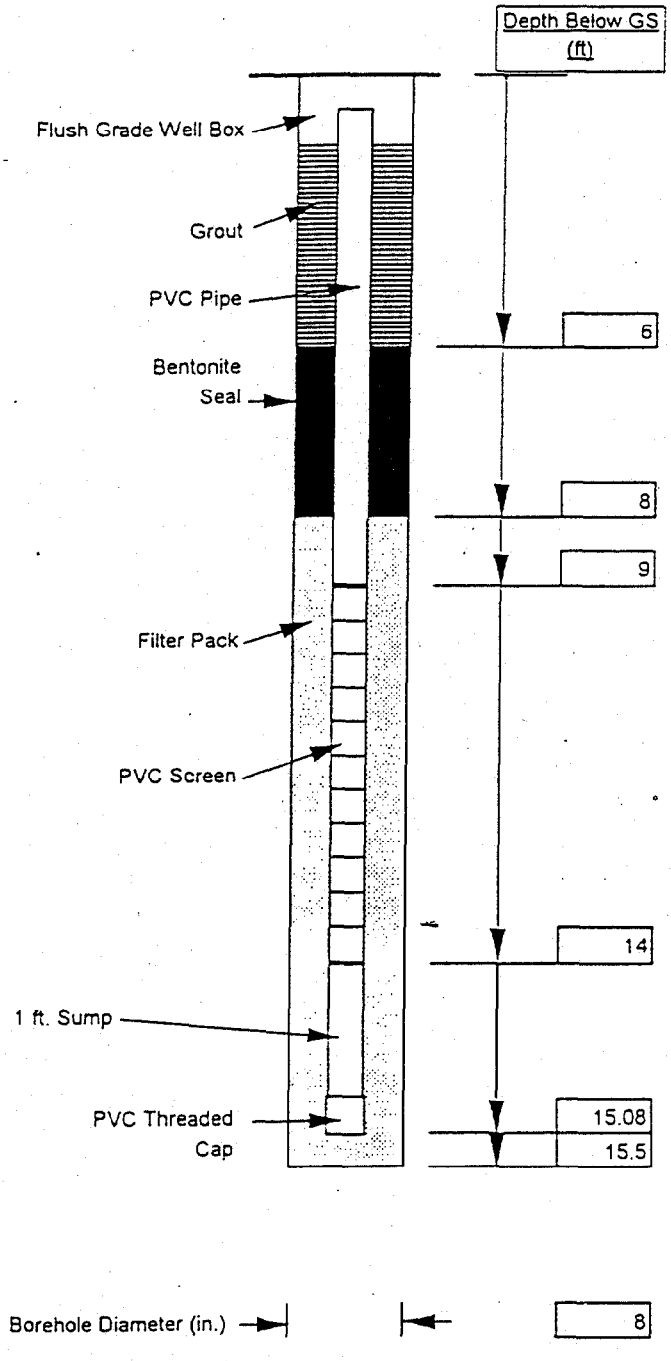
BOREHOLE LOG

Project Name: Parris Island, SC, MCRD		Borehole No.: 193-6-MW
Project Number: 22567-145	Elevation: 7.76 ft msl	
Location: Bldg 193, Dry Cleaners	Date Started: 12/16/96	Date Completed: 12/16/96
Driller: Brian Cornell	Total Depth (ft): 15.5	
Equipment: Mobile B-57	Depth to Bedrock (ft): None	
Drilling Method: Hollow Stem Auger	Hole Diameter (in): 8	
Drilling Fluid: None	Depth to Water (ft): 3.0	
Completion: Completed as Monitoring Well See Well Construction Logs for details	Logged By: P. Linley	Posthole 1ft BGL

Depth (ft)	Description	Sample Number	Sample Type	% Recovery	Blow Count	Comments
	0-4.2ft SAND: *(SP)*, Fill/slag/cinders; dusky yel brn (10YR2/2) to pale yel brn (10YR6/2) to olive gry (5Y4/1), fine, unconsld, mod well sort, subang to subrd, wet at 3ft.	1	SS	75		Split spoon from 1-7ft analytical sample (1-3ft bgl)
	4.2-5ft: CLAYEY SAND: *(SC)*, med gry (N5), v fine to fine, mod sort, unconsld, subang to subrd, saturated, silt frac 15%.	2	SS	100		N/A
5	5-15.5ft: SAND: *(SP)*, grn gry (5G6/1) to dk yel brn (10YR6/6) to med lt gry (N6), to lt gry (N7), fine, unconsld, mod sort, sub-ang to subrd, saturated, silt frac 10-15%; 8ft lt olive gry (5Y5/2) 12ft cuttings soupy; 15ft lt olive gry (5Y6/1) to med gry (N5).	3	SS	65		8/8/8/6 analytical sample (5-7ft bgl)
10						
15						
20						
25						
30						

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-6-MW-D
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/16/96	Coordinates:	N 187277.268
Drilling Equipment:	Mobile B-57	Date Completed:	12/16/96		E 2099296.248
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.52 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	10

Backfill

Type	Grout Seal
Length (ft)	6
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	2
Placement	Pour

Filter Pack

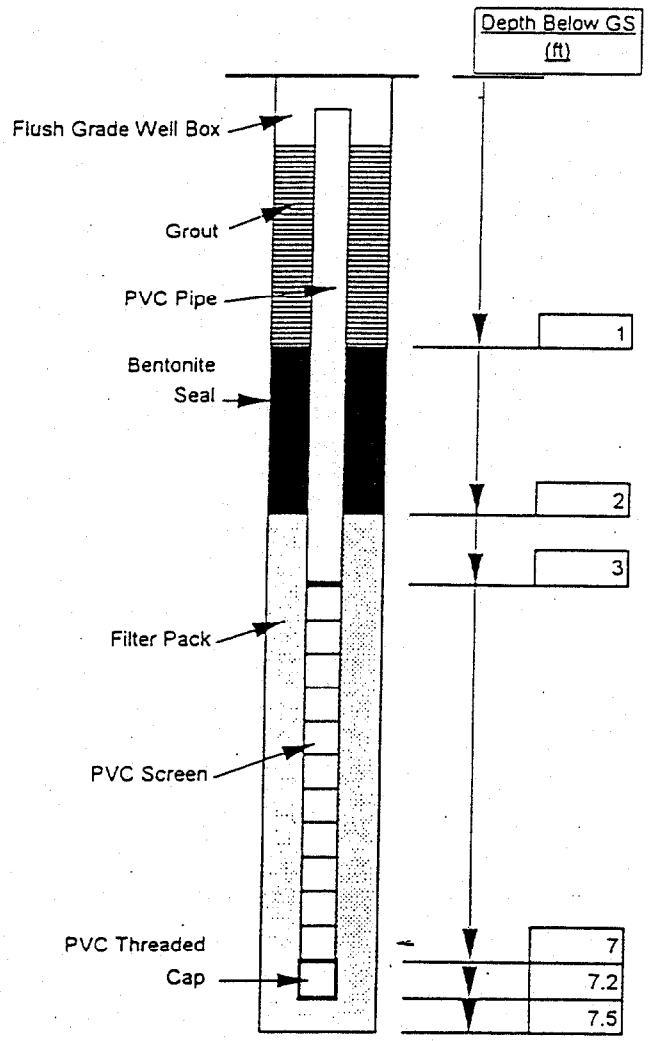
Type	20/30
Length (ft)	7.5
Placement	Pour
Amount Placed	125 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	5
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-6-MW-S
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/16/96	Coordinates:	N 187273.011
Drilling Equipment:	Mobile B-57	Date Completed:	12/16/96		E 2099295.097
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.61 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	5

Backfill

Type	Grout Seal
Length (ft)	N/A
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	1
Placement	Pour

Filter Pack

Type	20/30
Length (ft)	5.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	4
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

Borehole Diameter (in.) 8

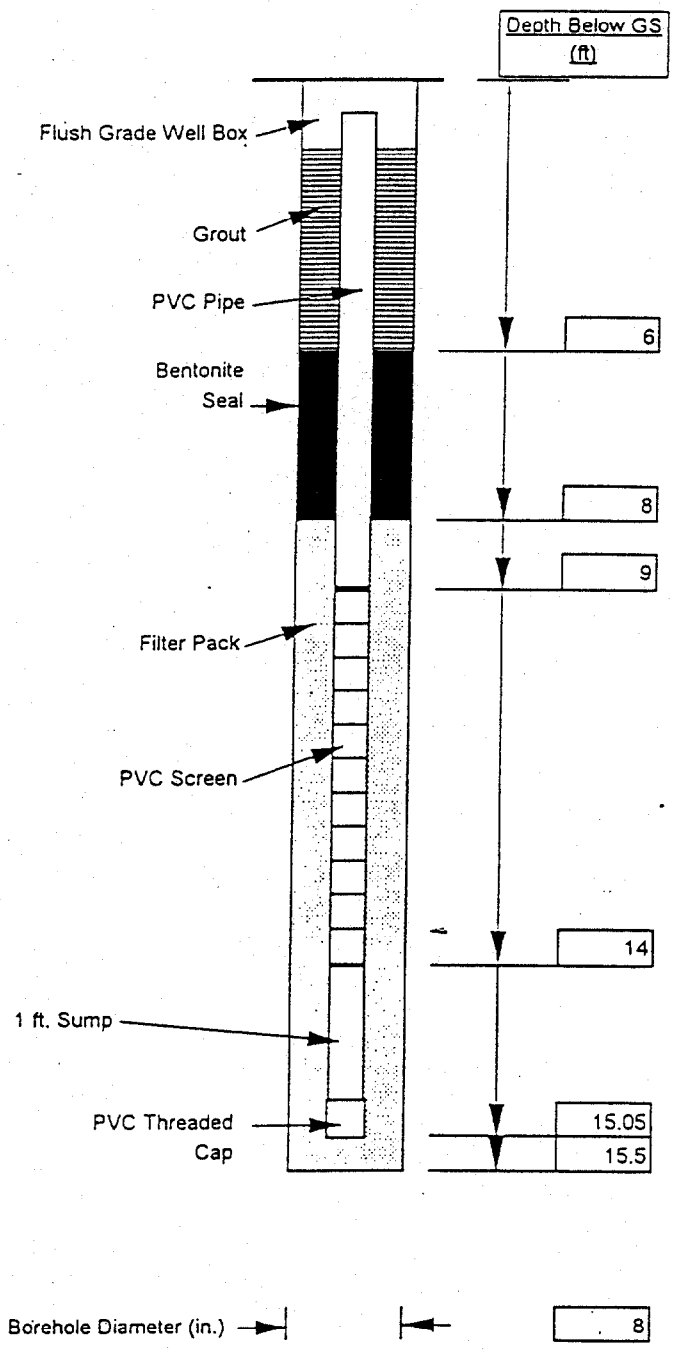
BOREHOLE LOG

Project Name: Parris Island, SC, MCRD		*Borehole No.: 193-7-MW*
Project Number: 22567-145	*Elevation: 7.95 ft msl*	
Location: Bldg 193, Dry Cleaners	*Date Started: 12/16/96*	*Date Completed: 12/16/96*
Driller: Brian Cornell	*Total Depth (ft): 19.0*	
Equipment: Mobile B-57	*Depth to Bedrock (ft): None*	
Drilling Method: Hollow Stem Auger	*Hole Diameter (in): 8*	
Drilling Fluid: None	*Depth to Water (ft): 3.0*	
Completion: Completed as Monitoring Well See Well Construction Logs for details	*Logged By: P. Linley*	*Posthole to 1ft BGL*

Depth (ft)	Description	Sample Number	Sample Type	% Recovery	Blow Count	Comments
	0-8.8ft: SAND: *(SP)*, gry brn (5YR3/2) to dusky brn (5YR2/2) to lt olive brn (5Y5/6) to lt gry (N7) to brn blk (5YR2/1) to dk yel org (10YR6/6) to pale yel org (10YR8/6), fine, unconsld, mod well sort, subang to subrd, wet at 3ft, silt frac to 15%.	1	SS	75		N/A analytical sample
		2	SS	60		2/4/2/2
5		3	SS	70		6/7/8/7 analytical sample
		4	SS	80		7/2/2/1
	8.8-9ft: SILTY CLAY: *(CL)*, med lt gry (N6) v fine, unconsld, mod sort, subang to subrd, wet.	5	SS	100		10/20/20/20
10	9-18.5ft: SAND: *(SP)*, brn gry (5YR4/1) to dk yel org (10YR6/6) to v lt gry (N8) to pale yel org (10YR8/6) to gry org (10YR7/4) to pink gry (5YR8/1) to med gry (N5) to white (N9) to med lt gry (N6), fine, mod well sort, unconsld, subang to subrd, wet to saturated, silt frac 10-15%.	6	SS	100		10/3/3/4
		7	SS	100		2/2/1/2
15		8	SS	100		2/2/3/4
		9	SS	100		2/2/1/4 analytical sample (TOC)
	18.5-19ft: CLAYEY SAND: *(SC)*, med gry (N5) wet, organic layer at 18.8ft brn blk (5YR2/1) to dusky brn (5YR2/2), moist.					
20						
25						
30						

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-7-MW-D
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/16/96	Coordinates:	N 187328.810
Drilling Equipment:	Mobile B-57	Date Completed:	12/16/96		E 2099293.569
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.72 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	10

Backfill

Type	Grout Seal
Length (ft)	6
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	2
Placement	Pour

Filter Pack

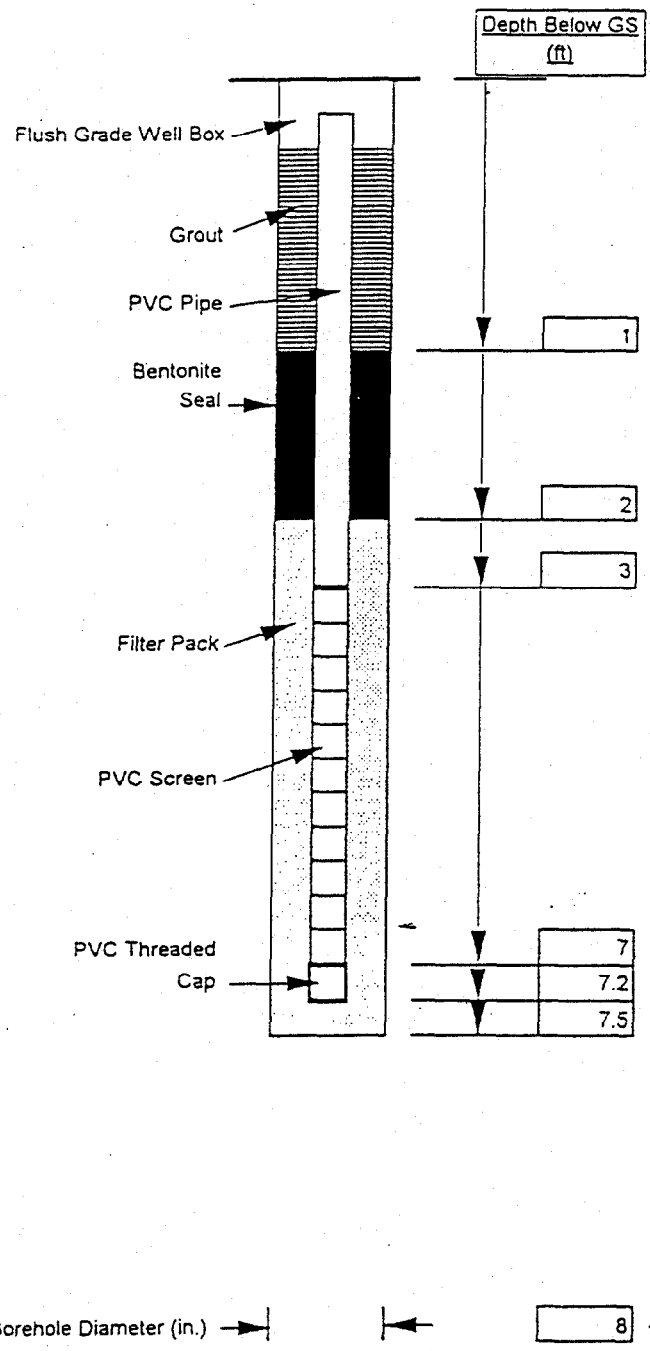
Type	20/30
Length (ft)	7.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	5
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-7-MW-S
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/16/96	Coordinates:	N 187326.652
Drilling Equipment:	Mobile B-57	Date Completed:	12/16/96		E 2099295.775
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.68 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	5

Backfill

Type	Grout Seal
Length (ft)	N/A
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	1
Placement	Pour

Filter Pack

Type	20/30
Length (ft)	5.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	4
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

bhlg

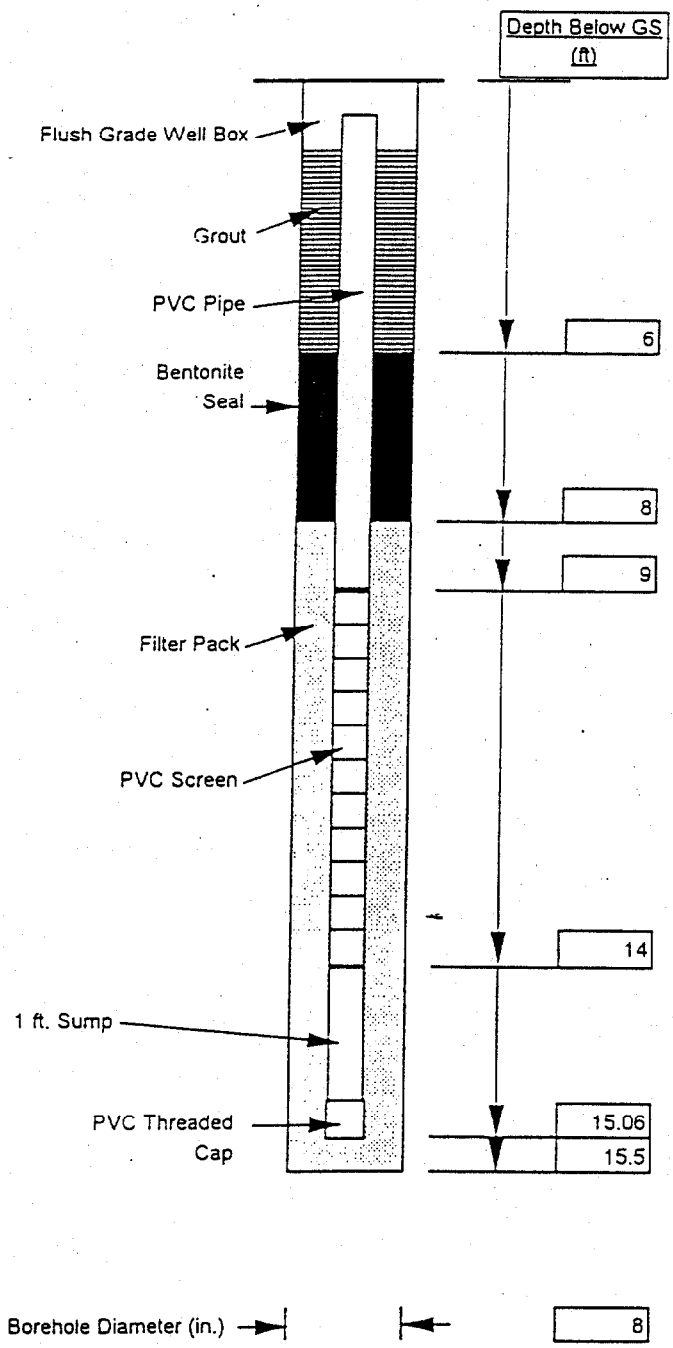
BOREHOLE LOG

Project Name: Parris Island, SC, MCRD		Borehole No.: 193-MW-8
Project Number: 22567-145	Elevation: 7.77 ft msl	
Location: Bldg 193, Dry Cleaners	Date Started: 12/16/96	Date Completed: 12/16/96
Driller: Brian Cornell	Total Depth (ft): 15.5	
Equipment: Mobile B-57	Depth to Bedrock (ft): None	
Drilling Method: Hollow Stem Auger	Hole Diameter (in): 8	
Drilling Fluid: None	Depth to Water (ft): 3.0	
Completion: Completed as Monitoring Well See Well Construction Logs for details	Logged By: P. Linley	Posthole to 1ft BGL

Depth (ft)	Description	Sample Number	Sample Type	% Recovery	Blow Count	Comments
	0-15.5ft: SAND: *(SP)*, dusky yel brn (10YR2/2) to blk (N1) to brn gry (5YR4/1) to dk yel org (10YR6/6) to mod yel brn (10YR 5/4) to pink gry (5YR8/1) to med dk gry (N4) to yel gry (5Y7/2) fine, unconsld, mod sort, subang to subrd, upper 1.5ft gvl frac 25% to 2.5" dia., 1-3ft poorly sorted - fine to coarse grained (slag/cinders layer), 3ft wet to saturated, 15ft silt & clay frac increasing w/depth to 10-15% each.					Split spoon from 1-7ft
		1	SS	80		N/A analytical sample
		2	SS	70		N/A
5		3	SS	90		2/5/7/7 analytical sample
10						
15						
20						
25						
30						

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-MW-8D
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/16/96	Coordinates:	N 187391.271
Drilling Equipment:	Mobile B-57	Date Completed:	12/16/96		E 2099319.322
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.53 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	10

Backfill

Type	Grout Seal
Length (ft)	6
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	2
Placement	Pour

Filter Pack

Type	20/30
Length (ft)	7.5
Placement	Pour
Amount Placed	137.5 lbs

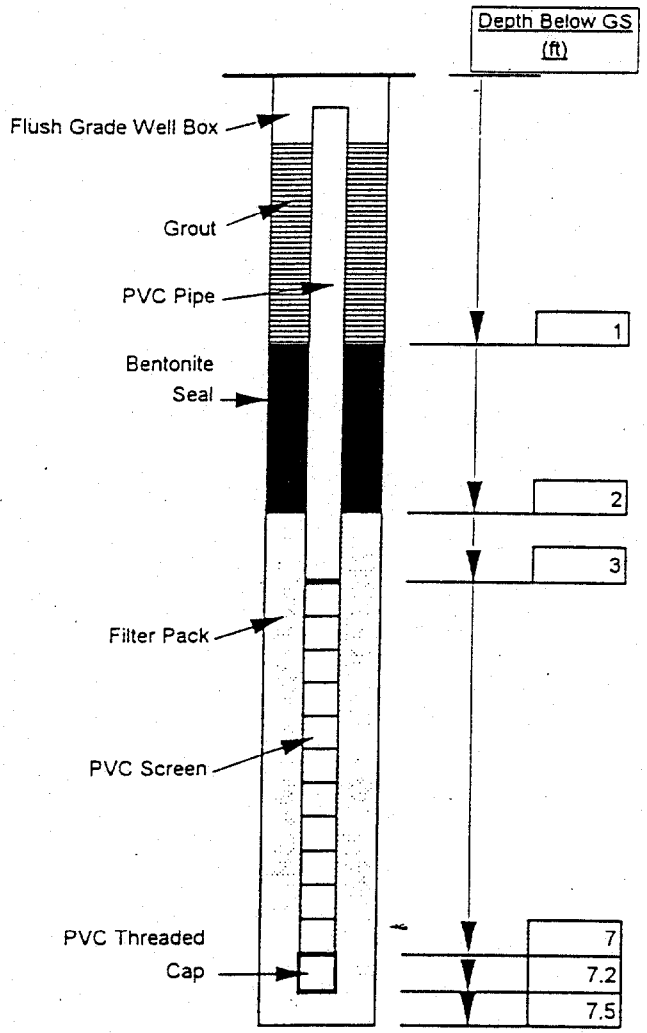
Screen

Type	Schedule 40 PVC
Length (ft)	5
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

000075

WELL CONSTRUCTION LOG

MCRD Parris Island	Site: Dry Cleaners Bld 193			Well No.:	193-8-MW-S
Drilling Company:	Environmental Drilling Inc.	Project No.:	22567-145	Logged By:	P. Linley
Driller:	Brian Cornell	Date Started:	12/16/96	Coordinates:	N 187387.149
Drilling Equipment:	Mobile B-57	Date Completed:	12/16/96		E 2099318.846
Drilling Method:	HSA	Depth to Water:	3ft bgl		
Drilling Fluid:	None	Elevation:	7.60 ft msl		



MATERIALS

Riser Pipe

Type	Schedule 40 PVC
Diameter (in.)	2
Length (ft)	2.83

Backfill

Type	Grout Seal
Length (ft)	N/A
Placement	Tremie

Seal

Type	Bentonite Pellets
Length (ft)	1
Placement	Pour

Filter Pack

Type	20/30
Length (ft)	5.5
Placement	Pour
Amount Placed	150 lbs

Screen

Type	Schedule 40 PVC
Length (ft)	4
Diameter (in.)	2
Slot Size (in.)	0.01
Slot Type	Machine Slotted

Borehole Diameter (in.) 8

GENERAL ENGINEERING
A Division of
General Engineering Laboratories, Inc.

2040 Savage Road, Charleston, SC 29407 Phone: (803) 769-7378
P.O. Box 30712, Charleston, SC 29417 Fax: (803) 769-7397

LETTER OF TRANSMITTAL

TO: MR. MARK GAGE
BECHTEL ENVIRONMENTAL, INC
POST OFFICE 350
OAK RIDGE, TENNESSEE
37831-0350

DATE: 5-14-98

PROJECT CODE: BECH00198

RE: PARRIS ISLAND PROJECT

WE ARE SENDING YOU: ✓ Attached ____ Under separate cover via ____ the following items:

____ Letter ____ Drawings ____ Report ____ Specifications

✓ Certificate of Analysis ____ Other ____

NO.	DESCRIPTION
1	VARIOUS ITEMS RELATING TO WELL INSTALLATION

THESE ARE TRANSMITTED as checked below:

✓ For approval ✓ Final issue ____ As requested

✓ For your use ____ Returned for corrections

____ For review and comment ____ For Bids due ____ 19____

REMARKS MARK: ENCLOSED YOU WILL FIND HARD COPIES OF THE INFORMATION YOU HAVE REQUESTED. THE WATER WELL RECORDS WERE ALSO MAILED TODAY TO DHEC & THE PLATES WERE INSTALLED YESTERDAY.

Y TO: FILE

SIGNED: R. Gaskin

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 734-5300

DHEC — PROMOTE PROTECT PROSPER

1. LOCATION OF WELL:
County: Beaufort System Name: RW-1
Latitude: N [illegible] Longitude: E [illegible]

Distance and Direction from Road Intersections:
SEE ATTACHED MAP

Street Address & City of Well Location:

Sketch Map:
SEE ATTACHED MAP

RW #1

2. CUTTING SAMPLES: ☐ Yes ☒ No
Geophysical Logs: ☐ Yes (please enclose) ☒ No

Formation Description	Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

3. REMARKS:

4. OWNER OF WELL: MARINE CORPS RECRUIT DEPOT
Address: DRY CLEANERS FACILITY
[illegible] STREET PARRIS ISLAND SC
Telephone No.:

Engineer: BECHTEL ENVIRONMENTAL
Address: 151 LAFAYETTE DRIVE
OAK RIDGE TN 37830
Telephone No.: (423) 220-2000

5. WELL DEPTH (completed) 18.10 ft.
Date Started: 3-24-98
Date Completed: 3-24-98

6. ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☒ Other

7. USE:
☐ Domestic ☐ Public Supply–Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ~~☐ Monitor Well~~ ☒ Recovery

8. CASING: ☒ Threaded ☐ Welded
Diam.: 6"
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 5 ft. depth
in. to ft. depth
Height: (Above)/Below Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

9. SCREEN
Type: P.V.C. Diam.: 6"
Slot/Gauge: 0.10 Length: 12'
Set Between: 5 ft. and 17 ft. bls NOTE: MULTIPLE SCREENS
ft. and ft. USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

10. STATIC WATER LEVEL
2.5 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
9 ft. after ____ hrs. Pumping 2 G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield:

12. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No NA
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☐ Yes ☐ No
Installed from 18.10 ft. to 4 ft.
Effective size #30/50 Uniformity Coefficient

14. WELL GROUTED? ☐ Yes ☒ No
☐ Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other
Depth: From ____ ft. to ____ ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: 15 ft. NW direction
Type well disinfected ☐ Yes Type:
upon completion ☐ No Amount:

16. PUMP: Date installed: 4/7/98 Not installed ☐
Mfr. Name: GRUNDFOS Model No.: 5E8
H.P. 1/2 Volts 230 Length of drop pipe 12 ft. Capacity 5 gpm
TYPE: ☒ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: Atlantic Drilling Corp Date: 3-24-98
Address: 4247 Spruill Ave N. Charleston, S.C. 29405
Signed: Mark M. Jones Cert. No.: 1294
Authorized Representative

DHEC 1903 (10/96)

COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

DHEC
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 734-5300

1. LOCATION OF WELL:
County: BEAUFORT System Name: RW-2
Latitude: N 32 16 54[illegible] Longitude: 2080305.616[illegible]

Distance and Direction from Road Intersections:
SEE ATTACHED MAP

Street Address & City of Well Location:

Sketch Map:
SEE ATTACHED MAP
RW #2

2. CUTTING SAMPLES: ☐ Yes ☒ No
Geophysical Logs: ☐ Yes (please enclose) ☒ No

3.

Formation Description	Thickness of Stratum	Depth to Bottom of Stratum
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

REMARKS:

4. OWNER OF WELL: MARINE CORPS RECRUIT DEPOT
Address: [illegible]
[illegible]
Telephone No:

Engineer: BECHTEL ENVIRONMENTAL
Address: 151 LAFAYETTE DRIVE
OAK RIDGE, TN 37830
Telephone No: [illegible]

5. WELL DEPTH (completed) 18.4 ft. Date Started: 3-25-98
Date Completed: 3-25-98

6. ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☒ Other

7. USE:
☐ Domestic ☐ Public Supply–Permit No. ______ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☒ Monitor Well ☒ Recovery

8. CASING: ☒ Threaded ☐ Welded
Diam.: 6"
Type: ☒ PVC ☐ Galvanized
☐ Steel ☐ Other
0 in. to 5 ft. depth
______ in. to ______ ft. depth

Height: (Above)/Below
Surface ______ ft.
Weight ______ lb./ft.
Drive Shoe? ☐ Yes ☐ No

9. SCREEN
Type: P.V.C Diam.: 6"
Slot/Gauge: 0.10 Length: 12'
Set Between: 5 ft. and 17 ft. NOTE: MULTIPLE SCREENS
______ ft. and ______ ft. USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

10. STATIC WATER LEVEL
2.5 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
9 ft. after ______ hrs. Pumping 2 G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield:

12. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☐ Yes ☐ No
Installed from 18.4 ft. to 4. ft.
Effective size 30/50 Uniformity Coefficient

14. WELL GROUTED? ☐ Yes ☒ No
☐ Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other
Depth: From ______ ft. to ______ ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: 40 ft. NW direction
______ Type well disinfected ☐ Yes Type:
upon completion ☐ No Amount:

16. PUMP: Date installed: 4/7/98 Not installed ☐
Mfr. Name: Grundfos Model No.: 5E8
H.P. 1/2 Volts 230 Length of drop pipe 12 ft. Capacity 15 gpm
TYPE: ☒ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: Atlantic Drilling Corp Date: 3-25-98
Address: 4247 Spruill Ave N. Charleston, S.C. 29405
Signed: Nack R. Jones Cert. No.: 1294
Authorized Representative

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 734-5300

1. LOCATION OF WELL
County: [illegible] System Name: [illegible]
Latitude: [illegible] Longitude: [illegible]
Distance and Direction from Road Intersections: See Attached Map
Street Address & City of Well Location:
Sketch Map: see Attached Map
RW-3

4. OWNER OF WELL
Address: [illegible]
Telephone No.:

Engineer
Address: [illegible]
Telephone No.:

5. WELL DEPTH (completed) 18.4 ft. Date Started: 3-23-98 Date Completed: 3-23-98

6. ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☒ Other

7. USE: ☐ Domestic ☐ Public Supply–Permit No. ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☒ Monitor Well ☒ Recovery

8. CASING: ☒ Threaded ☐ Welded
Diam.: 6"
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 5 ft. depth
in. to ft. depth
Height: Above/Below Surface ft.
Weight lb./ft.
Drive Shoe? ☐ Yes ☐ No

2. CUTTING SAMPLES: ☐ Yes ☒ No
Geophysical Logs: ☐ Yes (please enclose) ☒ No

Formation Description	Thickness of Stratum	Depth to Bottom of Stratum

*Indicate Water Bearing Zones
(Use a 2nd sheet if needed)

9. SCREEN
Type: P.V.C Diam.: 6"
Slot/Gauge: 0.10 Length: 12'
Set Between: 5 ft. and 17 ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

10. STATIC WATER LEVEL 2.5 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface
9.5 ft. after hrs. Pumping 2 G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield:

12. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☐ Yes ☐ No
Installed from 18.4 ft. to 4 ft.
Effective size 30/50 Uniformity Coefficient

14. WELL GROUTED? ☐ Yes ☒ No
☐ Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other
Depth: From ft. to ft.

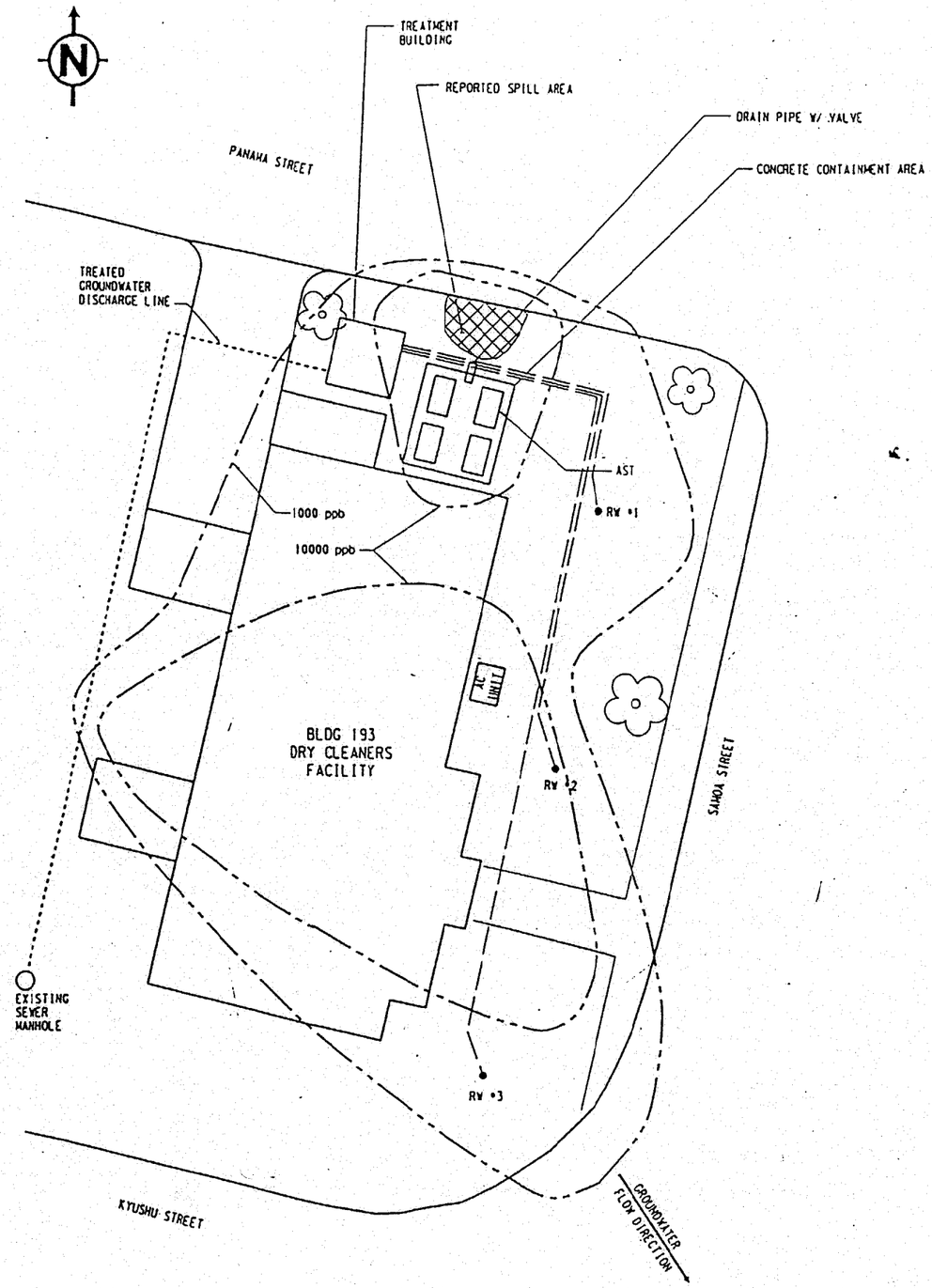
15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: 75 ft. NW direction
Type
Was well disinfected upon completion ☐ Yes ☐ No Type: Amount:

16. PUMP: Date installed: 4/7/98 Not installed ☐
Mfr. Name: Grundfos Model No.: 5 E8
H.P. 1/2 Volts 230 Length of drop pipe 12 ft. Capacity 15 gpm
TYPE: ☒ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

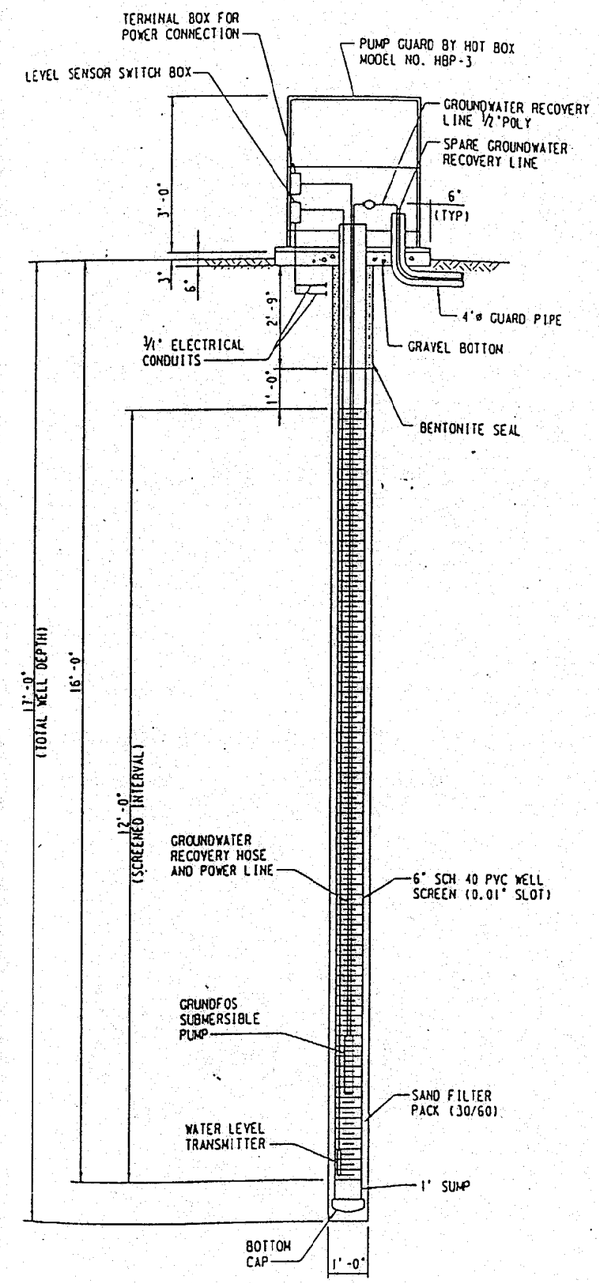
17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: Atlantic Drilling Co. Date:
Address: 4247 Spruill Ave N. Charleston S.C. 29405
Signed: [illegible] Cert. No. 1294
Authorized Representative

3. REMARKS:

DHEC 1903 (10/96) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)



FACILITY PLAN
1"=15'-0"



RECOVERY WELL PROFILE
NTS (3 REQUIRED)

NOTES

1. DEPTH OF SCREEN WILL BE ADJUSTED TO SET SCREEN ABOVE EXISTING AQUITARD.
2. PRIOR TO ADVANCING DRILL AUGERS THE DRILL HOLE SHALL BE ADVANCED 4' BELOW LAND SURFACE USING HAND TOOLS TO VERIFY THE ABSENCE OF UNDERGROUND INDUSTRIAL OR UTILITY LINES.
3. LOCATIONS SHOWN FOR RECOVERY WELLS ARE APPROXIMATE. THEIR LOCATION WILL BE ADJUSTED TO AVOID CONFLICT WITH UNDERGROUND UTILITIES.
4. SCALE SHOWN ON THIS DRAWING IS BASED ON A DRAWING SIZE OF 22" X 34"; ANY REDUCTION IN DRAWING SIZE WILL REQUIRE AN APPROPRIATE ADJUSTMENT IN THE SCALE.
5. LOCATION SHOWN FOR UNDERGROUND RECOVERY LINES ARE APPROXIMATE. THEIR LOCATIONS WILL BE ADJUSTED TO AVOID CONFLICT WITH UTILITIES AND TREES.
6. DEPTH OF UNDERGROUND RECOVERY LINES SHALL BE 12" MINIMUM.

REFERENCE DRAWINGS

GROUNDWATER TREATMENT SYSTEM P&ID	145-0000-007
GROUNDWATER EQUIPMENT BUILDING	145-0000-008
ELECTRICAL SYSTEM	145-0000-009
CONTROL SYSTEM	145-0000-010

LEGEND

- ● RECOVERY WELL RW #
- —— —— UNDERGROUND GROUNDWATER RECOVERY LINE
- – —— GROUNDWATER CONTAMINATION CONTOUR
- ppb PARTS PER BILLION

NO.	DATE	REVISIONS	BY	CHKD	DESIGN MGR	ENGR	PROJ ENGR	MECHD ENGR
B	2/05/98	ISSUED FOR REVIEW FOR PUMP & TREAT SYSTEM	RGB	WRZ	NJA	REH	REH	
A	3/12/97	ISSUED FOR REVIEW	RGB	WEH	FMB	FMB	JRM	

SCALE NOTED — 22567 145 1450002.DGN

BECHTEL ENVIRONMENTAL INC.
OAK RIDGE, TENNESSEE

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

MARINE CORPS RECRUIT DEPOT, PARRIS ISLAND, S.C.
SITE 45/SWMU 45, DRY CLEANERS FACILITY
GROUNDWATER TREATMENT SYSTEM

JOB NO.	DRAWING NO.	REV
22567	145-0000-002	B

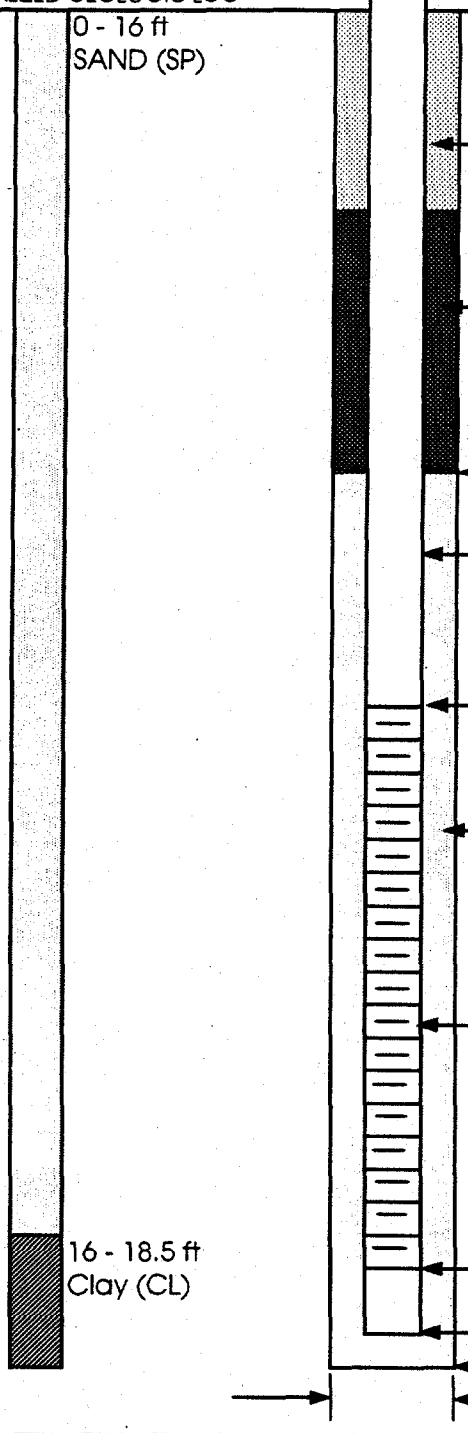
229A032

RECOVERY WELL	PROJECT Bldg 193, MCRD, Parris Island, SC	WELL NO. 193-1-RW

JOB NO.	SITE	COORDINATES
22567-145	45	N 187366.755, E 2099314.999

BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS
1/24/1998	1/24/1998	M.A. Gage	Ground Surface

GENERALIZED GEOLOGIC LOG



0 - 16 ft
SAND (SP)

16 - 18.5 ft
Clay (CL)

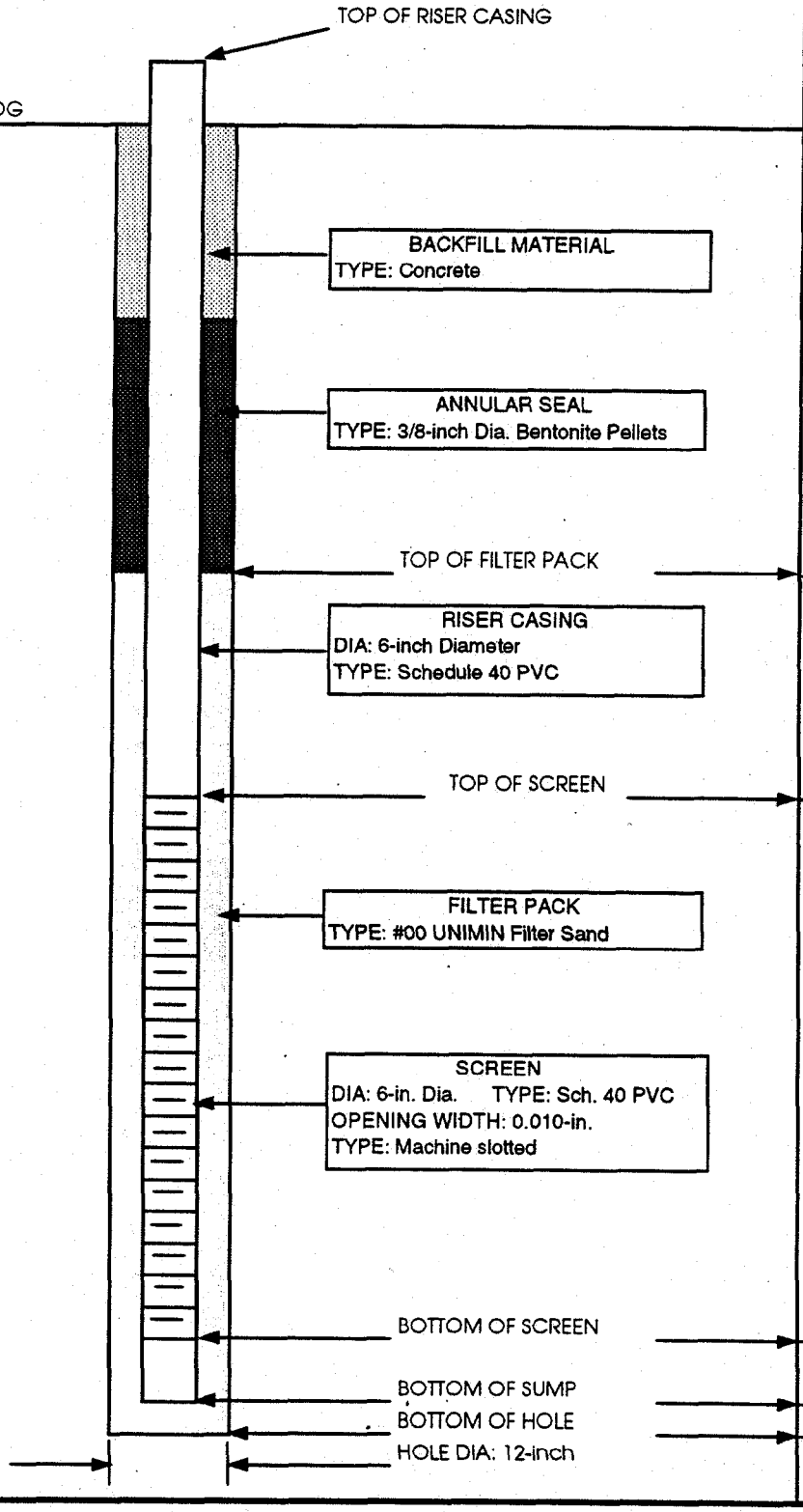
	DEPTH	ELEV.
TOP OF RISER CASING	1.78	9.81
	0	8.03
BACKFILL MATERIAL TYPE: Concrete		
	2	6.03
ANNULAR SEAL TYPE: 3/8-inch Dia. Bentonite Pellets		
TOP OF FILTER PACK	3.9	4.13
RISER CASING DIA: 6-inch Diameter TYPE: Schedule 40 PVC		
TOP OF SCREEN	4.9	3.13
FILTER PACK TYPE: #00 UNIMIN Filter Sand		
SCREEN DIA: 6-in. Dia. TYPE: Sch. 40 PVC OPENING WIDTH: 0.010-in. TYPE: Machine slotted		
BOTTOM OF SCREEN	16.9	-8.87
BOTTOM OF SUMP	18.2	-10.17
BOTTOM OF HOLE	18.5	-10.47
HOLE DIA: 12-inch		

RECOVERY WELL

PROJECT: Bldg 193, MCRD, Parris Island, SC			WELL NO.: 193-2-RW
JOB NO.: 22567-145	SITE: 45	COORDINATES: N 187316.548, E 2099305.618	
BEGUN: 1/25/1998	COMPLETED: 1/25/1998	PREPARED BY: M.A. Gage	REFERENCE POINT FOR MEASUREMENTS: Ground Surface

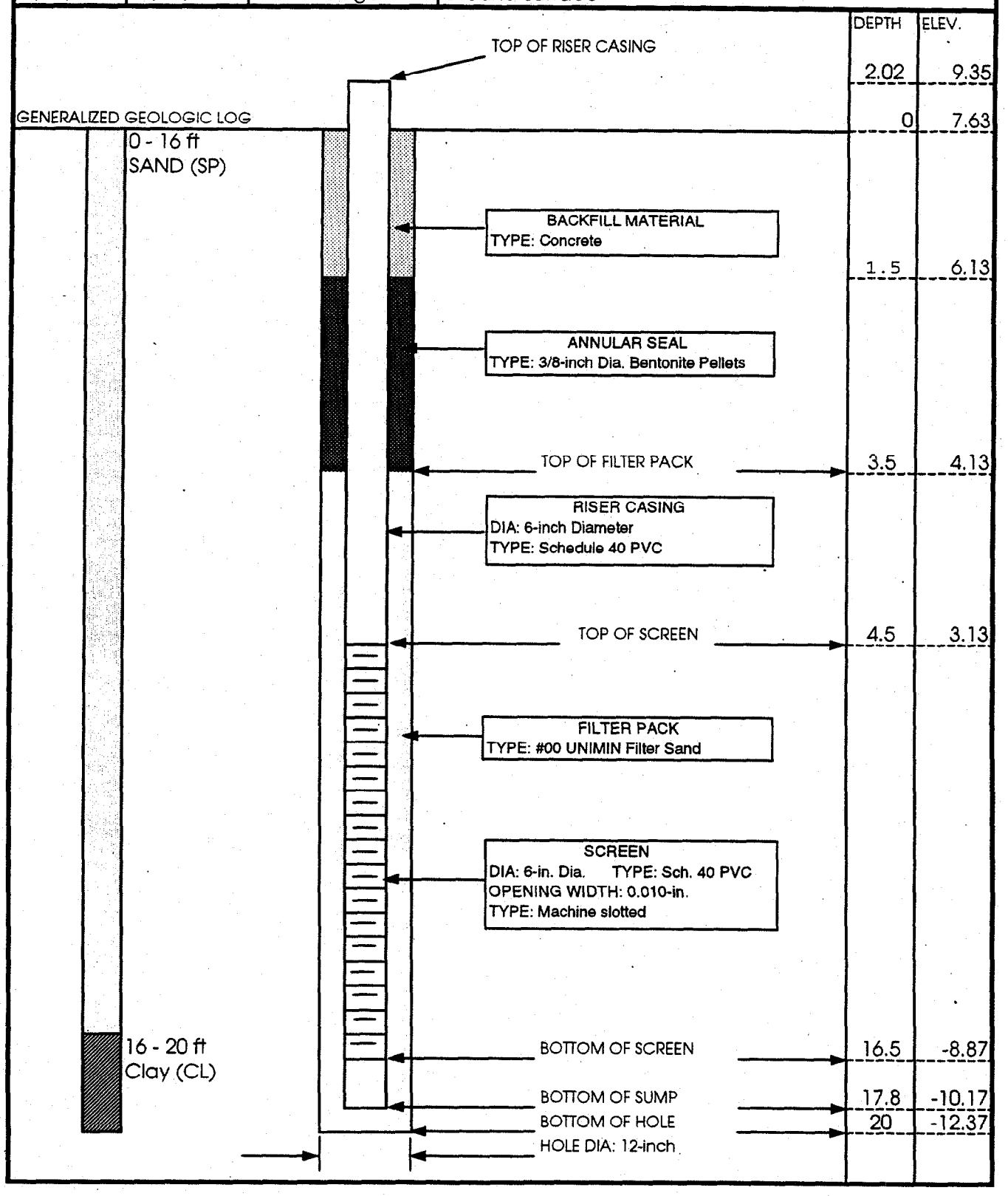
GENERALIZED GEOLOGIC LOG

0 - 19 ft
SAND (SP)



DEPTH	ELEV.
1.74	9.63
0	7.89
2	5.89
4	3.89
5	2.89
17	-9.11
18.3	-10.41
19	-11.11

RECOVERY WELL	PROJECT Bldg 193, MCRD, Parris Island, SC		WELL NO. 193-3-RW
JOB NO. 22567-145	SITE 45	COORDINATES N 187263.741, E 209925.314	
BEGUN 1/23/1998	COMPLETED 1/23/1998	PREPARED BY M.A. Gage	REFERENCE POINT FOR MEASUREMENTS Ground Surface



APPENDIX C

TREATMENT SYSTEM AS-BUILT DRAWINGS

MONITORING *	NORTH	EAST	TOP OF RISER
193-1-MW-S	187455.597	2099298.879	7.60 FT
193-1-MW-D	187454.710	2099308.355	7.57 FT
193-2-MW-S	187345.032	2099203.731	7.11 FT
193-2-MW-D	187341.197	2099201.966	7.23 FT
193-3-MW-S	187257.657	2099244.001	7.60 FT
193-3-MW-D	187258.713	2099239.820	7.57 FT
193-4-MW-S	187150.910	2099249.096	6.98 FT
193-4-MW-D	187149.280	2099253.080	6.93 FT
193-5-MW-S	187192.220	2099377.309	8.60 FT
193-5-MW-D	187187.346	2099376.763	8.26 FT
193-6-MW-S	187273.011	2099295.097	7.57 FT*
193-6-MW-D	187277.268	2099296.248	7.52 FT
193-7-MW-S	187326.652	2099295.775	7.68 FT
193-7-MW-D	187328.810	2099293.569	7.72 FT
193-8-MW-S	187387.149	2099318.846	7.60 FT
193-8-MW-D	187391.271	2099319.322	7.53 FT
193-1-RW	187366.755	2099314.999	9.81 FT
193-2-RW	187316.548	2099305.618	9.63 FT
193-3-RW	187263.741	2099295.314	9.35 FT

* CUT TOP OF RISER RESURVEYED 4/14/98

COORDINATES OF BUILDING

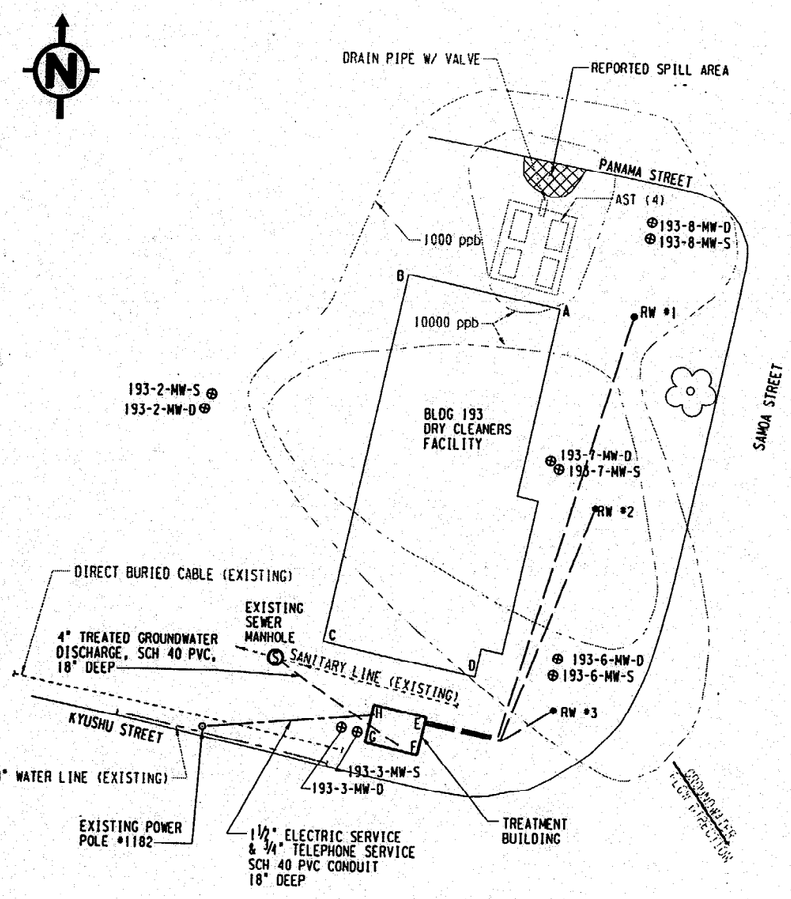
A	N 187368.364	E 2099295.250
B	N 187376.949	E 2099255.312
C	N 187280.942	E 2099234.675
D	N 187272.357	E 2099274.613
E	N 187261.555	E 2099261.948
F	N 187251.804	E 2099259.729
G	N 187254.911	E 2099246.078
H	N 187264.662	E 2099248.297

CONCRETE PAD ELEVATIONS "X" MARKS

TREATMENT BLDG FLOOR	7.81 FT
TREATMENT BLDG TOP OF CURB	8.11 FT
193-1-RW	8.27 FT
193-2-RW	8.07 FT
193-3-RW	7.79 FT

WELL EQUIPMENT ELEVATIONS

WELL NO.	REF	DESCRIPTION	ELEVATION MSL
193-1-RW	I	TOP SCREEN	3.13 FT
193-1-RW	J	PUMP INTAKE	-6.69 FT
193-1-RW	K	BOTTOM TRANSDUCER	-8.82 FT
193-1-RW	L	BOTTOM SCREEN	-8.87 FT
193-2-RW	I	TOP SCREEN	3.89 FT
193-2-RW	J	PUMP INTAKE	-7.17 FT
193-2-RW	K	BOTTOM TRANSDUCER	-9.27 FT
193-2-RW	L	BOTTOM SCREEN	-9.11 FT
193-3-RW	I	TOP SCREEN	3.13 FT
193-3-RW	J	PUMP INTAKE	-6.75 FT
193-3-RW	K	BOTTOM TRANSDUCER	-8.86 FT
193-3-RW	L	BOTTOM SCREEN	-8.87 FT



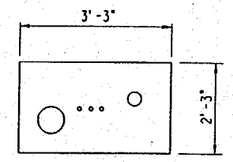
FACILITY PLAN
1"=20'-0"

193-1-MW-S ⊕ ⊕ 193-1-MW-D

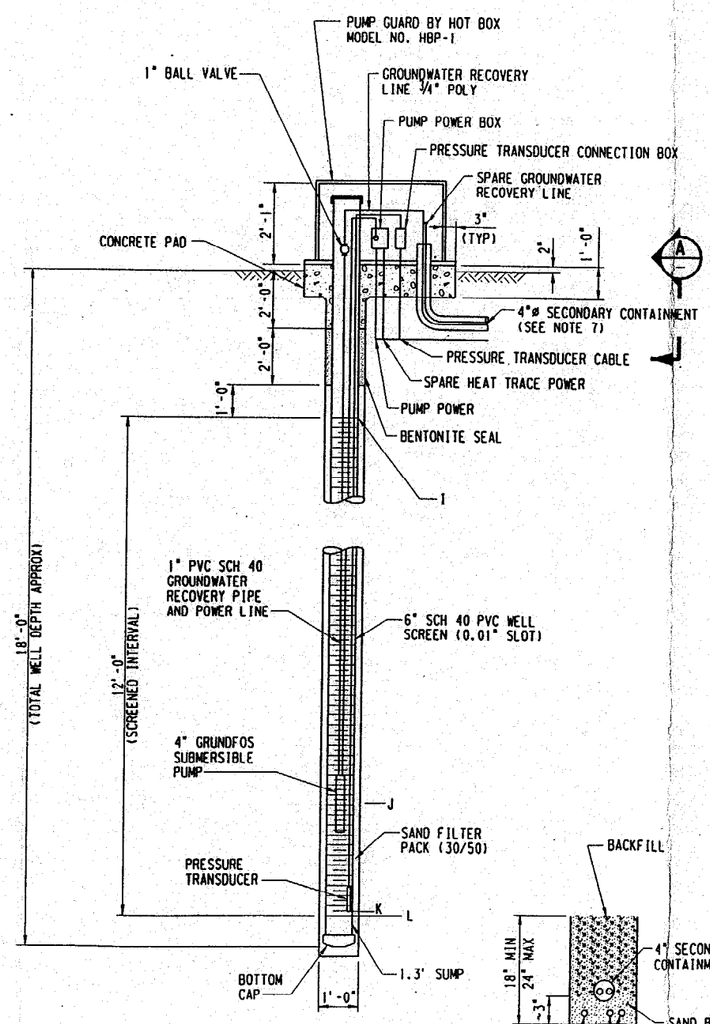
193-5-MW-S ⊕
193-5-MW-D ⊕

193-4-MW-S ⊕ ⊕ 193-4-MW-D

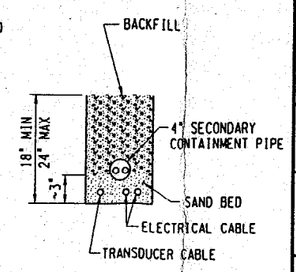
229AB42



CONCRETE PAD PLAN
NTS (3 REQUIRED)



RECOVERY WELL PROFILE
NTS (3 REQUIRED)



SECTION A
NTS

NOTES

1. DEPTH OF SCREEN IS SET ABOVE EXISTING AQUITARD.
2. COORDINATES ARE SOUTH CAROLINA STATE PLANE.
3. THE EXISTING UNDERGROUND UTILITIES SHOWN ARE PARTIAL AND NOT INTENDED TO BE COMPLETE.
4. SCALE SHOWN ON THIS DRAWING IS BASED ON A DRAWING SIZE OF 22" X 34"; ANY REDUCTION IN DRAWING SIZE WILL REQUIRE AN APPROPRIATE ADJUSTMENT IN THE SCALE.
5. LOCATION SHOWN FOR UNDERGROUND RECOVERY LINES ARE APPROXIMATE.
6. ELECTRIC SERVICE DROP IS FROM POLE #1182.
7. ELEVATION OF SECONDARY CONTAINMENT PIPE ABOVE THE CONCRETE PAD IS MINIMUM OF 2" ABOVE THE TREATMENT PAD TOP OF CURB.
8. TREATED WATER IS BEING DISCHARGED TO FOTW SANITARY SEWER SYSTEM.
9. TREATMENT SYSTEM UTILIZES NCRD PHONE SERVICE.

REFERENCE DRAWINGS

GROUNDWATER TREATMENT SYSTEM P&ID	145-D000-007
GROUNDWATER EQUIPMENT BUILDING	145-D000-008
ELECTRICAL SYSTEM	145-D000-009
CONTROL SYSTEM	145-D000-010

LEGEND

- SANITARY SEWER MANHOLE
- MONITORING WELL
- RECOVERY WELL RW #
- UNDERGROUND GROUNDWATER RECOVERY LINE
- GROUNDWATER CONTAMINATION CONTOUR
- ppb PARTS PER BILLION
- TREATED GROUNDWATER DISCHARGE LINE
- ELECTRIC & TELEPHONE SERVICE LINES

NO.	DATE	REVISIONS	BY	CHKR	DESIGN SUPV	ENGR	PROJ ENGR	MICRO FLMG
0		AS-BUILT						

SCALE NOTED

22567 145-D000-002

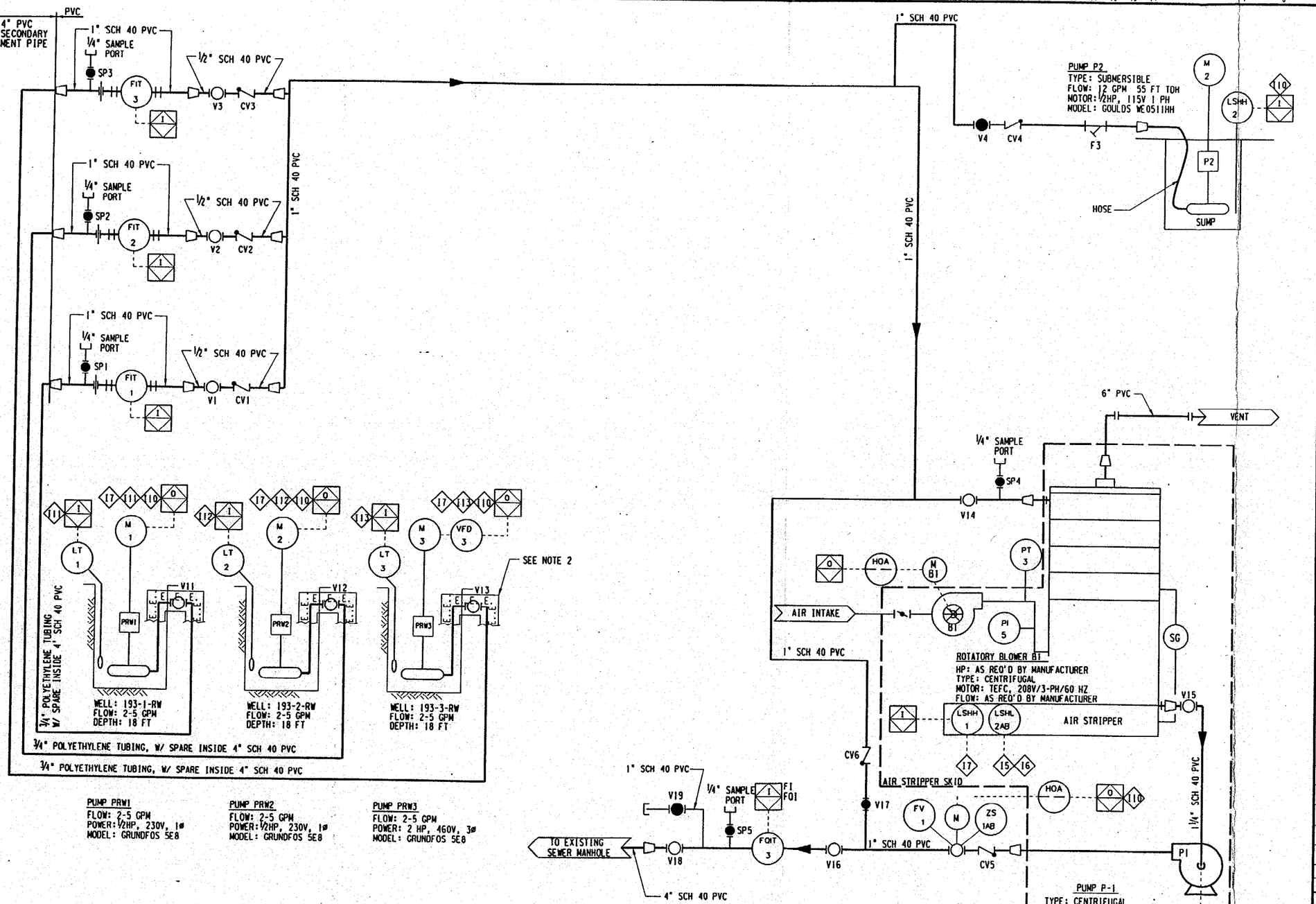
BECHTEL ENVIRONMENTAL INC.
OAK RIDGE, TENNESSEE

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

MARINE CORPS RECRUIT DEPOT, PARRIS ISLAND, S.C.
SITE 45/SWMU 45, DRY CLEANERS FACILITY
GROUNDWATER TREATMENT SYSTEM

JOB NO.	DRAWING NO.	REV
22567	145-D000-002	0

22567/145/145D002.DGN



NOTES

1. FIT 1 THROUGH FIT 3 MUST BE INSTALLED IN VERTICAL RUN OF PIPE.
2. POWER FEED WILL BE INSTALLED TO EACH WELL FOR FUTURE HEAT TRACE INSTALLATION (IF NEEDED).
3. MOTOR FOR WELL 193-3-RW USES VARIABLE FREQUENCY DRIVE FOR LOW FLOW CONTROL.

LEGEND

INTERLOCKS

I5 - AIR STRIPPER SUMP LOW
I6 - AIR STRIPPER SUMP HIGH
I7 - AIR STRIPPER SUMP HIGH HIGH
I10 - SUMP HIGH HIGH LEVEL
I11 - WATER LEVEL AT P1
I12 - WATER LEVEL AT P2
I13 - WATER LEVEL AT P3

NO.	DATE	REVISIONS	BY	CHKR	DESIGN ENGR	ENGR	PROJ ENGR	MICRO FLMD
0	6/23/00	AS-BUILT	JTM	JRM	MJM	WH	JTM	

SCALE NOTED

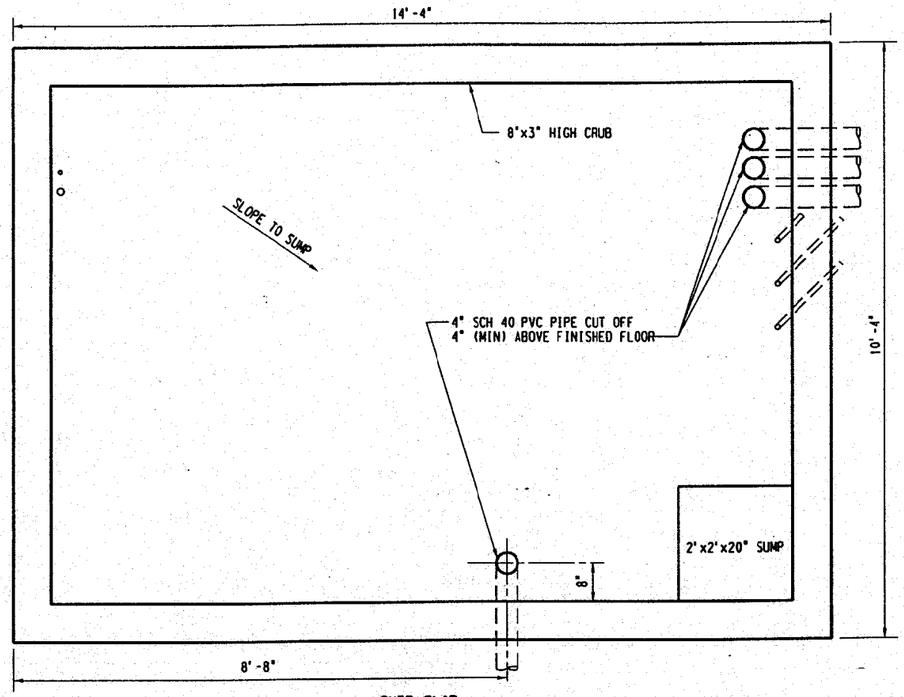
BECHTEL ENVIRONMENTAL INC.
OAK RIDGE, TENNESSEE

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

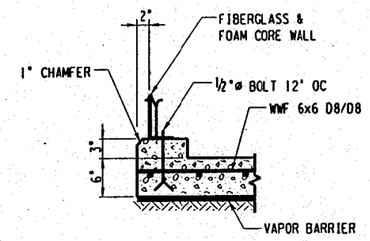
MARINE CORPS RECRUIT DEPOT, PARRIS ISLAND, S.C.
SITE 45/SWMU 45, DRY CLEANERS FACILITY
GROUNDWATER TREATMENT SYSTEM P & ID

JOB NO.	DRAWING NO.	REV
22567	145-D000-007	0

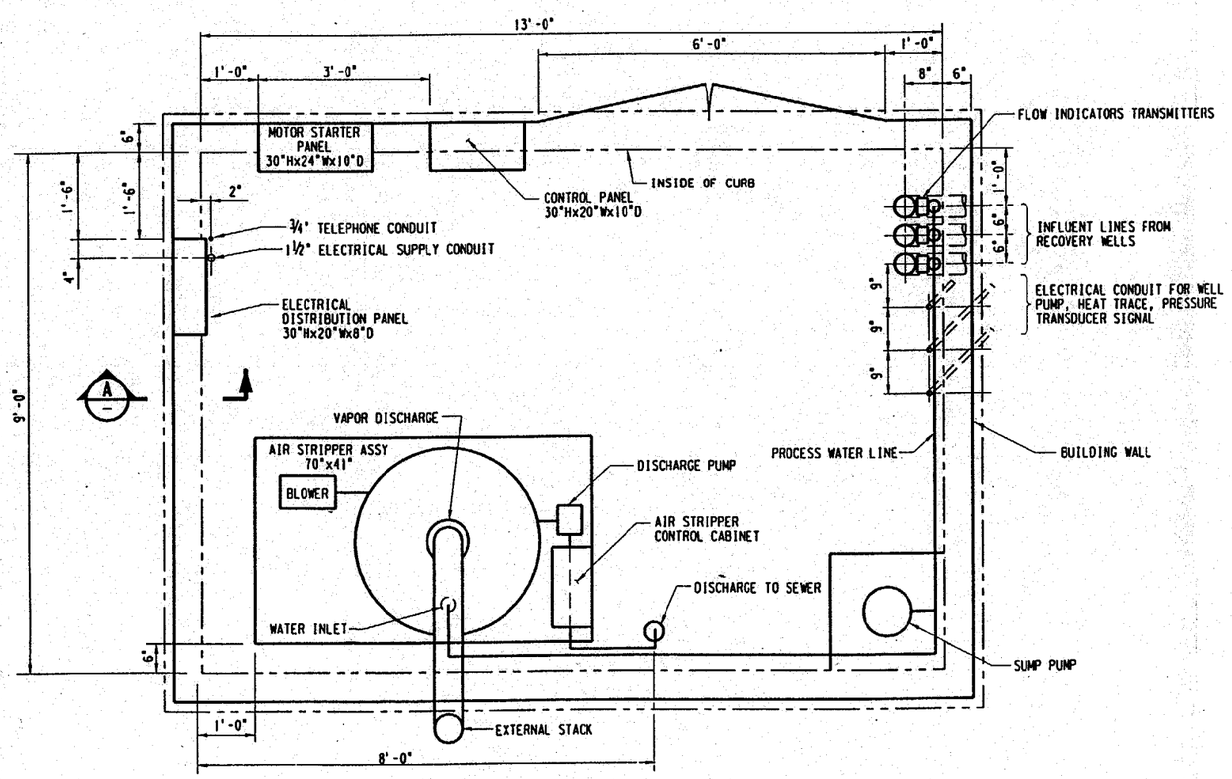
22567 145 145D007.DGN



SHED SLAB



SECTION A
1"=1'-0"



EQUIPMENT BUILDING, PLAN VIEW

NOTES

LEGEND

NO.	DATE	REVISIONS	BY	CHKR	DESIGN SUPV	ENGR	PROJ ENGR	MICRO FILMD
0		AS-BUILT						
A	2/5/98	ISSUED FOR REVIEW	RGB	WLU	NJA	WRZ	REH	

SCALE NOTED

S:\22567\145\D000\008.DGN 07/06/2000

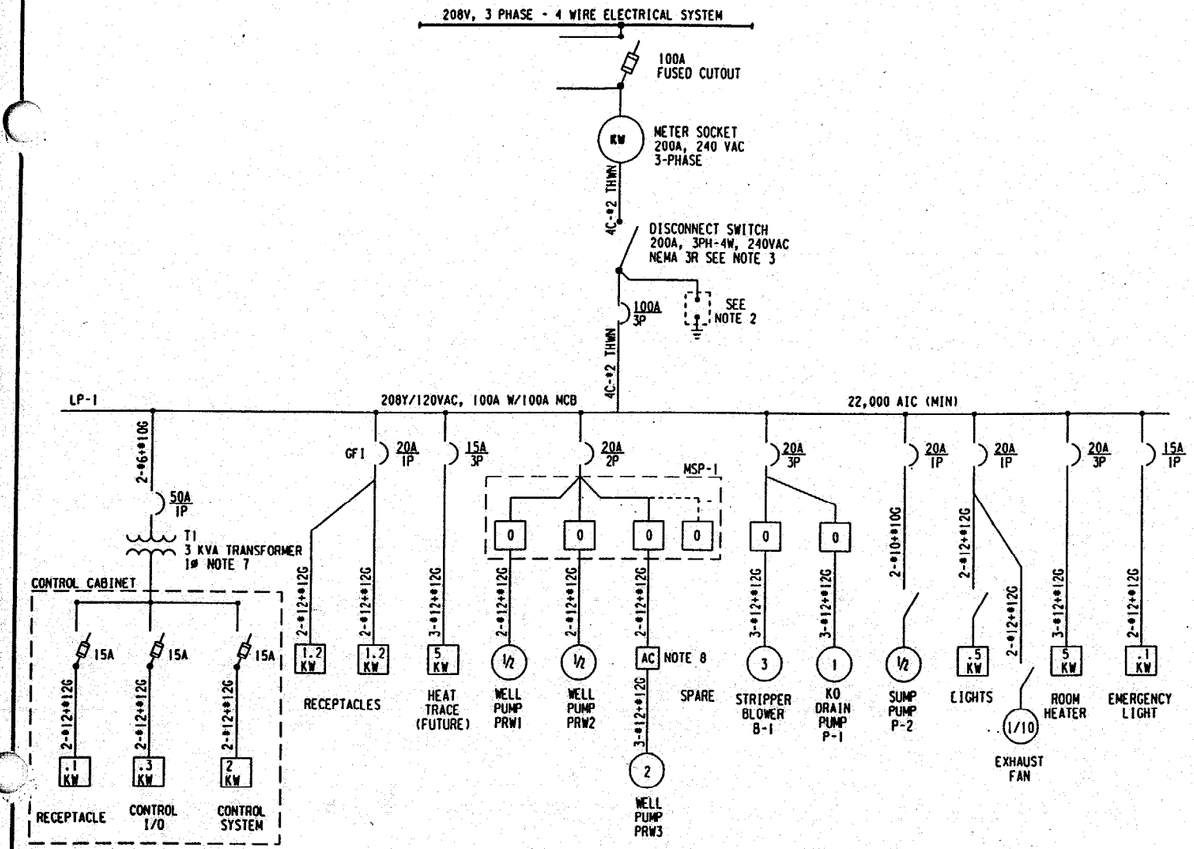
BECHTEL ENVIRONMENTAL INC.
OAK RIDGE, TENNESSEE

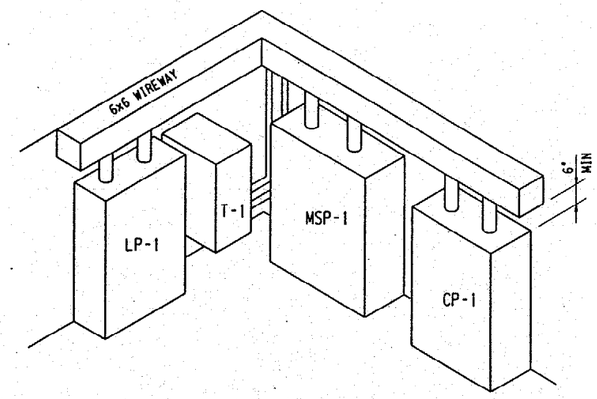
DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

MARINE CORPS RECRUIT DEPOT, PARRIS ISLAND, S.C
SITE 45/SWMU 45, DRY CLEANERS FACILITY
GROUNDWATER EQUIPMENT BUILDING

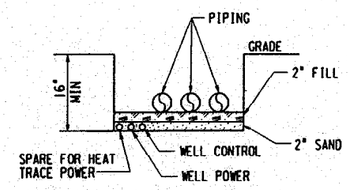
JOB NO.	DRAWING NO.	REV
22567	145-D000-008	A

22567 145 145D008.DGN





PANEL ARRANGEMENT
NTS



SECTION B
3/4"=1'-0"

NOTES

1. ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NFPA 70).
2. SURGE ARRESTER, WIREMOLD SENTRON HB-120Y.
3. MOUNT DISCONNECT SWITCH ON SERVICE DROP POLE TO PROVIDE EASY ISOLATION POINT.
4. CONDUIT INSIDE BUILDING TO BE E.M.T.
5. CABLING TO WELLS TO BE DIRECT BURIED.
6. FLEXIBLE CONDUIT TO BE USED FOR MOTOR CONNECTION. FLEX LENGTH TO BE APPROXIMATELY 5 FEET.
7. POWER CONDITIONER, SOLA TYPE 63-23-230-8.
8. AC FREQUENCY CONTROLLER, SIEMENS MICROMASTER MODEL NUMBER 6SE9216-8CB40.

LEGEND

	DUPLEX RECEPTACLE
UH	ELECTRIC HEATER
EF	EXHAUST FAN MOTOR
FL	FLUORESCENT LIGHT FIXTURE
J	JUNCTION/PULL BOX
EM	EMERGENCY LIGHT DUAL-LITE DL-2, 120V
	DISCONNECT SWITCH
--- E ---	UNDERGROUND POWER CONDUIT
--- T ---	UNDERGROUND TELEPHONE CABLE

PANEL NO. LP-1 — VOLTAGE: ☒ 120/208V,3 PHASE — GROUND: ☒ LUG ☐ BUS

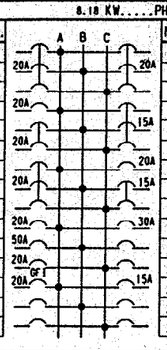
MOUNTING: ☐ FLUSH ☒ SURFACE — MAINS: ☐ LUGS ONLY AMP. ☒ MAIN BREAKER 100 AMP. — ☒ TOP ☐ BOTTOM — NEUTRAL: ☐ 50 % ☒ 100 %

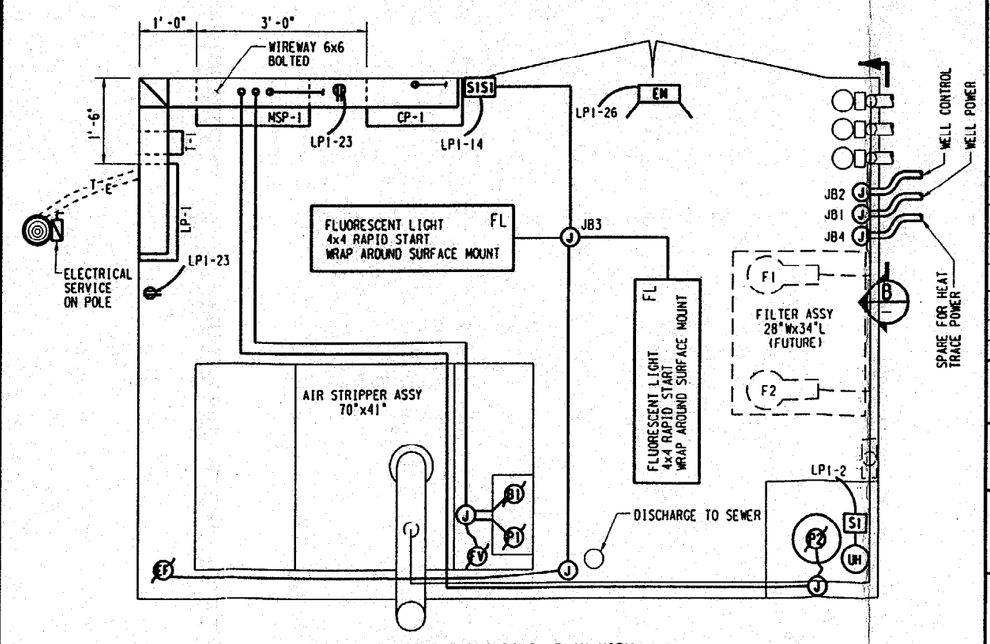
COVER: ☒ WITH DOOR ☐ WITHOUT DOOR — ☒ WITH LOCK ☐ WITHOUT LOCK

ALL BRANCH BKRS. 20A.,1 POLE UNLESS NOTED OTHERWISE
U/L LISTED BKR. INTERRUPTING RATING 22000 RMS SYM. AMPS.

CONNECTED LOAD: PHASE A 6.14 KW.....PHASE B 8.18 KW.....PHASE C 7.78 KW.....TOTAL 22.10

LOCATION	LOAD	NO.	NO.	LOAD	LOCATION
STRIPPER BLOWER B-1	1.19	1	2	1.67	ROOM HEATER
	1.19	3	4	1.67	
	1.19	5	6	1.67	
SUMP PUMP P-2	1.01	7	8	1.67	HEAT TRACE
MOTOR STARTER PANEL	0.75	9	10	1.67	
MOTOR STARTER PANEL	0.75	11	12	1.67	
		13	14	0.50	LIGHTS & EXHAUST FAN
SPARE		15	16		SPARE
		17	18		SPARE
SPARE		19	20		SPARE
T1 TRANSFORMER	2.90	21	22		SPARE
RECEPTACLES	2.40	23	24		SPARE
SPARE		25	26	0.10	EMERGENCY LIGHT
SPACE		27	28		SPACE
		29	30		SPACE





EQUIPMENT BUILDING, PLAN VIEW
3/4"=1'-0"

NO.	DATE	REVISIONS	BY	CHKR	DESIGN ENGR	ENGR	PROJ ENGR	MICRO FLMD
0	9/20/99	AS-BUILT	JEM	WEH	NJA	WLU	JRM	

SCALE NONE

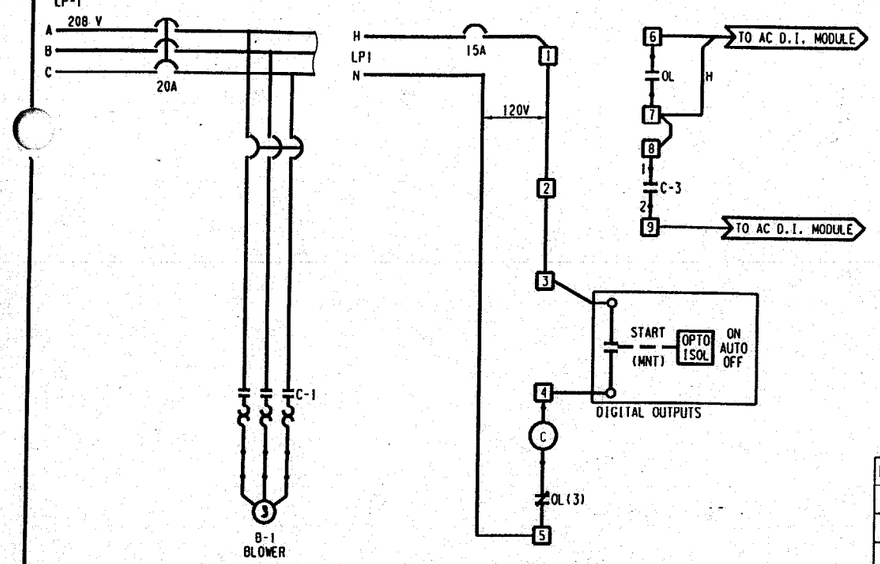
BECHTEL ENVIRONMENTAL INC.
OAK RIDGE, TENNESSEE

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

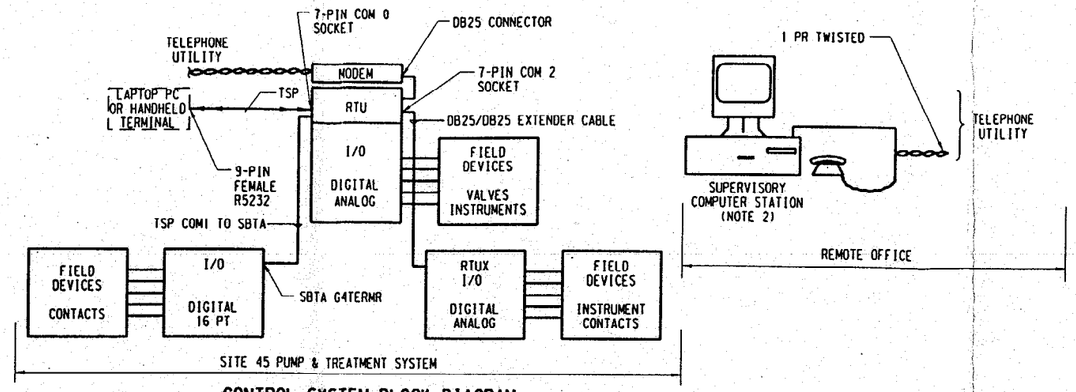
MARINE CORPS RECRUIT DEPOT, PARRIS ISLAND, S.C.
SITE 45/SWMU 45, DRY CLEANERS FACILITY
ELECTRICAL SYSTEM

JOB NO.	DRAWING NO.	REV
22567	145-D000-009	0

22567 145 1450009.DGN



208V, 3 PHASE MOTOR CONTROL SCHEMATIC, SINGLE SPEED



CONTROL SYSTEM BLOCK DIAGRAM

NTS

ITEM	QTY	DESCRIPTION
1	1	Remote Telemetry Unit, Opto 22 P/N M4RTU
2	1	RTU AC Power Supply 90-130V, Opto 22 P/N M4PS120A
3	1	RTU Serial Adapter Card, Opto 22 P/N M4SSER
4	1	Remote Telemetry Unit Extender, Opto 22 P/N M4RTUX
5	1	Mystic 200 Remote Digital Brick 16 I/O Points, Opto 22 P/N G4D16R
7	1	Single Brick Terminal Adapter, Opto 22 P/N SBTA
8	1	Mystic Brick Power Supply, 120V FM Opto 22 P/N G4PS24XAFM
9	1	Mystic 200 Remote Terminator, Opto 22 P/N G4TERMR

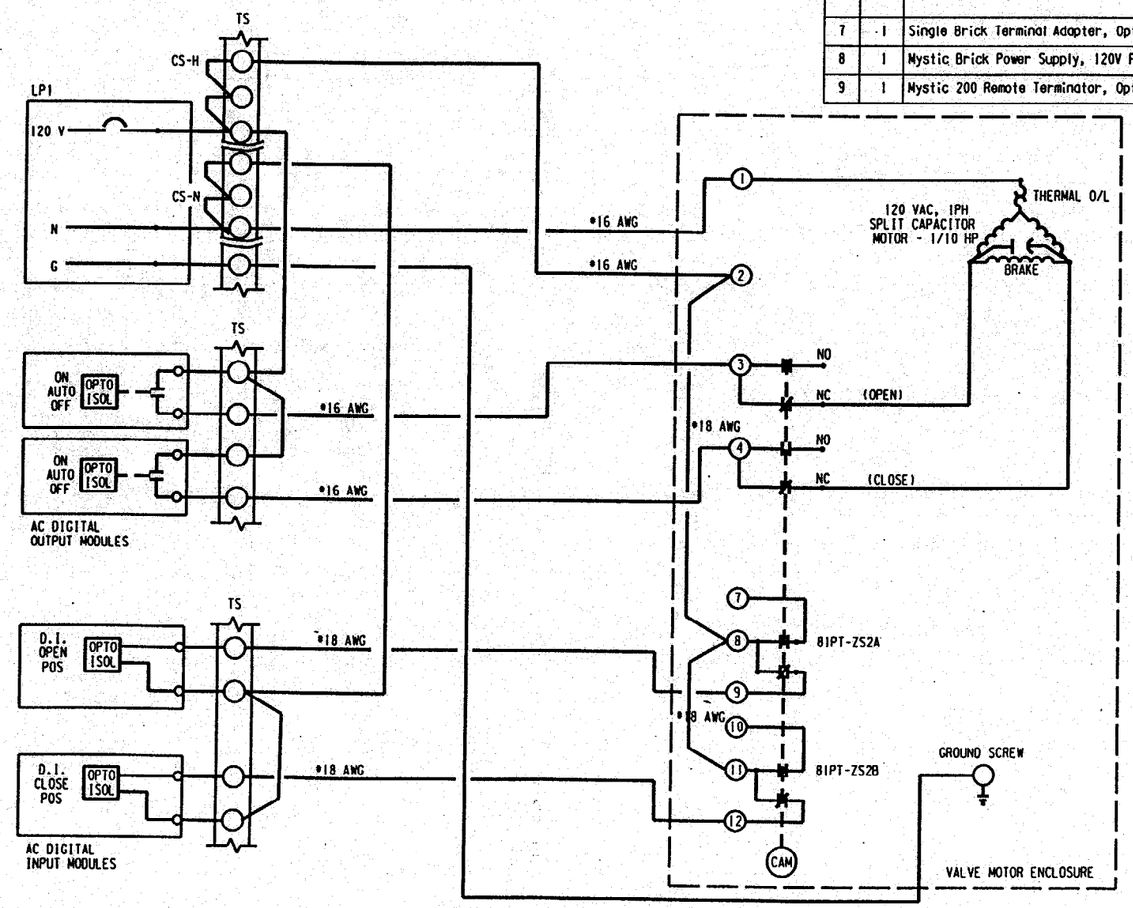
ITEM	QTY	DESCRIPTION
10	15	Digital AC Input Module, Opto 22 P/N G4IAC5
11	12	Digital AC Output Relays, with mode control toggle switch, Opto 22 P/N G4OAC5MA
12	10	Analog Input Module, 4-20 maDC, Opto 22 P/N G4AD3
14	1	Software, Mystic 200 Processor, lot Opto 22 P/N 'Cyrano 200'
15	1	Software, Mystic 200 Windows MMI, lot Opto 22 P/N 'Mystic MMI'
16	2	4 MEG RAM Expansion, Opto 22 P/N G4RAM4M
17	1	MODEM ZYPCOM Z326-SX
18	1	OPTO 22 P/N G4REG

NOTES

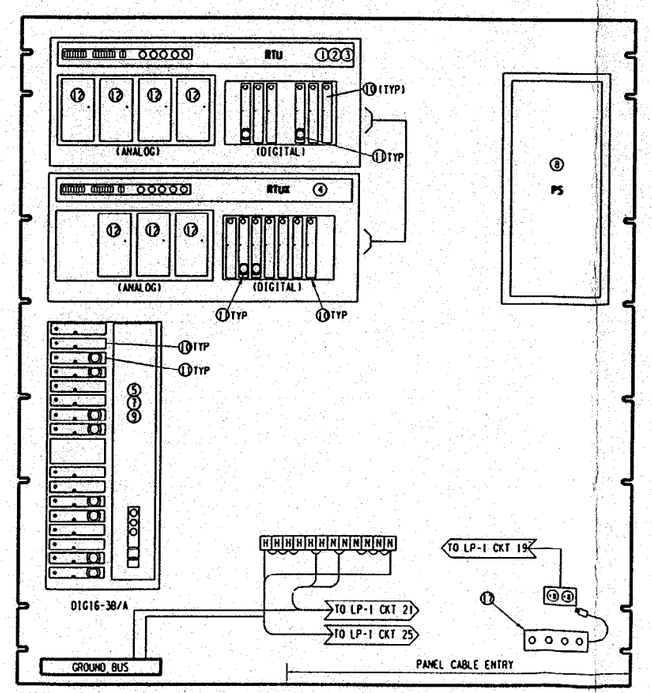
1. FV MOTOR LOCKED-ROTOR CURRENT ESTIMATED TO BE 0.8 AMPERES. TYPICAL CONTROLLER RELAY OUTPUT HAS RATING OF 1 AMPERE. USE OF MOTOR STARTER IS NOT REQUIRED.
2. SUPERVISORY PC USES INTERNAL MODEM SETUP FOR COM PORT 2 COMMUNICATIONS.

LEGEND

GROUNDWATER PUMP AND TREATMENT SYSTEM P&ID	145-D000-010



FV MOTOR CONTROL SCHEMATIC



NOTE: CONTROL PANEL INSTALLED IN NEMA 4X ENCLOSURE FOR WALL MOUNTING.

CONTROL SYSTEM PANEL LAYOUTS

NTS

LEGEND

C	CONTACTOR
DO	DIGITAL OUTPUT
DI	DIGITAL INPUT
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
MNT	MAINTAINED STATE
OL	OVERLOAD

NO.	DATE	REVISIONS	BY	CHKR	PROJ ENGR	ENGR	PROJ ENGR	MICRO FLMD
0		AS-BUILT						

SCALE NONE

BECHTEL ENVIRONMENTAL INC.
OAK RIDGE, TENNESSEE

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

MARINE CORPS RECRUIT DEPOT, PARRIS ISLAND, S.C.
SITE 45/SWMU 45, DRY CLEANERS FACILITY
CONTROL SYSTEM

JOB NO.	DRAWING NO.	REV
22567	145-D000-010	0

22567 145 145D010.DGN

APPENDIX D

O&M LOGSHEETS

OPERATION AND MAINTENANCE LOGSHEET
FDCF, MCRD Parris Island, SC

Inspector's Name Scott Towns		Date 6/30/98
Time Arrived at Site 8:30 AM	Time Departed Site 1:00pm	Weather Conditions Sunny w a breeze
Materials/Supplies Used: 5		

Item	Readings/Results	Comments
1.0 Recovery Pump House #1		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
2.0 Recovery Pump House #2		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem reas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
3.0 Recovery Pump House #3		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
4.0 Air Sampling Readings		
PID reading from treatment building	NA for 6/30/98 ppm	
5.0 Flow Readings		
5.1 FIT-1 Reading	NA gallons	
5.2 FIT-2 Reading	2.8 gallons	
5.3 FIT-3 Reading	1.8 gallons	
6.0 Air Stripper		
6.1 PI-5 reading	16.5 inches of water	
6.2 FQIT 1 reading	0133820 gallons	
6.3 Blower inspection/maintenance		
6.4 Blower Filter Replacement	☐ Yes ☐ No NA	No Filter
6.5 Discharge pump inspection/ maintenance	✓	Cleaned Stripper Trays
6.5 Inspect/clean air stripper trays	✓	" "

22567-115-SC-0816-0025-(11-1

Treatment System Water Sampling Log

Collected by TStowns | Date 6/30/98 | SEIR No. PI-001

Sample Location			SP-1	SP-2	SP-3	SP-5
Analytes	Container	Presv.	Container ID	Container ID	Container ID	Container ID
VOCs	(3) 40 mL vials	HCl	PI1624801-02-03	PI1624901 02-03	PI1625001 02-03	PI1624701-02-03
TOC	(1) 250 mL amber	H_2SO_4	" " 04	" " 04	" " 04	NA
Alkalinity	(1) 1000 mL poly	none	" " 05	PI1624905	PI1625005	NA
Sulfate	(1) 250 mL poly	none	" " 06	" " 06	" " 06	NA
Chloride	"	"	" " 06	" " 06	06	NA
Nitrate	"	"	" " 06	06	06	NA
Iron	(1) 250 mL poly	HNO_3	" " 07	PI1624907	PI1625007	NA
BOD 5 day	(1) 1,000 mL poly	none	NA	NA	NA	PI1624704
TOD	1000 mL Poly	None	NA	NA	NA	PI1624705

Treatment System Water Field Data

Collected by Scott Towns | Date 6/30/98

Equipment used and Serial Numbers:

Horiba U-10

Orion 3 Redox Meter

Parameter	Sample Location SP-1	SP-2	SP-3	SP-5
pH	4.66	4.86	4.66	4.81
Temperature	29.2	26.3	28.4°C	NA
Conductivity	.325	.385	.543	NA
Dissolved O_2	.58	.82	.37	NA
Turbidity	999	153	20	NA
Redox Potential	112	145 mV	088 mV	134 mV
Salinity	.01	.01	.02	NA

22567-145-SC-0816-0025-(1)-1

NOTES

OPERATION AND MAINTENANCE LOGSHEET
FDCF, MCRD Parris Island, SC

Inspector's Name TS Towns		Date 7/22/98
Time Arrived at Site 12:15 pm	Time Departed Site	Weather Conditions Hot Sunny
Materials/Supplies Used:		

Item	Readings/Results	Comments
1.0 Recovery Pump House #1		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☒ Yes ☐ No	
2.0 Recovery Pump House #2		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☒ Yes ☐ No	
3.0 Recovery Pump House #3		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☒ Yes ☐ No	
4.0 Air Sampling Readings	NA 0.0 ppm	
PID reading from treatment building	0.0 ppm	
5.0 Flow Readings		
5.1 FIT-1 Reading	1.0 gallons	adjusted to 1.5
5.2 FIT-2 Reading	2.2 gallons	
5.3 FIT-3 Reading	NA gallons	Not operational
6.0 Air Stripper		
6.1 PI-5 reading	12 inches of water	
6.2 FQIT 3 reading	158930 gallons	
6.3 Blower inspection/maintenance	✓ fine	
6.4 Blower Filter Replacement	☐ Yes ☐ No NA	
6.5 Discharge pump inspection/ maintenance	✓ fine	
6.5 Inspect/clean air stripper trays	✓	Cleaned stripper trays

Treatment System Water Sampling Log						
Collected by Thomas S. Towns		Date 7/22/98		SEIR No. PI 011		
Sample Location			SP-1	SP-2	SP-3	SP-~~4~~ 5
Analytes	Container	Presv.	Container ID	Container ID	Container ID	Container ID
VOCs	40 mL vials	HCl	PI16270 133	PI16271 ~~03~~ 36	NR	PI16272 01 02 03
TOC	250 mL amber	H_2SO_4	" " 04	" " 01		NA
Alkalinity	1000 mL poly	none	" " 5	" " 02		NA
Sulfate	250 mL poly	none	" " 6	03		NA
Chloride	"	"	" " 6	03		NA
Nitrate	"	"	" " 6	03		NA
Iron	250 mL poly	HNO_3	" " 7	" " 04		NA
BOD 5 day	1,000 mL poly	none	NA	NA	NA	PI16272 05
TDS	1000mL	None	NA	NA	NA	PI16272 04

Treatment System Water Field Data		
Collected by Scott Towns	Date 7/22/98	
Equipment used and Serial Numbers:		

Parameter	Sample Location			
	SP-1	SP-2	SP-3	SP-~~4~~ 5
pH	5.84	5.66	NA	7.80
Temperature	31.1 °C	27.9 °C	Pulled off Hand	NA
Conductivity	.299	.351		NA
Dissolved O_2	1.90	1.08		NA
Turbidity	999	310		NA
Redox Potential	NA			NA

NOTES

☆ resampled VOC's per Roy Hockstra request on 8/7/98

ph for SP-5 (Effluent)

1) 8.33 2 cups
2) 8.53 2 cups
3) 8.57 2 cups

OPERATION AND MAINTENANCE LOGSHEET
FDCF, MCRD Parris Island, SC

Inspector's Name		Date
Towns		8/31/98
Time Arrived at Site	**Time Departed Site**	**Weather Conditions**
9:48 AM		Humid & Hot

Materials/Supplies Used:

Item	Readings/Results	Comments
1.0 Recovery Pump House #1		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
2.0 Recovery Pump House #2		
Open the cover/and inspect the pump housing, pumps/piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
3.0 Recovery Pump House #3		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
4.0 Air Sampling Readings		
PID reading from treatment building	0.0 ppm	
5.0 Flow Readings		
5.1 FIT-1 Reading	2.7 gallons	after allowed well to recharge
5.2 FIT-2 Reading	-2.8 gallons	
5.3 FIT-3 Reading	1.8 gallons	
6.0 Air Stripper		
6.1 PI-5 reading	16.5 inches of water	
6.2 FQIT 3 reading	21,154 gallons	
6.3 Blower inspection/maintenance		
6.4 Blower Filter Replacement	☐ Yes ☒ No	
6.5 Discharge pump inspection/ maintenance	✓	
6.5 Inspect/clean air stripper trays	✓	Cleaned w pressure sprayer

Treatment System Water Sampling Log						
Collected by		Date		SEIR No.		
Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Container ID	Container ID	Container ID	Container ID
VOCs	40 mL vials	HCl	[illegible]	[illegible]	[illegible]	[illegible]
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1000 mL poly	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	"	"	[illegible]	[illegible]	[illegible]	NA
Nitrate	"	"	[illegible]	[illegible]	[illegible]	NA
Iron	250 mL poly	HNO_3	[illegible]	07	07	NA
BOD 5 day	1,000 mL poly	none	NA	NA	NA	04
TDS						05

Treatment System Water Field Data		
Collected by	Date	
Equipment used and Serial Numbers:		

Parameter	Sample Location			
	SP-1	SP-2	SP-3	SP-4
pH	5.27	5.20	[illegible] 5.28	5.79
Temperature	29.3	28.3	[illegible]	NA
Conductivity	307	361	633	NA
Dissolved O_2	.48	1.03	.57	NA
Turbidity	999	34	632	NA
Redox Potential	76	61	53	93 NA

NOTES

Need VOC V:/s

OPERATION AND MAINTENANCE LOGSHEET
FDCF, MCRD Parris Island, SC

Inspector's Name		Date for 9/98
Thomas Scott Towns		10/5/98
Time Arrived at Site	**Time Departed Site**	**Weather Conditions**
10:25 am		Sunny & Windy

Materials/Supplies Used:

Item	Readings/Results	Comments
1.0 Recovery Pump House #1		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
2.0 Recovery Pump House #2		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
3.0 Recovery Pump House #3		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	Clean RW 3 pump with pressure sprayer clogged again
4.0 Air Sampling Readings	NA	
PID reading from treatment building	NA ppm	
5.0 Flow Readings		
5.1 FIT-1 Reading	2.0 gallons	
5.2 FIT-2 Reading	2.4 gallons	
5.3 FIT-3 Reading	2.3 gallons	adjusted to 3.0
6.0 Air Stripper		
6.1 PI-5 reading	15 inches of water	
6.2 FQIT 3 reading	0263830 gallons	
6.3 Blower inspection/maintenance	✓ fine added grease	
6.4 Blower Filter Replacement	☐ Yes ☒ No	
6.5 Discharge pump inspection/ maintenance	✓ Fine	
6.5 Inspect/clean air stripper trays	pressure sprayed Trays	

Treatment System Water Sampling Log

Collected by Scott Towns | Date 10/5/98 | SEIR No. PI, 011

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Container ID	Container ID	Container ID	Container ID
VOCs	40 mL vials	HCl	PI16283 01, 02, 03	PI16284 01, 02, 03	PI16285 01, 02, 03	PI16282 01, 02, 03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1000 mL poly	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	"	"	06	06	06	NA
Nitrate	"	"	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5 day	1,000 mL poly	none	NA	NA	NA	04
T.D.S.		None				05

Treatment System Water Field Data

Collected by TS Towns | Date 10/5/98

Equipment used and Serial Numbers:

Cole Parmer pH meter

Horiba U-10 Water Quality meter

Parameter	Sample Location			
	SP-1	SP-2	SP-3	SP-4
pH	5.28	5.02	5.35	7.10
Temperature	30.3°C	28.8	28.4	NA
Conductivity	.34	.393	1.43	NA
Dissolved O_2	.05	.34	2.09	NA
Turbidity	42	72	315	NA
Redox Potential	039	064	072	NA

NOTES

9/23/98 Met Bill Heurdeys for 1) cleaning RW3 pump out 2) Calibrating all three wells 3) assisted in repairing water level sighting ~~ex~~ pipe/Hose,

10/5/98 recleaned RW3 well pump full of silt/sediment

10/7/98 Flow meter stuck system shut down ~~to~~ clean flow meter restart system

OPERATION AND MAINTENANCE LOGSHEET
FDCF, MCRD Parris Island, SC

Inspector's Name		Date
T.S. Towns		11/5/98
Time Arrived at Site	**Time Departed Site**	**Weather Conditions**
7:30 Am	9:30	Cold

Materials/Supplies Used:

Item	Readings/Results	Comments
1.0 Recovery Pump House #1		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
2.0 Recovery Pump House #2		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☑ No	11/4/98 at night knocked RPH #2 House off Foundation with Truck while doing Quarterly Sampling
3.0 Recovery Pump House #3		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	Replaced ~~Bad~~ rund FOS small Blade pump with new pump
4.0 Air Sampling Readings		
PID reading from treatment building	0.0 ppm	
5.0 Flow Readings		
5.1 FIT-1 Reading	1.6 gallons	
5.2 FIT-2 Reading	2.5 gallons	
5.3 FIT-3 Reading	1.2 gallons	
6.0 Air Stripper		
6.1 PI-5 reading	14.5 inches of water	
6.2 FQIT 3 reading	0311270 gallons	
6.3 Blower inspection/maintenance		
6.4 Blower Filter Replacement	☐ Yes ☒ No	
6.5 Discharge pump inspection/ maintenance	✓ Bill H Performed upkeep	
6.5 Inspect/clean air stripper trays	✓ Bill H. also cleaned	strippers trays during Quarterly Sampling on 11/5/98

Treatment System Water Sampling Log		
Collected by T.S Towns	Date 11/5/98	SEIR No.

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Container ID	Container ID	Container ID	Container ID
VOCs	40 mL vials	HCl	PI16303 01,02,03	PI16304 01,02,03	PI16305 01,02,03	PI16306 01,02,03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1000 mL poly	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	"	"	06	06	06	NA
Nitrate	"	"	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5 day	1,000 mL poly	none	NA	NA	NA	04
TDS						05

Treatment System Water Field Data	
Collected by T.S. Towns	Date 11/5/98

Equipment used and Serial Numbers:

Horiba U-10

3

Cole Parmer

Parameter	Sample Location			
	SP-1	SP-2	SP-3	SP-4
pH	5.78	5.62	5.86	7.42
Temperature	73.5	57.5	30.2 °C	NA
Conductivity	.34	.53	1.9	NA
Dissolved O_2	.9	.4	.9	NA
Turbidity	83	2	9	NA
Redox Potential	47.7	53.6	45.4	NA

NOTES

OPERATION AND MAINTENANCE LOGSHEET
FDCF, MCRD Parris Island, SC

Inspector's Name T. Scott Towns		**Date** 11/30/98
Time Arrived at Site 1:00 pm	**Time Departed Site** 6:35 pm	**Weather Conditions** Cool Mild
Materials/Supplies Used:		

Item	Readings/Results	Comments
1.0 Recovery Pump House #1		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
2.0 Recovery Pump House #2		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
3.0 Recovery Pump House #3		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
4.0 Air Sampling Readings		
PID reading from treatment building	0.0 ppm	
5.0 Flow Readings		
5.1 FIT-1 Reading	~~[illegible]~~ 2.2 gallons	
5.2 FIT-2 Reading	2.0 gallons	
5.3 FIT-3 Reading	1.9 gallons	
6.0 Air Stripper		
6.1 PI-5 reading	~~[illegible]~~ 19 inches of water	
6.2 FQIT 3 reading	349090 gallons	
6.3 Blower inspection/maintenance	✓	
6.4 Blower Filter Replacement	☐ Yes ☑ No	
6.5 Discharge pump inspection/ maintenance	✓	
6.5 Inspect/clean air stripper trays	Cleaned top tray	

Treatment System Water Sampling Log						
Collected by T. Scott Towns	Date 11/30/98	SEIR No. PI 011				
Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Container ID	Container ID	Container ID	Container ID
VOCs	40 mL vials	HCl	PI16308 01 02 03	PI16309 01, 02 03	PI16310 01 02 03	PI16311 01,02,03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1000 mL poly	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	"	"	06	06	06	NA
Nitrate	"	"	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5 day	1,000 mL poly	none	NA	NA	NA	04
TOS						05

Treatment System Water Field Data		
Collected by T. Scott Towns	Date 11/30/98	

Equipment used and Serial Numbers:

Horiba U-10

3

Orion ORP Quick Check

Parameter	Sample Location			
	SP-1	SP-2	SP-3	SP-4
pH	5.59	5.63	5.79	6.65
Temperature	23	22.5	25.5	NA
Conductivity	.405	.629	2.0	NA
Dissolved O_2	.75 mg	.62	1.40	NA
Turbidity	259	18	63	NA
Redox Potential	41	76	40	NA

NOTES

OPERATION AND MAINTENANCE LOGSHEET
FDCF, MCRD Parris Island, SC

Inspector's Name		Date
TS Towns		12/31/98
Time Arrived at Site	**Time Departed Site**	**Weather Conditions**
		Cold

Materials/Supplies Used:

Item	Readings/Results	Comments
1.0 Recovery Pump House #1		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
2.0 Recovery Pump House #2		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
3.0 Recovery Pump House #3		
Open the cover and inspect the pump housing, pumps, piping, electrical connections. Note any problem areas, leaks, etc.	Are conditions acceptable? ☑ Yes ☐ No	
4.0 Air Sampling Readings		
PID reading from treatment building	0.0 ppm	
5.0 Flow Readings		
5.1 FIT-1 Reading	1.5 gallons	
5.2 FIT-2 Reading	2.4 gallons	
5.3 FIT-3 Reading	2.6 gallons	
6.0 Air Stripper		
6.1 PI-5 reading	16 inches of water	
6.2 FQIT 3 reading	398370 gallons	
6.3 Blower inspection/maintenance		
6.4 Blower Filter Replacement	☐ Yes ☑ No	
6.5 Discharge pump inspection/ maintenance	✓ Fine	
Inspect/clean air stripper trays	Cleaned system one week before today	

Treatment System Water Sampling Log						
Collected by TSTowns		Date 12/31/98		SEIR No. PSC011		
Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Container ID	Container ID	Container ID	Container ID
VOCs	40 mL vials	HCl	PI16313,01,02,03	PI16314 01,02,03	PI16315 01,02,03	PI16316 01 02 03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1000 mL poly	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	"	"	06	" "	" "	NA
Nitrate	"	"	06	" "	" "	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5 day	1,000 mL poly	none	NA	NA	NA	04
TDS						05

Treatment System Water Field Data				
Collected by TSTowns		Date 12/31/98		
Equipment used and Serial Numbers: Orion ORP meter; Horiba U-10 Water Quality Meter				
Parameter	Sample Location			
	SP-1	SP-2	SP-3	SP-4
pH	5.51	5.44	5.45	6.29
Temperature	17.4 °C	20.4 °C	20.7 °C	NA
Conductivity	.358	.725	2.16	NA
Dissolved O_2	1.55	1.46	1.45	5.5 NA
Turbidity	999	83	250	NA
Redox Potential	90 mV	109	120	NA

MCRD PARRIS ISLAND, SC

Inspector's Name: T Scott Towns		Date: 1/29/89
Time Arrived at Site: 7:50Am	Time Departed Site:	Weather Conditions: Mild

Materials/Supplies Used:

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.2 Pump Control Elevations	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
2.0 Air Sample Readings	
PID reading from treatment building	0.0 ppm
3.0 Flow Readings	
3.1 FIT-1 reading	2.2 gpm
3.2 FIT-2 reading	2.8 gpm
3.3 FIT-3 reading	3.9 gpm
4.0 Air Stripper	before cleaning trays
4.1 PI-5 reading	19 inches of water
4.2 FQIT 3 reading	447410 gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☑ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☑ Yes ☐ No
4.6 Inspect/clean air stripper trays and refill wiers	☑ Yes ☐ No
4.7 Check tightness of bolts and fittings	☑ Yes ☐ No
4.8 Remove deposits from vent drain plug on pressure switch	☑ Yes ☐ No
4.9 Re-zero magnehelic gauge	☑ Yes ☐ No
5.0 Building and Miscellaneous Equipment	☑ Yes ☐ No
5.1 Unit heater – check temperature setting	☑ Yes ☐ No
5.2 Clean strainer basket	☑ Yes ☐ No
5.3 Exhaust fan inspection and maintenance	☑ Yes ☐ No
5.4 Check/clean building door louvers	☑ Yes ☐ No
5.5 Clean sump and bump test pump	☑ Yes ☐ No
5.6 Clean building floor	☑ Yes ☐ No

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Treatment System Water Sampling Log

Collected by: T S Towns | Date: 1/28/99 | SEIR No.: 8PI013

Sample Location			SP-1	SP-2	SP-3	SP-4 5
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16 33601,02,03	PI16 33701,02,03	PI16 33801 02 03	PI16 33901,02,03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	06	06	NA
Nitrate	250 mL poly	none	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	PI16 33904
TDS						PI16 33905

Treatment System Water Field Data

Collected by: T S Towns | Date: 1/28/99

Equipment used and Serial Numbers:

Horiba U-10 Calibrated 1/28/99

Orion Quick Check ORP 1/28/99

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4 5
pH	5.78	5.62	5.81	6.72
Temperature	18.3	21.5	22.3	NA
Conductivity	.317	.714	2.25	NA
Dissolved O_2	-.19	-.09	-.08	NA
Turbidity	835	999	-10	NA
Redox Potential	191	210	156	NA

Notes:

SP5 - collected @ 9:01 AM

SP1 - " " 10:00 AM

SP2 - " " 11:36

SP3 - " " 11:55

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: TS Towns		Date: 2/26/99
Time Arrived at Site: 8:00 am	Time Departed Site: 2:30 pm	Weather Conditions: Sunny Breezy
Materials/Supplies Used:		

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☒ No RW 2 ☐ Yes ☒ No RW 3 ☐ Yes ☒ No
1.2 Pump Control Elevations	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
2.0 Air Sample Readings	
PID reading from treatment building	N/A ppm
3.0 Flow Readings	
3.1 FIT-1 reading	3 gpm.
3.2 FIT-2 reading	3.2 gpm
3.3 FIT-3 reading	3.9 gpm
4.0 Air Stripper	Pump Final Reading 13
4.1 PI-5 reading ~1' adjusted down water still for passing	12.5 inches of water
4.2 FQIT 3 reading	5C8250 gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☒ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☒ Yes ☐ No
4.6 Inspect/clean air stripper trays and refill wiers	☒ Yes ☐ No
4.7 Check tightness of bolts and fittings	☐ Yes ☒ No
4.8 Remove deposits from vent drain plug on pressure switch	☒ Yes ☐ No
4.9 Re-zero magnehelic gauge	☐ Yes ☒ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☒ Yes ☐ No
5.2 Clean strainer basket	☐ Yes ☒ No
5.3 Exhaust fan inspection and maintenance	☒ Yes ☑ Not
5.4 Check/clean building door louvers	☒ Yes ☐ No
5.5 Clean sump and bump test pump	☒ Yes ☐ No
5.6 Clean building floor	☒ Yes ☐ No

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Treatment System Water Sampling Log

Collected by: [illegible]	Date: 2 [illegible]	SEIR No.: SPI [illegible]

			1:26pm	1:35	1:35	1:48
Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16 3410 1-03	[illegible] 03	[illegible] 03	[illegible] 03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	06	06	NA
Nitrate	250 mL poly	none	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04
TDS ~~To be Determined~~						05 06*

Treatment System Water Field Data

Collected by:	Date: 2/26/99

Equipment used and Serial Numbers:

Horiba U-10 Water Quality Meter
Cole Parmer pH meter

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4
pH	5.79	5.71	5.9	6.80
Temperature	19.4	21.5	22	NA
Conductivity	.407	.418	.409	NA
Dissolved O_2	6.13	5.10	6.4	NA
Turbidity	764	451	99 NTU	NA
Redox Potential	153	161	159	NA

Notes:

* To be Determined by Bechtel

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: T.S. Towns		Date: 4/1/99
Time Arrived at Site: 9:00 AM	Time Departed Site:	Weather Conditions: Cloudy, Windy, Sprinkle Rain
Materials/Supplies Used:		

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☐ Yes ☑ No
1.2 Pump Control Elevations	RW 1 ☑ Yes ☑ No RW 2 ☑ Yes ☑ No RW 3 ☑ Yes ☑ No
2.0 Air Sample Readings	
PID reading from treatment building	NA ppm
3.0 Flow Readings	
3.1 FIT-1 reading	~2.2 gpm
3.2 FIT-2 reading	4.0 gpm
3.3 FIT-3 reading	4.0 gpm
4.0 Air Stripper	
4.1 PI-5 reading	11 inches of water
4.2 FQIT 3 reading	567410 gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☑ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☑ Yes ☐ No
4.6 Inspect/clean air stripper trays and refill wiers	☑ Yes ☐ No
4.7 Check tightness of bolts and fittings	☐ Yes ☑ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☑ No
4.9 Re-zero magnehelic gauge	☐ Yes ☑ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☑ Yes ☐ No
5.2 Clean strainer basket	☑ Yes ☐ No
5.3 Exhaust fan inspection and maintenance	☑ Yes ☐ No
5.4 Check/clean building door louvers	☑ Yes ☐ No
5.5 Clean sump and bump test pump	☑ Yes ☐ No
5.6 Clean building floor	☑ Yes ☐ No

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Treatment System Water Sampling Log						
Collected by: TS Towns			Date: 4/1/99		SEIR No.: PI 13	
Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16345 01 02 03	PI16346 01 02 03	PI16347 01 02 03	PI16348 01 02 03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	/	/	NA
Nitrate	250 mL poly	none	06	/	/	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04
TDS						05

Treatment System Water Field Data		
Collected by: TS Towns	Date: 4/1/99	
Equipment used and Serial Numbers: Horiba U-10 (Calibrated) water Quality Meter		

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4
pH	5.86	5.76	~~6.69~~ 5.91	6.66
Temperature	19.5°C	20.9	21.5	NA
Conductivity	.349	.829	2.91	NA
Dissolved O_2	.80	.90	1.69	NA
Turbidity	736	76	250	NA
Redox Potential	79 mV	105 mV	36 mV	NA

Notes:

SP1 @ ~~2:44~~ 2:57
SP2 @ 2:44
SP3 @ 2:52
SPH @ 3:03

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56 A

Inspector's Name: T. Scott Towns		Date: 6/8/99
Time Arrived at Site: 11:40	Time Departed Site:	Weather Conditions: Sunny Breezy

Materials/Supplies Used:

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☑ No *
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☑ Yes ☐ No
1.2 Pump Control Elevations	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☐ Yes ☑ No
2.0 Air Sample Readings	
PID reading from treatment building	NA ppm
3.0 Flow Readings	
FIT-1 reading	2 gpm
3.2 FIT-2 reading	3.8 gpm
3.3 FIT-3 reading	5 gpm *
4.0 Air Stripper	
4.1 PI-5 reading	12 inches of water
4.2 FQIT 3 reading	671690 gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☑ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☑ Yes ☐ No
4.6 Inspect/clean air stripper trays and refill wiers	☐ Yes ☑ No
4.7 Check tightness of bolts and fittings	☑ Yes ☐ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☑ No
4.9 Re-zero magnehelic gauge	☐ Yes ☑ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☐ Yes ☑ No
5.2 Clean strainer basket	☐ Yes ☑ No
5.3 Exhaust fan inspection and maintenance	☐ Yes ☑ No
5.4 Check/clean building door louvers	☑ Yes ☐ No
5.5 Clean sump and bump test pump	☑ Yes ☐ No
Clean building floor	☑ Yes ☐ No

22567-145-SC-0816-0020-(1)-1

Treatment System Water Sampling Log

Collected by: TS Towns | Date: 6/8/00 | SEIR No.: 4 13

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI 5710.22	PI 6.372	PI 6.37.3	PI 6.37
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	06	06	NA
Nitrate	250 mL poly	none	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04
TOC						05

Treatment System Water Field Data

Collected by: TS Towns | Date: 6/8/00

Equipment used and Serial Numbers:

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4
X pH	5.55	5.60	5.68	6.83
X Temperature	57.2°C	56.6	57.7°C	NA
Conductivity	NA	NA	NA	NA
* Dissolved O_2	1.5 - 2.0 mg/L	0.0	<1.0	NA
Turbidity	NA	NA	NA	NA
X Redox Potential	64.2 mV	60.1	54.8	NA

Notes:

* used Hach DO Test kit Model OX-2P

X used Cole Parmer Meter pH/mV/°C meter

MAINTENANCE ACTIVITY → TROUBLE SHOOT PUMP on RW3, PUMP OUT SEDIMENTS FROM RW3 USING TRASH PUMP TO BUILDING SUMP FOR PROCESSING THRU AIR STRIPPER. (SHRS)

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: T. Scott Towns		Date: 7/8/95
Time Arrived at Site: 9:22	Time Departed Site:	Weather Conditions: Sunny Hot
Materials/Supplies Used:		

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☐ Yes ☑ No
1.2 Pump Control Elevations	RW 1 ☐ Yes ☐ No RW 2 ☐ Yes ☐ No RW 3 ☐ Yes ☐ No
2.0 Air Sample Readings	
PID reading from treatment building	NA ppm
3.0 Flow Readings	
3.1 FIT-1 reading * Reading before any adjustments made	3.3 gpm
3.2 FIT-2 reading	0.0 gpm
3.3 FIT-3 reading shutoff	gpm
4.0 Air Stripper	
4.1 PI-5 reading * 9.0 after cleaned stripper trays adjusted to 12	14.5 inches of water
4.2 FQIT 3 reading	702980 gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☐ Yes ☐ No *
4.5 Discharge pump inspection/maintenance	☑ Yes ☐ No
4.6 Inspect/clean air stripper trays and refill wiers	☐ Yes ☐ No
4.7 Check tightness of bolts and fittings	☑ Yes ☐ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☑ No
4.9 Re-zero magnehelic gauge	☑ Yes ☐ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☐ Yes ☑ No
5.2 Clean strainer basket	☑ Yes ☐ No
5.3 Exhaust fan inspection and maintenance	☑ Yes ☐ No
5.4 Check/clean building door louvers	☑ Yes ☐ No
5.5 Clean sump and bump test pump	☑ Yes ☐ No
5.6 Clean building floor	☑ Yes ☐ No

22567-145-SC-0816-0019-(1)-1

Treatment System Water Sampling Log

Collected by: TS Team 5 | Date: 7/8/99 | SEIR No.: PI 13

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16376 01, 02, 03	PI16377 01, 02, 03	PI16375 01, 02, 03	PI16378 01, 02, 03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none				NA
Nitrate	250 mL poly	none		06		NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04 05

FOB

Treatment System Water Field Data

Collected by: | Date:

Equipment used and Serial Numbers:
Cole Parmer

Parameter	Sample Locations SP-1	SP-2	SP-3	SP-4 (Redox -2.2)
pH	5.62	5.75		7.22
Temperature	27.1	28.6	NA	NA
Conductivity	.413	1.15		NA
Dissolved O_2	.66	1.09		NA
Turbidity	999	822	Not Running	NA
Redox Potential	45.1 mV	60 mV		NA
Salinity	.01	.05		

Notes:
SP3 still not Running even after changing out spare starter motor will not run long enough to collect a Sample TST

22567-145-SC-0816-0019-(1)-1

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: TS Towns		Date: 8/3/99
Time Arrived at Site: 8:00 Am	Time Departed Site: 7:00 pm	Weather Conditions: Breezy / Hot

Materials/Supplies Used: Used Cole Parmer for most Parameters ~~to~~ U-10 broke today before could get Treatment building Parameters

Item	Readings/Results		
1.0 Recovery Pump House	Are conditions acceptable?		
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1	☑ Yes	☐ No
	RW 2	☑ Yes	☐ No
	RW 3	☑ Yes	☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1	☐ Yes	☑ No
	RW 2	☐ Yes	☑ No
	RW 3	☐ Yes	☑ No
1.2 Pump Control Elevations	RW 1	☐ Yes	☑ No
	RW 2	☐ Yes	☑ No
	RW 3	☐ Yes	☑ No
2.0 Air Sample Readings			
PID reading from treatment building	NA ppm		
3.0 Flow Readings			
3.1 FIT-1 reading	3.4 gpm		
3.2 FIT-2 reading	4.2 gpm		
3.3 FIT-3 reading	4.4 gpm		
4.0 Air Stripper			
4.1 PI-5 reading	12.5 inches of water		
4.2 FQIT 3 reading	726290 gallons		
4.3 Blower inspection/maintenance	✓		
4.4 Blower grease bearing		☑ Yes	☐ No
4.5 Discharge pump inspection/maintenance		☑ Yes	☐ No
4.6 Inspect/clean air stripper trays and refill wiers	8/2/99	☑ Yes	☐ No
4.7 Check tightness of bolts and fittings		☑ Yes	☐ No
4.8 Remove deposits from vent drain plug on pressure switch		☐ Yes	☑ No
4.9 Re-zero magnehelic gauge		☐ Yes	☑ No
5.0 Building and Miscellaneous Equipment		☐ Yes	☑ No
5.1 Unit heater – check temperature setting		☐ Yes	☑ No
5.2 Clean strainer basket		☑ Yes	☐ No
5.3 Exhaust fan inspection and maintenance		☐ Yes	☑ No
5.4 Check/clean building door louvers		☑ Yes	☐ No
5.5 Clean sump and bump test pump		☑ Yes	☐ No
5.6 Clean building floor		☑ Yes	☐ No

22567-145-SC-0816-0023-(1)-1

Treatment System Water Sampling Log		
Collected by: TStoung	Date: 8/3/99	SEIR No.: PI 13

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI 16383	PI 16384	PI 16385	PI 16386
TOC	250 mL amber	H_2SO_4	04	04		NA
Alkalinity	1,000 mL amber	none	05	05		NA
Sulfate	250 mL poly	none	06	06		NA
Chloride	250 mL poly	none	06	06		NA
Nitrate	250 mL poly	none	06	06		NA
Iron	250 mL poly	HNO_3	07	07		NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04 05

TDS

Treatment System Water Field Data	
Collected by:	Date: 8/3/99

Equipment used and Serial Numbers:

Cole Parmer in place of down H-10

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4 5
pH	6.46	6.33	6.28	6.93
Temperature	50.9°C	61.9°C	52.3	NA
Conductivity				NA
Dissolved O_2				NA
Turbidity				NA
Redox Potential mV	35.3	42.6	44.6	NA

Notes: Horiba H-10 shut down would not work toward the end of 8/3/99. Had to use Cole Parmer for above parameters

22567-145-SC-0816-0023-(1)-1

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: T Scott Towns		Date: 8/30/99
Time Arrived at Site: 10:00 AM	Time Departed Site: 13:15 pm	Weather Conditions: Windy Fair
Materials/Supplies Used: Ziplock bags for samples		

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☐ Yes ☑ No
1.2 Pump Control Elevations	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☐ Yes ☑ No
2.0 Air Sample Readings	
PID reading from treatment building	NA ppm
3.0 Flow Readings	
3.1 FIT-1 reading	4.6 gpm
3.2 FIT-2 reading	3.4 gpm
3.3 FIT-3 reading	2.2 gpm
4.0 Air Stripper	
4.1 PI-5 reading	16 inches of water
4.2 FQIT 3 reading	771430 gallons
4.3 Blower inspection/maintenance	✓ Fine
4.4 Blower grease bearing	☑ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☑ Yes ☐ No
4.6 Inspect/clean air stripper trays and refill wiers	☑ Yes ☐ No
4.7 Check tightness of bolts and fittings	☑ Yes ☐ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☑ No NA
4.9 Re-zero magnehelic gauge	☑ Yes ☐ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☐ Yes ☑ No
5.2 Clean strainer basket	☑ Yes ☐ No
5.3 Exhaust fan inspection and maintenance	☑ Yes ☐ No
5.4 Check/clean building door louvers	☐ Yes ☑ No
5.5 Clean sump and bump test pump	☑ Yes ☐ No
5.6 Clean building floor	☑ Yes ☐ No

22567-145-SC-0816-0021-(1)-1

Treatment System Water Sampling Log		
Collected by: T. Tr...	Date: 9/7/99	SEIR No.: PI 13

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16401 01 02 03	PI16402 01, 02 03	PI16403 01, 02 03	PI16404, 01, 02, 03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	06	06	NA
Nitrate	250 mL poly	none	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04
TDS						05

Treatment System Water Field Data		
Collected by:	Date:	
Equipment used and Serial Numbers:		

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4
pH	5.68	5.64	5.61	6.63
Temperature	27.2	26.8	26.8	NA
Conductivity	.488	1.31	4.92	NA
Dissolved O_2	1.37	.79	1.12	NA
Turbidity	399	147	2	NA
Redox Potential	40.0	50.9	53	NA

Notes: ~~of~~ adjusted to 13 inches of water between 12 & 14

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: T Scott Towns		Date: 9/29/99
Time Arrived at Site: 11:30	Time Departed Site: 1604	Weather Conditions: Sunny Nice
Materials/Supplies Used: Zip lock bags		

Item	Readings/Results		
1.0 Recovery Pump House	Are conditions acceptable?		
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1	☑ Yes	☐ No
	RW 2	☑ Yes	☐ No
	RW 3	☑ Yes	☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1	☑ Yes	☐ No
	RW 2	☑ Yes	☐ No
	RW 3	☑ Yes	☐ No
1.2 Pump Control Elevations	RW 1	☑ Yes	☐ No
	RW 2	☑ Yes	☐ No
	RW 3	☑ Yes	☐ No
2.0 Air Sample Readings			
PID reading from treatment building	NA	ppm	
3.0 Flow Readings			
3.1 FIT-1 reading	4.0	gpm	
3.2 FIT-2 reading	2.4	gpm	
3.3 FIT-3 reading	.8-.9	gpm	
4.0 Air Stripper			
4.1 PI-5 reading	11	inches of water	
4.2 FQIT 3 reading	817370	gallons	
4.3 Blower inspection/maintenance			
4.4 Blower grease bearing		☑ Yes	☐ No
4.5 Discharge pump inspection/maintenance		☑ Yes	☐ No
4.6 Inspect/clean air stripper trays and refill wiers		☑ Yes	☐ No
4.7 Check tightness of bolts and fittings		☐ Yes	☑ No
4.8 Remove deposits from vent drain plug on pressure switch		☐ Yes	☑ No
4.9 Re-zero magnehelic gauge		☐ Yes	☑ No
5.0 Building and Miscellaneous Equipment		☐ Yes	☐ No
5.1 Unit heater – check temperature setting		☐ Yes	☑ No
5.2 Clean strainer basket		☐ Yes	☑ No
5.3 Exhaust fan inspection and maintenance		☑ Yes	☐ No
5.4 Check/clean building door louvers		☑ Yes	☐ No
5.5 Clean sump and bump test pump		☐ Yes	☑ No
5.6 Clean building floor		☐ Yes	☑ No

22567-145-SC-0816-0026-(11)-1

9/22/99

Treatment System Water Sampling Log

Collected by: TS Towns | Date: [redacted] | SEIR No.: PI713

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16466 01,02,03	PI16467 01,02,03	PI16468 01,02,03	PI16469 01,02,03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	06	06	NA
Nitrate	250 mL poly	none	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04
TOS						05

Treatment System Water Field Data

Collected by: TS Towns | Date: 9/22/99

Equipment used and Serial Numbers:

Cole Parmer Ph/Temp/mV meter

YSI Dissolved Oxygen meter

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4
pH	6.14	5.60	6.99	6.16
Temperature	26.7	26.8	27.2	NA 28.7
Conductivity	—	—	—	NA
Dissolved O_2	2.7	1.4	1.6 mg/l	NA DO=6.6
Turbidity	~~[illegible]~~ **		Very Clear .8-.9	NA
Redox Potential	24.3	45.6	16.0	NA 13.6

Note *

Notes:

9:00 am prep
9:30 Am on road to site
11:30 arrived on site start cleaning stripper trays
1:30 Finished cleaning
1:45 start CoCust. and sample Parameters
1604 Depart site Call Bill Heavrdes

S

SP3 Very Clear @ .8-.9 **
SP2
SP1 Moderate to slightly heavy in orange color
* was not able to get Conductivity

22567-145-SC-0816-0026-(1)-1

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: T.S. Towns		**Date:** 10/28/99
Time Arrived at Site: 0820	**Time Departed Site:** 1700	**Weather Conditions:** Sunny Breezy
Materials/Supplies Used:		

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☐ Yes ☑ No
1.2 Pump Control Elevations	RW 1 ☑ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☐ Yes ☑ No
2.0 Air Sample Readings	
PID reading from treatment building	NA ppm
3.0 Flow Readings	
3.1 FIT-1 reading	2.3 gpm
3.2 FIT-2 reading	2.2 gpm
3.3 FIT-3 reading	2.8 gpm
4.0 Air Stripper	
4.1 PI-5 reading	12 inches of water
4.2 FQIT 3 reading	85492 gallons
4.3 Blower inspection/maintenance	✓
4.4 Blower grease bearing	☑ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☐ Yes ☑ No
4.6 Inspect/clean air stripper trays and refill wiers	☑ Yes ☐ No
4.7 Check tightness of bolts and fittings	☑ Yes ☐ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☑ No
4.9 Re-zero magnehelic gauge	☐ Yes ☑ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☐ Yes ☑ No
5.2 Clean strainer basket	☑ Yes ☐ No
5.3 Exhaust fan inspection and maintenance	☑ Yes ☐ No
5.4 Check/clean building door louvers	☐ Yes ☑ No
5.5 Clean sump and bump test pump	☑ Yes ☐ No
5.6 Clean building floor	☐ Yes ☐ No

Treatment System Water Sampling Log

Collected by:	TJ Towns	Date:	10/28/99	SEIR No.:	PI 013

Sample Location			SP-1	SP-2	SP-3	SP-~~4~~ 5
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16431-01 02 03	PI16432-01 02 03	PI16433-01 02 03	PI16434 01 02 03
TOC	250 mL amber	H_2SO_4	-04	-04	-04	NA
Alkalinity	1,000 mL amber	none	-05	-05	-05	NA
Sulfate	250 mL poly	none	-06			NA
Chloride	250 mL poly	none		-06	-06	NA
Nitrate	250 mL poly	none				NA
Iron	250 mL poly	HNO_3	-07	-07	-07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04
TDS	500mL Poly	NONE				05

Treatment System Water Field Data

Collected by:	Date:	

Equipment used and Serial Numbers:

Horiba U-10 & Cole Parmer (Redox)
(all other parameters)

	1335	1340	1345	1353
	Sample Locations			
Parameter	SP-1	SP-2	SP-3	SP-4
pH	6.05	5.66	5.64	6.58
Temperature	21.9	24.1	24.9	NA
Conductivity	.403	1.22	3.17	NA
Dissolved O_2	1.04	1.15	.73	NA
Turbidity	386	162	1	NA
Redox Potential	32.1	39.0	38.3	NA

Notes:

Magnehelic reading 14.5 after cleaned filters

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: TSTowns		Date: 11/10/99
Time Arrived at Site: 9:00 AM	Time Departed Site:	Weather Conditions:

Materials/Supplies Used:

Teflon Washers for repairing pump piece on PRV2

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☐ Yes ☐ No RW 2 ☐ Yes ☐ No RW 3 ☐ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☐ No RW 2 ☐ Yes ☐ No RW 3 ☐ Yes ☐ No
1.2 Pump Control Elevations	RW 1 ☐ Yes ☐ No RW 2 ☐ Yes ☐ No RW 3 ☐ Yes ☐ No
2.0 Air Sample Readings	
PID reading from treatment building	ppm
3.0 Flow Readings	
3.1 FIT-1 reading	gpm
3.2 FIT-2 reading	gpm
3.3 FIT-3 reading	gpm
4.0 Air Stripper	
4.1 PI-5 reading	inches of water
4.2 FQIT 3 reading	gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☐ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☐ Yes ☐ No
4.6 Inspect/clean air stripper trays and refill wiers	☐ Yes ☐ No
4.7 Check tightness of bolts and fittings	☐ Yes ☐ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☐ No
4.9 Re-zero magnehelic gauge	☐ Yes ☐ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☐ Yes ☐ No
5.2 Clean strainer basket	☐ Yes ☐ No
5.3 Exhaust fan inspection and maintenance	☐ Yes ☐ No
5.4 Check/clean building/door louvers	☐ Yes ☐ No
5.5 Clean sump and bump test pump	☐ Yes ☐ No
5.6 Clean building floor	☐ Yes ☐ No

Treatment System Water Sampling Log

Collected by:	Date:	SEIR No.:

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont.
VOCs	40 mL vials	HCl				
TOC	250 mL amber	H_2SO_4				NA
Alkalinity	1,000 mL amber	none				NA
Sulfate	250 mL poly	none				NA
Chloride	250 mL poly	none				NA
Nitrate	250 mL poly	none				NA
Iron	250 mL poly	HNO_3				NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	

Treatment System Water Field Data

Collected by:	Date:	

Equipment used and Serial Numbers:

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4
pH				
Temperature				NA
Conductivity				NA
Dissolved O_2				NA
Turbidity				NA
Redox Potential				NA

Notes: Arrived to check RW 3 & RW 2 Reset AC 39.0
- Clean PRW2 pump install new teflon bearings as needed
- Reset AC Drive to 35 Hz from 40.5 for PRW3
- Reset motor starter
- Reduce flow rate from wells to ± 1.5 to 2.0 gpm
- Replace Padlocks on Recovery wells and Treatment Bldg. Mail key
- Pickup Amp Meter & Leave in Bldg. Jim

out 3.21
New In 1.19

old In 1.25
out 3.80

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: TS Towns		Date: 12/30/99
Time Arrived at Site: 8:20 Am	Time Departed Site: 5:30	Weather Conditions: Sunny Cool
Materials/Supplies Used:		

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☑ Yes ☐ No
1.2 Pump Control Elevations	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☐ Yes ☑ No
2.0 Air Sample Readings	
PID reading from treatment building	0.0 ppm
3.0 Flow Readings	
3.1 FIT-1 reading	1.7 gpm
3.2 FIT-2 reading	2.1 gpm
3.3 FIT-3 reading	4.0 gpm
4.0 Air Stripper	
4.1 PI-5 reading 18 @ first reading	13.5 inches of water after cleaned Trays
4.2 FQIT 3 reading	915980 gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☑ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☑ Yes ☐ No
4.6 Inspect/clean air stripper trays and refill wiers	☑ Yes ☐ No
4.7 Check tightness of bolts and fittings	☑ Yes ☐ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☑ No
4.9 Re-zero magnehelic gauge	☐ Yes ☑ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☑ Yes ☐ No
5.2 Clean strainer basket	☐ Yes ☑ No
5.3 Exhaust fan inspection and maintenance	☑ Yes ☐ No
5.4 Check/clean building door louvers	☐ Yes ☑ No
5.5 Clean sump and bump test pump	☑ Yes ☐ No
5.6 Clean building floor	☑ Yes ☑ No

Treatment System Water Sampling Log						
Collected by: TS Towns			Date: 11/30/99		SEIR No.: PI 13	
			PI16436	PI16437	PI16438	PI16439
Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	01, 02, 03	01, 02, 03	01, 02, 03	01, 02, 03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	06	06	NA
Nitrate	250 mL poly	none	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	
TDS						

Treatment System Water Field Data	
Collected by: T.B. Towns	Date: 11/30/99
Equipment used and Serial Numbers: Horiba U-10 Water Quality Meter Cole Parmer	

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4
pH	5.57	5.60	5.89	6.78
Temperature	17.6	22.1	23.2	NA
Conductivity	.939	1.36	3.55	NA
Dissolved O_2	.52	.40	.66	NA
Turbidity	999	999	20	NA
Redox Potential	25.5	25.7	40	NA

Notes: OVA Reading 10 Ft 0.0 ppm N,S,E,W, 50 Feet out N,S,E,W 0.0 ppm

Take Amp Reading on RW3 Reading 2.8 Amps

Amp Reading on RW 2 -4.1 Amps

Pump 3

11:00-4:00 Clean Pump and reset motor (RW3) adjusted to 40 then back to 35 on AC drive

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name: E.S. Towns		Date: 1/4/00
Time Arrived at Site: 8:00 Am	Time Departed Site:	Weather Conditions: Warm
Materials/Supplies Used: Horiba Cole Parmer		

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☑ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.2 Pump Control Elevations	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
2.0 Air Sample Readings	
PID reading from treatment building	0.0 ppm
3.0 Flow Readings	
3.1 FIT-1 reading	1.6 gpm
3.2 FIT-2 reading	1.5 gpm
3.3 FIT-3 reading	2.45 gpm
4.0 Air Stripper	
4.1 PI-5 reading	12 * inches of water
4.2 FQIT 3 reading	949300 gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☑ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☐ Yes ☑ No
4.6 Inspect/clean air stripper trays and refill wiers	☑ Yes ☐ No
4.7 Check tightness of bolts and fittings	☐ Yes ☑ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☑ No
4.9 Re-zero magnehelic gauge	☐ Yes ☑ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☐ Yes ☑ No
5.2 Clean strainer basket	☐ Yes ☑ No
5.3 Exhaust fan inspection and maintenance	☐ Yes ☑ No
5.4 Check/clean building door louvers	☐ Yes ☑ No
5.5 Clean sump and bump test pump	☑ Yes ☐ No
5.6 Clean building floor	☑ Yes ☐ No

Treatment System Water Sampling Log

Collected by: David Camp | Date: 1/4/00 | SEIR No.: PI13

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16441 01,02 03	PI16442 01,02 03	PI16443 01,02 03	PI16444 01,02
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	06	06	NA
Nitrate	250 mL poly	none	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04
TDS						05

Treatment System Water Field Data

Collected by: TS Towns | Date: 1/4/00

Equipment used and Serial Numbers:
Horiba U-10 ? Cole Parmer Water Quality Instrument

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4
pH	6.4	5.9	6.2	7.1
Temperature	20	23	22	NA
Conductivity	.53	1.7	2.7	NA
Dissolved O_2	.3	.8	.7	NA
Turbidity	999	99	10	NA
Redox Potential	24.0	39.1	36.6	NA

Notes:
was 15 adjusted to 12
Changed out pumps RW2 RW3 for Remediation Pumps
Grundfos pump from RW3 in good condition can use to replace RW1 pump if need.
Cleaned stripper trays and reinstalled
Adjusted damper to get 12" of Water

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name:		Date: 1/5/2000
Time Arrived at Site: 1:30 pm 1330	Time Departed Site: 1700	Weather Conditions:
Materials/Supplies Used: * Inspection Trouble Shoot System		

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☐ Yes ☐ No RW 2 ☐ Yes ☐ No RW 3 ☐ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☐ No RW 2 ☐ Yes ☐ No RW 3 ☐ Yes ☐ No
1.2 Pump Control Elevations	RW 1 ☐ Yes ☐ No RW 2 ☐ Yes ☐ No RW 3 ☐ Yes ☐ No
2.0 Air Sample Readings	
PID reading from treatment building	ppm
3.0 Flow Readings	
3.1 FIT-1 reading	gpm
3.2 FIT-2 reading	gpm
3.3 FIT-3 reading	gpm
4.0 Air Stripper	
4.1 PI-5 reading	inches of water
4.2 FQIT 3 reading	gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☐ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☐ Yes ☐ No
4.6 Inspect/clean air stripper trays and refill wiers	☐ Yes ☐ No
4.7 Check tightness of bolts and fittings	☐ Yes ☐ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☐ No
4.9 Re-zero magnehelic gauge	☐ Yes ☐ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☐ Yes ☐ No
5.2 Clean strainer basket	☐ Yes ☐ No
5.3 Exhaust fan inspection and maintenance	☐ Yes ☐ No
5.4 Check/clean building door louvers	☐ Yes ☐ No
5.5 Clean sump and bump test pump	☐ Yes ☐ No
5.6 Clean building floor	☐ Yes ☐ No

Treatment System Water Sampling Log

Collected by:	Date:	SEIR No.:

	Sample Location		SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl				
TOC	250 mL amber	H_2SO_4				NA
Alkalinity	1,000 mL amber	none				NA
Sulfate	250 mL poly	none				NA
Chloride	250 mL poly	none				NA
Nitrate	250 mL poly	none				NA
Iron	250 mL poly	HNO_3				NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	

Treatment System Water Field Data

Collected by:	Date:	

Equipment used and Serial Numbers:

	Sample Locations			
Parameter	SP-1	SP-2	SP-3	SP-4
pH				
Temperature				NA
Conductivity				NA
Dissolved O				NA
Turbidity				NA
Redox Potential				NA

Notes: 1:30 pm on site to trouble shot system
1/5/00 Lighting Panel M1 M2 Heaters tripped when arrived M1 pulling ~ 5.0 Amps M2 ~ 3.
adjusted M1 to 8.5 then back to 8.0 Amps
got Amp readings at Panel & Blower Motor
Monitored system to see if cycles properly
- on phone with Bill Heavrdes
* Reset Main Power Switch in Breaker Box to reset computer, this appears to have solved problem of blower not cutting off
4:43 system cycles fine
Note Temporary lodging personell said a fuse on Pole blew out last night or yesterday afternoon & whole block lost power

O&MLOG2

5:00 pm or 1700 hrs

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Monday 0 3 UH

Inspector's Name: T. Scott Towns		**Date:** 2/3/06
Time Arrived at Site: 0830	**Time Departed Site:** ~ 1800	**Weather Conditions:**
Materials/Supplies Used:		

Item	Readings/Results
1.0 Recovery Pump House	Are conditions acceptable?
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1 ☑ Yes ☐ No RW 2 ☑ Yes ☐ No RW 3 ☑ Yes ☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1 ☐ Yes ☑ No RW 2 ☑ Yes ☐ No RW 3 ☐ Yes ☑ No
1.2 Pump Control Elevations	RW 1 ☐ Yes ☑ No RW 2 ☐ Yes ☑ No RW 3 ☐ Yes ☑ No
2.0 Air Sample Readings	
PID reading from treatment building	0.0 ppm
3.0 Flow Readings	
3.1 FIT-1 reading	3 gpm
3.2 FIT-2 reading	1.8 gpm
3.3 FIT-3 reading	3.2 gpm
4.0 Air Stripper	
4.1 PI-5 reading (18" of foam after cleaning)	12 inches of water
4.2 FQIT 3 reading	1002920 gallons
4.3 Blower inspection/maintenance	
4.4 Blower grease bearing	☑ Yes ☐ No
4.5 Discharge pump inspection/maintenance	☑ Yes ☑ No
4.6 Inspect/clean air stripper trays and refill wiers	☑ Yes ☐ No
4.7 Check tightness of bolts and fittings	☑ Yes ☐ No
4.8 Remove deposits from vent drain plug on pressure switch	☐ Yes ☑ No
4.9 Re-zero magnehelic gauge	☐ Yes ☑ No
5.0 Building and Miscellaneous Equipment	☐ Yes ☐ No
5.1 Unit heater – check temperature setting	☑ Yes ☐ No
5.2 Clean strainer basket	☐ Yes ☑ No
5.3 Exhaust fan inspection and maintenance	☐ Yes ☑ No
5.4 Check/clean building door louvers	☐ Yes ☑ No
5.5 Clean sump and bump test pump	☑ Yes ☐ No
5.6 Clean building floor	☐ Yes ☑ No

Treatment System Water Sampling Log

Collected by: T. Scott Towns | Date: 2/3/00 | SEIR No.: PI 13

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16446 01,02,03	PI16447 01,02,03	PI16448 01,02,03	PI16449 01,
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	06	06	NA
Nitrate	250 mL poly	none	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04
TDS		" "				05

Treatment System Water Field Data

Collected by: T. Scott Towns | Date: 2/3/00

Equipment used and Serial Numbers: Horiba U-10 & Cole Parmer

Parameter	Sample Locations SP-1	SP-2	SP-3	SP-4
pH	6.12	6.16	6.19	7.14
Temperature	16.7	20.7	19.9	NA
Conductivity	.534	1.34	3.10	NA
Dissolved O_2	.25	1.71	.41	NA
Turbidity	999	340	13	NA
Redox Potential	46.3	51.1	44.4	NA

Notes: 0880 on site Inches of water 18 when arrived shut system down to clean
RW3 freq setting for Clean Pump 21.5 to 28
11:00 - 2:30 clean RW2 Pump
1123 finish cleaning stripper & Taking Samples cleaning to leave cleaned manifold
PRW 2 2.1 gpm
PRW3 2.0 gpm
Inlet pipe 3/4 packed with sediment

O&M LOGSHEET
MCRD PARRIS ISLAND, SC

Inspector's Name:		**Date:** 3/3/00
Time Arrived at Site: 0830	**Time Departed Site:** 1730	**Weather Conditions:** Sunny Warm
Materials/Supplies Used:		

Item	Readings/Results		
1.0 Recovery Pump House	Are conditions acceptable?		
Open the cover and inspect the pump housing, pumps, piping, and electrical connections. Note any problem areas, leaks, etc.	RW 1	☑ Yes	☐ No
	RW 2	☑ Yes	☐ No
	RW 3	☑ Yes	☐ No
1.1 Clean Transducer Nose Cone and Filter	RW 1	☐ Yes	☑ No
	RW 2	☐ Yes	☑ No
	RW 3	☑ Yes	☐ No
1.2 Pump Control Elevations	RW 1	☑ Yes	☐ No
	RW 2	☑ Yes	☐ No
	RW 3	☑ Yes	☐ No
2.0 Air Sample Readings			
PID reading from treatment building	0.0	ppm	
3.0 Flow Readings			
3.1 FIT-1 reading	3.5	gpm	
3.2 FIT-2 reading	1.7	gpm	
3.3 FIT-3 reading .9 initial reading		gpm	
4.0 Air Stripper			
4.1 PI-5 reading	17/13 after cleaned	inches of water	
4.2 FQIT 3 reading	1056410	gallons	
4.3 Blower inspection/maintenance			
4.4 Blower grease bearing		☑ Yes	☐ No
4.5 Discharge pump inspection/maintenance		☑ Yes	☐ No
4.6 Inspect/clean air stripper trays and refill wiers		☑ Yes	☐ No
4.7 Check tightness of bolts and fittings		☐ Yes	☑ No
4.8 Remove deposits from vent drain plug on pressure switch		☐ Yes	☑ No
4.9 Re-zero magnehelic gauge		☐ Yes	☑ No
5.0 Building and Miscellaneous Equipment		☐ Yes	☐ No
5.1 Unit heater – check temperature setting		☑ Yes	☐ No
5.2 Clean strainer basket		☐ Yes	☑ No
5.3 Exhaust fan inspection and maintenance		☑ Yes	☐ No
5.4 Check/clean building door louvers		☑ Yes	☐ No
5.5 Clean sump and bump test pump		☑ Yes	☐ No
5.6 Clean building floor		☑ Yes	☐ No

Treatment System Water Sampling Log

Collected by: TS Toms | Date: 3/3/00 | SEIR No.: PI 13

Sample Location			SP-1	SP-2	SP-3	SP-4
Analytes	Container	Presv.	Cont. ID	Cont. ID	Cont. ID	Cont. ID
VOCs	40 mL vials	HCl	PI16451 01,02 03	PI16452 01,02 03	PI16453 01,02 03	PI16454 01,02 03
TOC	250 mL amber	H_2SO_4	04	04	04	NA
Alkalinity	1,000 mL amber	none	05	05	05	NA
Sulfate	250 mL poly	none	06	06	06	NA
Chloride	250 mL poly	none	06	06	06	NA
Nitrate	250 mL poly	none	06	06	06	NA
Iron	250 mL poly	HNO_3	07	07	07	NA
BOD 5-day	1,000 mL poly	none	NA	NA	NA	04
TDS						05

Treatment System Water Field Data

Collected by: | Date:

Equipment used and Serial Numbers:

Parameter	Sample Locations			
	SP-1	SP-2	SP-3	SP-4
pH	5.6	5.4	5.8	6.6
Temperature	18.1	20.7	20.1	NA
Conductivity	.498	1.35	3.37	NA
Dissolved O_2	.56	.66	.87	NA
Turbidity	127	390	370	NA
Redox Potential	36.8	39.6	296	NA

Notes:

APPENDIX E

ANALYTICAL DATA SUMMARY

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

Monthly Influent

ANALYTES	4/28/1998			5/27/1998			6/30/1998			7/22/1998			8/31/1998			10/5/1998		
Well ID	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3
Sample ID	16237	16238	16239	16243	16244	16245	16248	16249	16250	16270	16271	XX	16279	16280	16281	16283	16284	16285
Tetracloroethene (PCE) (µg/L)	5.7	4,140	56.1	982	6,990	660	444	7,200	983	799	4,780	XX	785	5,700	1,800	487	2,860	662
Tricholorethene (TCE) (µg/L)	39.3	4,630	417	740	2,730	750	346	2,540	834	634	2,420	XX	808	2,430	1,600	728	2,050	820
Vinyl Chloride (µg/L)	25.8	ND	ND	92.8	538	ND	33.6	421	ND	106	256	XX	127	ND	ND	109	237	6
Total Organic Carbon (mg/L)	21.9	16.3	24.2	19.2	27.6	19.6	22.5	24.4	22	55.5	25.4	XX	33.9	23.7	25	55.5	21.8	26.5
Alkalinity (mg/L)	128	46.6	121	83.5	67.9	83.5	36.4	34.1	43.7	71.7	65	XX	80.1	74.5	86.7	77.1	73.2	63
Sulfate (mg/L)	32.4	35.9	27.5	43.2	41.7	37.2	42.7	43.9	35.4	40.1	53.9	XX	38.2	57.4	40.7	42.3	52.6	63.8
Chloride (mg/L)	17.6	37.3	31.9	34.9	86.9	85.2	35	68.9	127	35	66.7	XX	30.4	53	180	31.7	77.5	306
Nitrate (mg/L)	ND	ND	ND	ND	0.07	ND	ND	ND	ND	ND	ND	XX	0.09	ND	ND	ND	0.06	ND
Iron (mg/L)	27	4.63	4.31	21.7	6.38	14.9	82.6	23.7	9.16	67.6	14.8	XX	64.6	5.88	84.7	172	8.24	37.8
FIELD PARAMETERS																		
Temp (°C)	19.7	20.2	20.4	23.4	22.2	22.5	29.2	26.3	28.4	31.1	27.9	XX	29.3	28.3	28.7	30.3	28.8	28.4
pH	6.31	5.94	6.18	5.57	5.63	5.56	4.66	4.86	4.66	5.84	5.66	XX	5.27	5.2	5.28	5.28	5.02	5.35
Conductivity (mS/cm)	0.465	0.325	0.484	0.303	0.374	0.394	0.325	0.385	0.543	0.299	0.351	XX	0.307	0.361	0.633	0.34	0.393	1.43
Dissolved Oxygen (mg/L)	1.4	1.15	1.21	0.5	0.56	0.58	0.58	0.82	0.37	1.9	1.08	XX	0.48	1.03	0.57	0.05	0.34	2.09
Turbidity (NTU)	0	0	0	57	5	26	999	153	20	999	310	XX	999	34	632	42	72	315
Oxygen/Reduction Potential (mV)	8	35	-4.5	74	62	72	112	145	88	EM	EM	XX	76	61	53	39	64	72

Notes:

J = Estimated value
NM = Not measured
EM = Equipment malfunction
XX = Well clogged with silt
ND = Not detected
B = Analyte in blank as well as sample

µg/L = micrograms per liter
mg/L = milligrams per liter
mS/cm = microSiemens/centimeter
NTU = Nephelometric turbidity units
MV = millivolts

Discharge Limits:

PCE	5 µg/L
TCE	5 µg/L
VC	2 µg/L
pH	6.0 - 8.5
BOD	10 mg/L

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

Monthly Influent

ANALYTES	11/6/1998			11/30/1998			12/31/1998			1/28/1999			2/26/1999			4/1/1999		
Well ID	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3
Sample ID	16303	16304	16305	16308	16309	16310	16313	16314	16315	16336	16337	16338	16341	16342	16343	16345	16346	16347
Tetracloroethene (PCE) (µg/L)	540	3,770	1,000	695	3,910	984	873	3,200	1,270	1,330	3,090	738	2,030	2,600	772	3,570	3,590	727
Tricholorethene (TCE) (µg/L)	888	2,170	1,310	954	1,760	1,320	1,370	1,830	2,000	1,500	1,490	680	1,770	1,390	668	2,730	1,500	908
Vinyl Chloride (µg/L)	158	270	ND	115	146J	19.6J	168	202	39	142	121	10.4	120	208	17.5	98.8	107	10.2
Total Organic Carbon (mg/L)	81.1	19.5	24.1	57.5	26.9	59	84.8	23.7	48.4	98	59	29.1	152	44	102	50.5	21.6	26.8
Alkalinity (mg/L)	80.4	58	61.7	86	54.4	63.1	78.2	45.5	17.3	73.4	52.2	40.8	86.5	46.5	37.3	73.3	50.5	75.2
Sulfate (mg/L)	38.7	52	82.8	42.3	57.9	148	44.2	55.2	130	46.6	60.5	131	49.4	62.4	144	48	68.5	159
Chloride (mg/L)	37.3	97.7	417	35.5	140	894	35.8	168	876	31.8	191	762	30.8	188	827	35	194	952
Nitrate (mg/L)	ND	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	0.03B	0.06	ND	ND	0.01J	ND	0.12
Iron (mg/L)	814	9.92	31.3	154	15.3	127	647	23.9	86.7	245	52.7	41.3	204	57.5	147	64.8	51.3	95.2
FIELD PARAMETERS																		
Temp (°C)	73.5	57.5	30.2	23	22.5	25.5	17.4	20.4	20.7	18.3	21.5	22.3	19.4	21.5	22	19.5	20.9	21.5
pH	5.78	5.62	5.66	5.59	5.63	5.79	5.51	5.44	5.45	5.78	5.62	5.81	5.79	5.71	5.9	5.86	5.76	5.91
Conductivity (mS/cm)	0.34	0.53	1.9	0.405	0.629	2	0.358	0.725	2.16	0.317	0.714	2.25	0.407	0.418	0.409	0.349	0.829	2.91
Dissolved Oxygen (mg/L)	0.9	0.4	0.9	0.75	0.62	1.4	1.55	1.46	1.45	EM	EM	EM	6.13	5.1	6.4	0.8	0.9	1.69
Turbidity (NTU)	83	2	9	259	18	63	999	83	250	835	999	EM	764	451	999	736	76	250
Oxygen/Reduction Potential (mV)	47.7	53.6	45.4	41	76	40	90	109	120	191	210	150	153	161	159	79	105	36

Notes:

J = Estimated value
NM = Not measured
EM = Equipment malfunction
XX = Well clogged with silt
ND = Not detected
B = Analyte in blank as well as sample

µg/L = micrograms per liter
mg/L = milligrams per liter
mS/cm = microSiemens/centimeter
NTU = Nephelometric turbidity units
MV = millivolts

Discharge Limits:

PCE	5 µg/L
TCE	5 µg/L
VC	2 µg/L
pH	6.0 - 8.5
BOD	10 mg/L

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

Monthly Influent

ANALYTES	5/18/1999			6/8/1999			7/8/1999			8/2/1999			8/30/1999			9/29/1999		
Sample Port (Well) ID	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3
Sample ID	16365	16366	16367	16371	16372	16373	16376	16377		16383	16384	16385	16401	16402	16403	16406	16407	16408
Tetracloroethene (PCE) (µg/L)	3,640	2,850	462	4,440	2,340	352	3,550	2,240	EM	3,740	2,170J	305J	3,470	2,640J	1,000	3,870	3,010	1,030
Tricholorethene (TCE) (µg/L)	2,700	1,230	796	3,770	1,180	334	3,100	1,270	EM	3,220	1,260	464J	3,620	1,570	2,650	4,060	1,930	2,910
Vinyl Chloride (µg/L)	124	166	17	143	167	2.9	121	216	EM	304	179J	ND	130	180	40.2	162	261	73.2
Total Organic Carbon (mg/L)	22.4	17	29.6J	16.8	17.1	36.8	33.9J	26.6	EM	27.7	26.2	35.4	27.4	15.7	22	448	21.7	32.1
Alkalinity (mg/L)	51	74.5	26.5	64.6	44.1	59.3	50.4	37.3	EM	62.6J	44.3J	76.7J	53.2	15.7	36.3	60.2	35.8	56.7
Sulfate (mg/L)	45.9	71.7	82.9	42.3	76	92.3	43.4	74.7	EM	41.3	78.2	80.3	40.9	89.4	257	40.7	87.2J	175J
Chloride (mg/L)	41.8	213	224	43.9	250	380	49.5	289	EM	55	331	368	63.7	369	1,660	59.9J	430J	1090J
Nitrate (mg/L)	ND	0.01J	0.35	ND	ND	0.04J	0.01J	ND	EM	1.4	0.03J	0.02J	0.14	ND	0.03J	ND	ND	0.04J
Iron (mg/L)	49.1	16.9	27.6	70.9	16.5	177	216	91.5	EM	35.1	200	29.4	239	20.5	92.5	492	47.4	49.8
FIELD PARAMETERS																		
Temp (°C)	23.4	23.5	23.6	57.2	56.6	57.7	27.1	28.6	EM	50.9	61.9	52.3	27.2	26.8	26.8	26.7	26.8	27.2
pH	5.9	5.7	4.93	5.55	5.6	5.68	5.62	5.75	EM	6.46	6.33	6.28	5.68	5.64	5.61	6.14	5.6	6.99
Conductivity (mS/cm)	0.394	0.958	3.12	EM	EM	EM	0.413	1.15	EM	EM	EM	EM	0.488	1.31	4.92	NM	NM	NM
Dissolved Oxygen (mg/L)	0.69	2.15	0.51	2.0J	0	ND	0.66	1.09	EM	EM	EM	EM	1.37	0.79	1.12	2.7	1.4	1.6
Turbidity (NTU)	999	54	345	EM	EM	EM	999	822	EM	EM	EM	EM	399	147	2	NM	NM	0.8
Oxygen/Reduction Potential (mV)	43.8	57.6	83.9	64.2	60.1	54.8	45.1	60	EM	35.3	42.6	44.6	40	50.9	53	24.3	45.6	16

Notes:

J = Estimated value
NM = Not measured
EM = Equipment malfunction
XX = Well clogged with silt
ND = Not detected
B = Analyte in blank as well as sample

µg/L = micrograms per liter
mg/L = milligrams per liter
mS/cm = microSiemens/centimeter
NTU = Nephelometric turbidity units
MV = millivolts

Discharge Limits:

PCE	5 µg/L
TCE	5 µg/L
VC	2 µg/L
pH	6.0 - 8.5
BOD	10 mg/L

Monthly Influent

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

ANALYTES	10/28/1999			11/30/1999			1/4/2000			2/3/2000			3/3/2000		
Sample Port (Well) ID	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3	SP-1	SP-2	SP-3
Sample ID	16431	16432	16433	16436	16437	16438	16441	16442	16443	16446	16447	16448	16451	16452	16453
Tetracloroethene (PCE) (µg/L)	3680J	3,010	1290J	5100	5520	2010	5420J	2910J	2910J	6400J	2570J	2990J	6,100	2,160	2,350
Tricholorethene (TCE) (µg/L)	3650J	1610J	2480J	4380	2340	2810	4,180	1,500	4420	5410J	1720J	3770J	4,590	1,250	2540J
Vinyl Chloride (µg/L)	135J	285	86.2J	198J	139J	133J	141	249	17.2	290J	275J	182J	245	220	138
Total Organic Carbon (mg/L)	22.4	20.5	26.6	125	20	28.9	227	23.5	37	330	31.4	43.1	23.3	28.7	31.6
Alkalinity (mg/L)	63.7	38.8	42.8	65	52	68	113	31.7	55.4	218J	44.1J	46J	41.7	42.7	64.9
Sulfate (mg/L)	38.8	78.4	161	40.7	82.2	178	42.5	84.3	97.3	48.8	86.3	148	47	85.8	160
Chloride (mg/L)	64.5J	306J	852J	73.5J	318J	1040J	82.9	335	474	88	313	781	95.3	326	862
Nitrate (mg/L)	0.02J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron (mg/L)	31.3	40	42.3	837	31.8	54	639	34.4	21.2	1140	34.8	35.6	41.5	92.3	55.4
FIELD PARAMETERS															
Temp (°C)	21.9	24.1	24.9	17.6	22.1	23.2	20	23	22	16.7	20.7	19.9	18.1	20.7	20.1
pH	6.05	5.66	5.64	5.57	5.6	5.89	6.4	5.9	6.2	6.12	6.16	6.19	5.6	5.4	5.8
Conductivity (mS/cm)	0.403	1.22	3.17	0.439	1.36	3.55	0.53	1.7	22	0.534	1.34	3.1	0.498	1.35	3.37
Dissolved Oxygen (mg/L)	1.04	1.15	0.73	0.52	0.4	0.66	0.3	0.8	0.7	0.25	1.71	0.41	0.56	0.66	0.87
Turbidity (NTU)	386	162	1	999	999	20	999	99	10	999	340	13	127	390	370
Oxygen/Reduction Potential (mV)	32.1	39	38.3	25.5	25.7	40	24	39.1	36.6	46.3	51.1	44.4	36.8	39.6	29.6

Notes:

J = Estimated value
NM = Not measured
EM = Equipment malfunction
XX = Well clogged with silt
ND = Not detected
B = Analyte in blank as well as sample

µg/L = micrograms per liter
mg/L = milligrams per liter
mS/cm = microSiemens/centimeter
NTU = Nephelometric turbidity units
MV = millivolts

Discharge Limits:

PCE	5 µg/L
TCE	5 µg/L
VC	2 µg/L
pH	6.0 - 8.5
BOD	10 mg/L

ANALYTIC. SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

Monthly Effluent

ANALYTES	Sample Date	4/18/98	4/28/98	5/27/98	6/30/98	7/22/98	8/31/98	10/5/98	11/6/98	11/30/98	12/31/98	1/28/99	2/26/99	4/1/99
	Sample ID	16235	16241	16242	16247	16277	16278	16282	16306	16311	16316	16339	16344	16348
Tetrachloroethene (PCE) (µg/L)		ND	ND	ND	ND	ND	5.1	ND	ND	ND	1.0 J	ND	ND	ND
Trichloroethene (TCE) (µg/L)		ND	ND	ND	ND	ND	2.4	ND	ND	ND	1.0 J	ND	ND	ND
Vinyl Chloride (µg/L)		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Biological Oxygen Demand (BOD)-5 day (mg/L)		ND	ND	10	3	3	6	6	3 B	12	8	ND	7	34.0 J
Total Dissolved Solids (mg/L)		NM	17	316	327	303	409	465	555	688	804	1,020	817	1,100
FIELD PARAMETERS														
pH		NM	8.10		4.81	8.50	5.79	7.10	7.42	6.65	6.29	6.72	6.80	6.66

ANALYTES	Sample Date	5/18/99	6/8/99	7/8/99	8/2/99	8/30/99	9/29/99	10/28/99	11/30/99	01/04/00	2/03/00	3/03/00
	Sample ID	16368	16374	16379	16386	16404	16409	16434	16439	16444	16449	16454
Tetrachloroethene (PCE) (µg/L)		51	48	23.5	19.7	14.8	ND	ND	ND	ND	ND	0.45J
Trichloroethene (TCE) (µg/L)		46	21.6	18.3	19.4	22.9	ND	ND	ND	0.31J	ND	0.17J
Vinyl Chloride (µg/L)		1.5 J	1.3 J	ND	ND	0.79J	ND	ND	ND	ND	ND	ND
Biological Oxygen Demand (BOD)-5 day (mg/L)		6	ND	6.0 J	6	3.0J	5	3.0J	4	ND	ND	4.48J
Total Dissolved Solids (mg/L)		NM	719	445	757	1,090	1190	1280	1400	936	1250	1280
FIELD PARAMETERS												
pH		6.68	6.83	7.22	6.93	6.63	6.16	6.58	6.78	7.10	7.14	6.60

Discharge Limits:

PCE 5 µg/L
TCE 5 µg/L
VC 2 µg/L
pH 6.0 - 8.5
BOD 10 mg/L

Notes:

ND = Not detected
NM = Not measured
J = Estimated value

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

MONITORING WELL 1S

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/26/99
Sample ID	16213	16253	16294	16318	16350	16380	16413
Tetrachloroethene (PCE) (µg/L)	3.6J	ND	0.97J	ND	ND	ND	ND
Trichloroethene (TCE) (µg/L)	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	17.3	18.2	16.7	18.5	16.8	18.3	19.3
Alkalinity (mg/L)	163	146	162	127	124	59.4J	137
Sulfate (mg/L	30.3	29.3	24.6	57.2	38	39.2	48.1
Chloride (mg/L)	6.5	5.6	6.3	5.9	9.1	9.6	11.2
Nitrate (mg/L)	ND	ND	ND	ND	ND	0.02J	ND
Iron (mg/L)	4.75	86.1	4.64	2.74	1.94	2.26	2.03
FIELD PARAMETERS							
Temperature (°C)	19.5	27	34.3	19	25.8	32.6	23.9
pH	7.11	5.04	6.3	6.44	6.40	6.24	6.14
Conductivity (mS/cm)	0.321	0.158	0.33	0.326	0.329	0.345	0.35
Dissolved Oxygen (mg/L)	EM	0.37	1.8	0.11	1.05	0.55	1.07
Turbidity (NTU)	3	999	3	34	1.0	31	6
Oxidation/Reduction Potential (mV)	-2	20	16.8	50	19.2	14.0	23.8

MONITORING WELL 1D

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/26/99
Sample ID	16214	16254	16292	16319	16349	16381	16414
Tetrachloroethene (PCE) (µg/L)	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE) (µg/L)	ND	ND	0.96J	ND	ND	ND	ND
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	6.6J	6.5	9.5	8.1	4.2	6.7	5.9
Alkalinity (mg/L)	103	126	111	109	97.9	109J	106
Sulfate (mg/L	39.7	10.5	12.1	9.5	13.6	6.9	18.2
Chloride (mg/L)	17.2	15.8	14.3	12	11.3	16.8	12.2
Nitrate (mg/L)	ND	ND	0.02B	ND	ND	0.06J	ND
Iron (mg/L)	3.56	12.2	3.5	3.61	2.94	2.57	3.91J
FIELD PARAMETERS							
Temperature (°C)	21.0	27.5	35.2	21.2	24.1	31.5	25.5
pH	6.71	6.38	6.24	6.21	6.18	6.19	6.07
Conductivity (mS/cm)	0.264	0.248	0.250	0.237	0.259	0.284	0.268
Dissolved Oxygen (mg/L)	EM	0.45	1.7	EM	1.01	1.15	1.5
Turbidity (NTU)	14	999	90	30	37	70	25
Oxidation/Reduction Potential (mV)	-28	-5	19.9	-28	30.6	22.0	20.7

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

QUARTERLY

MONITORING WELL 2S

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/26/99
Sample ID	16215	16255	16296	16320	16352	16382	16415
Tetrachloroethene (PCE) (µg/L)	ND	0.23J	3	ND	ND	ND	ND
Trichloroethene (TCE) (µg/L)	ND	ND	0.84J	ND	ND	ND	ND
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	22.8	42.6	40.5	18.8	17.5	17.1	14.8
Alkalinity (mg/L)	117	81.2	46.8	69.3	44.9	79.9J	32.8
Sulfate (mg/L	55.4	61.1	73.2	107	76.3	105	171J
Chloride (mg/L)	23.9	24.8	26.2	44.6	39.2	43.6	49.2J
Nitrate (mg/L)	ND	ND	ND	0.08	0.02J	ND	0.1
Iron (mg/L)	14.8	47.2	11.1	5.45	5.87	5.52	1.38
FIELD PARAMETERS							
Temperature (°C)	18.5	26.8	37.9	17.6	24.6	30.2	24.9
pH	6.71	5.85	5.24	6.07	5.71	6.0	5.37
Conductivity (mS/cm)	0.377	0.312	0.31	0.416	0.387	0.583	0.518
Dissolved Oxygen (mg/L)	EM	0.55	0.8	EM	1.70	1.31	1.59
Turbidity (NTU)	2	265	7	63	20	17	8
Oxidation/Reduction Potential (mV)	73	128	66.3	127	55.5	35.1	55.8

MONITORING WELL 2D

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/26/99
Sample ID	16216	16256	16295	16321	16351	16387	16416
Tetrachloroethene (PCE) (µg/L)	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE) (µg/L)	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	14.9	13.7	13.2	17.7	13.5	12.5	13.8
Alkalinity (mg/L)	56	51.5	42.1	41.3	24.5	16.2J	33.8
Sulfate (mg/L	68.4	64.8	82.5	97.7	147	151	167J
Chloride (mg/L)	76.6	104	115	136	165	172	184J
Nitrate (mg/L)	ND	ND	0.30	0.04B	ND	ND	ND
Iron (mg/L)	4.46	6.04	6.86	6.61	11.9	12.7	13.3J
FIELD PARAMETERS							
Temperature (°C)	18.2	24.9	38	19.5	23.6	27.2	23.5
pH	6.38	5.79	5.47	5.76	5.77	5.73	5.52
Conductivity (mS/cm)	0.429	0.474	0.570	0.582	0.879	1.01	0.864
Dissolved Oxygen (mg/L)	EM	0.35	1.3	EM	0.95	0.89	1.04
Turbidity (NTU)	1	50	20	4	2	10	5
Oxidation/Reduction Potential (mV)	-133	78	56.3	91	42	51.0	45.2

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

QUARTERLY

MONITORING WELL 3S

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/26/99
Sample ID	16217	16257	16298	16322	16354	16389	16417
Tetrachloroethene (PCE) (µg/L)	ND	1.8J	ND	ND	ND	ND	ND
Trichloroethene (TCE) (µg/L)	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	19.9	105	108	13.5	47.2	87.2	15
Alkalinity (mg/L)	158	619	559	326	396	366J	364
Sulfate (mg/L	19.6	20.2	31.7	69.9	49.8	30.7	42.7
Chloride (mg/L)	13.2	44.8	48	23.9	24.0J	23.9	17.5
Nitrate (mg/L)	ND	0.21	0.38	1.4	0.08J	0.12	4.7
Iron (mg/L)	6.21	304	196	0.141	41.2	6.89	0.049
FIELD PARAMETERS							
Temperature (°C)	19.3	29.8	40.1	17.9	24.9	29.5	24.1
pH	7.9	7.22	6.98	7.11	7.08	6.83	6.65
Conductivity (mS/cm)	0.606	1.34	1.3	0.680	0.863	0.896	0.718
Dissolved Oxygen (mg/L)	1.32	NM	2.6	EM	0.76	0.74	2.78
Turbidity (NTU)	EM	999	580	3	142	78	2
Oxidation/Reduction Potential (mV)	36	168	-16.6	29	-24.2	3.9	-11

MONITORING WELL 3D

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/26/99
Sample ID	16218	16258	16297	16323	16353	16388	16418
Tetrachloroethene (PCE) (µg/L)	2,510	155	167	1,870	793	2,300	8,930J
Trichloroethene (TCE) (µg/L)	438B	49.2	114	1,490	2,000	6,900	6,760J
Vinyl Chloride (µg/L)	ND	ND	ND	ND	378	738	514J
Total Organic Carbon (mg/L)	24.3	26.5	26.9	25.8	39.4	34.8	26.7
Alkalinity (mg/L)	164	116	103	78.2	108	105J	89.6
Sulfate (mg/L	29.4	74.3	84.8	88.2	75.2	86.1	82J
Chloride (mg/L)	98.4	126	186	268	257	223	205J
Nitrate (mg/L)	ND	ND	0.05	ND	ND	ND	ND
Iron (mg/L)	3.56	3.13	3.54	4.52	9.13	9.36	6.63J
FIELD PARAMETERS							
Temperature (°C)	19.5	25.7	40.6	20.4	24.5	26.3	25.6
pH	6.97	6.01	5.8	6.03	6.13	6.25	5.84
Conductivity (mS/cm)	0.583	0.627	0.88	1.10	1.09	1.33	0.934
Dissolved Oxygen (mg/L)	EM	0.38	0.1	EM	0.66	0.71	1.38
Turbidity (NTU)	0	16	2	7	10	13	4
Oxidation/Reduction Potential (mV)	-161	EM	37.4	18	26.3	19.6	25.9

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

QUARTERLY

MONITORING WELL 4S

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/26/99
Sample ID	16219	16259	16300	16325	16356	16390	16419
Tetrachloroethene (PCE) (µg/L)	21.1J	24.6	11.2	4.8	4.5	5.9	ND
Trichloroethene (TCE) (µg/L)	2.1B	1.6J	1.3J	1.3J	1.2J	1.3J	1.3J
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	10.1	20.5	11.7	9.9	9.3	5.2	6.0
Alkalinity (mg/L)	19.5	16.2	13.1	8.2	14.3	ND	4.5
Sulfate (mg/L	41.5	36.3	33.4	27.9	20.0	20.4	27.8
Chloride (mg/L)	20.5	23.8	34.5	45.7	154	130	145J
Nitrate (mg/L)	ND	0.03B	0.16	0.59	0.03J	ND	1.9
Iron (mg/L)	3.66	89.7	31.3	13.6	2.4	0.90	0.707
FIELD PARAMETERS							
Temperature (°C)	18.1	26.9	55.4	17.8	23.4	26.7	21.2
pH	5.56	4.78	4.82	5.2	4.86	4.90	4.84
Conductivity (mS/cm)	0.167	0.159	0.18	0.239	0.562	0.533	0.558
Dissolved Oxygen (mg/L)	EM	0.88	0.5	9.19	1.30	0.50	1.89
Turbidity (NTU)	20	999	71	292	1	21	8
Oxidation/Reduction Potential (mV)	184	204	93.4	138	96.0	108.3	59.6

MONITORING WELL 4D

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/26/99
Sample ID	16220	16260	16299	16326	16355	16391	16420
Tetrachloroethene (PCE) (µg/L)	2,290	996	609	298	147	129	93.8J
Trichloroethene (TCE) (µg/L)	13.2J	11.9J	11J	13.2	4.3	6.4	10.8
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	20.7	17.3	17.1	19.9	65.6J	24.7	26.9
Alkalinity (mg/L)	40	44.8	22.4	0.5	18.4	45.9J	50.4
Sulfate (mg/L	85.1	55	63.4	89.4	83.8	76.3	65.2J
Chloride (mg/L)	217	223	340	592	516	501	499J
Nitrate (mg/L)	ND	5.6	0.04B	27.1	ND	0.06J	0.08
Iron (mg/L)	4.39	5.84	11.8	19.2	15.1	16.2	15.9J
FIELD PARAMETERS							
Temperature (°C)	18.7	24.6	41.7	19.4	22.9	25.9	21.7
pH	5.93	5.41	5.17	5.25	5.57	5.53	5.38
Conductivity (mS/cm)	0.7	0.620	1.6	1.88	1.85	2.06	1.92
Dissolved Oxygen (mg/L)	EM	0.06	0.5	8.62	1.23	0.75	1.09
Turbidity (NTU)	0	40	4	1	81	13	4
Oxidation/Reduction Potential (mV)	-72	108	73.7	102	62.2	48.0	51.5

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

QUARTERLY

MONITORING WELL 5S

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/27/9
Sample ID	16224	16261	16302	16328	16358	16392	16421
Tetrachloroethene (PCE) (µg/L)	ND	21.4	9.1B	1.0J	2.1	ND	9.8
Trichloroethene (TCE) (µg/L)	ND	6.9	29.8B	ND	2.1	ND	5.0
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	10.3	25.5	18.7	15	21.5	12.9	18
Alkalinity (mg/L)	186	82.9	62.6	93.7	86.7	264J	253
Sulfate (mg/L	13.7	18.9	21.5	22.7	21.6	33.3	30.3
Chloride (mg/L)	5	16.7	10.6	11.1	7.8	19.1	9.3
Nitrate (mg/L)	0.31	0.05	0.09	18.6	0.04J	0.85	1.5
Iron (mg/L)	0.146	143	0.622	0.0889	0.24	0.04	ND
FIELD PARAMETERS							
Temperature (°C)	19.8	28.8	44.6	20.9	24.0	29.8	22.5
pH	7.06	6.06	5.8	6.58	6.18	6.69	6.71
Conductivity (mS/cm)	0.341	0.201	0.19	0.348	0.233	0.633	0.54
Dissolved Oxygen (mg/L)	0.02	1.83	3.8	EM	1.61	3.24	3.09
Turbidity (NTU)	1	999	5	1	7	20	0
Oxidation/Reduction Potential (mV)	151	157	41.7	140	31.5	-9.4	-14.5

MONITORING WELL 5D

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/27/9
Sample ID	16225	16262	16301	16329	16357	16393	16422
Tetrachloroethene (PCE) (µg/L)	51.8J	35.4	71.9B	52	32.1	32.2	42.5J
Trichloroethene (TCE) (µg/L)	80.1J	40.2	69.8B	62.8	31.7	27.6	38.8J
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	18.3	20	27	23.5	18.9	16.5	20.9
Alkalinity (mg/L)	57.3	60.5	80.4	73.4	67.3	49.7J	75.6
Sulfate (mg/L	40.7	33.9	35.6	32.2	31.4	33.8	29.2
Chloride (mg/L)	257	207	140	129	131	230	130J
Nitrate (mg/L)	ND	ND	0.04B	ND	0.03J	0.04J	ND
Iron (mg/L)	15.4	14.7	8.32	8.27	7.97	13.9	10.2J
FIELD PARAMETERS							
Temperature (°C)	19.3	26.4	46.1	21.8	21.3	28.8	22.6
pH	6.43	5.82	5.8	5.91	6.01	5.85	6.0
Conductivity (mS/cm)	1.05	0.876	0.61	0.544	0.656	1.10	0.66
Dissolved Oxygen (mg/L)	EM	1.62	2.5	9.34	2.10	0.94	1.61
Turbidity (NTU)	1	999	6	12	0	49	0
Oxidation/Reduction Potential (mV)	-123	133	44.4	135	21.5	22.0	11.4

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

QUARTERLY

MONITORING WELL 6S

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/27/9
Sample ID	16226	16263	16287	16330	16360	16394	16424
Tetrachloroethene (PCE) (µg/L)	10.7	836	1,180	2,440	4,100	1,930	1,110B
Trichloroethene (TCE) (µg/L)	39.8	625	601	380	672	718	339
Vinyl Chloride (µg/L)	40.2	ND	20.1	217	22	167	42.9
Total Organic Carbon (mg/L)	20.2	86	39.2	20.5	22.9	18.4	21.3
Alkalinity (mg/L)	183	230	215	238	171	188J	187
Sulfate (mg/L	29.3	608	522	129	222	285	342J
Chloride (mg/L)	60.6	3,670	3,410	415	612	1,370	1,960J
Nitrate (mg/L)	0.04B	ND	0.21	0.08	0.13	0.02J	0.1
Iron (mg/L)	15.5	424	190	0.805	0.99	2.6	1.33
FIELD PARAMETERS							
Temperature (°C)	19.2	27.8	42	15.7	22.7	28.8	23.8
pH	7.43	6.40	6.45	6.74	6.54	6.36	6.5
Conductivity (mS/cm)	0.499	13.2	13.2	1.73	2.67	5.06	7.05
Dissolved Oxygen (mg/L)	EM	0.53	3.01	8.74	2.67	0.88	1.82
Turbidity (NTU)	11	999	999	0	200	20	10
Oxidation/Reduction Potential (mV)	-82	NM	10.4	109	0.3	18.1	-0.7

MONITORING WELL 6D

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/27/9
Sample ID	16227	16264	16286	16331	16359	16395	16425
Tetrachloroethene (PCE) (µg/L)	129	53.3	16.1	15.3	8.5	406	170B
Trichloroethene (TCE) (µg/L)	1,420	85.6	226	185	141	1,010	456
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	25.8	ND
Total Organic Carbon (mg/L)	25	22.7	21	24.1	23.0	28.0	23
Alkalinity (mg/L)	84	92.3	142	137	137	95J	87.6
Sulfate (mg/L	26.8	35.6	16.5	27	40.9	53.4	54.6J
Chloride (mg/L)	22	46.8	34.1	45.2	130	210	112J
Nitrate (mg/L)	0.16	ND	0.03B	0.04B	ND	0.02J	ND
Iron (mg/L)	5.11	10.2	5.82	10.1	11.1	26.4	13.3J
FIELD PARAMETERS							
Temperature (°C)	19.2	25.8	42.1	16.8	22.2	26.6	25.1
pH	6.54	5.89	6.02	6.27	6.27	6.27	6.09
Conductivity (mS/cm)	0.269	0.321	0.393	0.428	0.799	0.898	0.68
Dissolved Oxygen (mg/L)	EM	0.11	0.94	8.38	1.54	1.60	1.55
Turbidity (NTU)	0	121	11	0	0	EM	12
Oxidation/Reduction Potential (mV)	23	NM	31	34	13.5	18.0	14.1

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

QUARTERLY

MONITORING WELL 7S

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/27/9
Sample ID	16228	16266	16289	16332	16362	16396	16426
Tetrachloroethene (PCE) (µg/L)	57.7	558	1,250	73.6	1,960	1,680	14.3B
Trichloroethene (TCE) (µg/L)	6.4j	2,550	4,780	316	6,580	8,070	31.2
Vinyl Chloride (µg/L)	ND	ND	182J	11	391	320	2.4
Total Organic Carbon (mg/L)	4.2	49.2	39.9	9.3	40.4	16.4	7.3
Alkalinity (mg/L)	96	157	161	76.6	147	152J	95.5
Sulfate (mg/L	7.2	11.2	10.2	15.2	12.3	16.8	13.4
Chloride (mg/L)	5.5	20.7	26.8	9.5	34.5	27.4	6.3
Nitrate (mg/L)	0.04B	0.35	0.04B	1.0	0.12	0.05J	0.78
Iron (mg/L)	0.639J	19	1.13	0.491	0.279	0.147	0.42
FIELD PARAMETERS							
Temperature (°C)	18.4	26.9	30	20	22.3	27.1	23.2
pH	7.09	6.29	6.3	6.45	6.15	6.14	6.44
Conductivity (mS/cm)	0.184	0.285	0.379	0.198	0.439	0.486	0.24
Dissolved Oxygen (mg/L)	EM	1.67	1.8	14.55	1.11	0.67	2.02
Turbidity (NTU)	3	999	11	0	0	3	10
Oxidation/Reduction Potential (mV)	126	NM	19.2	163	21.8	33.0	1.2

MONITORING WELL 7D

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/28/9
Sample ID	16229	16267	16288	16333	16361	16397	16427
Tetrachloroethene (PCE) (µg/L)	8,220	21,400	20,000	10,200	28,600	3,180	25,600J
Trichloroethene (TCE) (µg/L)	14,400	5,200	3,520	3,090	3,720	1,530	7,030J
Vinyl Chloride (µg/L)	ND	ND	ND	ND	ND	1.2J	4.7
Total Organic Carbon (mg/L)	13.7	18.9	13.9	17.6	17.4	15.5	17.7
Alkalinity (mg/L)	75	85.1	89.8	81.5	82.6	74.5J	77.6
Sulfate (mg/L	50.6	62.2	50.8	46.7	44.4	42.9	46.1
Chloride (mg/L)	45.4	32	32.5	30.6	31.5	32.0	33.2
Nitrate (mg/L)	0.12	ND	ND	ND	0.02J	ND	ND
Iron (mg/L)	4.43	8.63	5.24	4.91	6.72	5.18	5.25
FIELD PARAMETERS							
Temperature (°C)	19.6	24.9	34.4	21.9	23.8	25.4	23.4
pH	6.36	5.74	5.72	5.79	5.85	5.83	5.67
Conductivity (mS/cm)	0.353	0.308	0.350	0.332	0.376	0.393	0.35
Dissolved Oxygen (mg/L)	EM	0.16	1.43	13.69	0.99	0.73	1.16
Turbidity (NTU)	1	127	27	0	0	10	9
Oxidation/Reduction Potential (mV)	23	NM	42.6	170	37.2	49.8	37.8

ANALYTICAL SUMMARY
SITE 45, FORMER DRY CLEANERS, MCRD PARRIS ISLAND, SOUTH CAROLINA

QUARTERLY

MONITORING WELL 8S

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/28/99
Sample ID	16230	16268	16291	16334	16364	16398	16429
Tetrachloroethene (PCE) (µg/L)	39.1	18,300	35,700	9,830	6,140	2,800	1,270J
Trichloroethene (TCE) (µg/L)	69.4	3,680	11,600	7,080	2,910	2,120	1,280J
Vinyl Chloride (µg/L)	1.8J	ND	571	ND	212	583	268
Total Organic Carbon (mg/L)	34	60.5	24.5	27	25.9	25.2	43.3
Alkalinity (mg/L)	282	268	206	166	157	153J	159
Sulfate (mg/L	24.9	20.1	21.5	33	48.4	44.6	49.5
Chloride (mg/L)	18.5	18.4	33.6	35.2	29.4	33.8	27.2
Nitrate (mg/L)	0.22	ND	ND	ND	0.02J	0.01J	ND
Iron (mg/L)	22.6	384	15.6	10.4	11.9	18.4	10.9
FIELD PARAMETERS							
Temperature (°C)	18.1	20.4	49.1	23	24.5	14.9	22.9
pH	7.10	6.49	6.39	6.04	5.97	6.29	5.93
Conductivity (mS/cm)	0.567	0.560	0.48	0.435	0.501	EM	0.471
Dissolved Oxygen (mg/L)	EM	0.21	1.4	EM	0.48	EM	1.01
Turbidity (NTU)	3	999	19	3	0	EM	10
Oxidation/Reduction Potential (mV)	-43	NM	14.8	158	34.2	43.8	23.7

MONITORING WELL 8D

ANALYTES	4/2/98	7/21/98	11/5/98	1/27/99	5/18/99	8/2/99	10/28/99
Sample ID	16231	16269	16290	16335	16363	16399	16430
Tetrachloroethene (PCE) (µg/L)	22,000	22,300	2,670	10,300	6,540	4,660	4,950J
Trichloroethene (TCE) (µg/L)	3,610	5,530	857	2,920	1,360	814	1,280J
Vinyl Chloride (µg/L)	ND	ND	ND	ND	21.8	9.6	28.6
Total Organic Carbon (mg/L)	13.5	11.2	8.4	19.6	18.6	10.2	18.7
Alkalinity (mg/L)	51	70.1	79.5	32.6	48.4	79.4	61.7
Sulfate (mg/L	52.1	54	49.3	57	51.8	36.9	58.4
Chloride (mg/L)	26.7	26.8	19.7	25.2	20.6	16.8	22.1
Nitrate (mg/L)	ND	ND	ND	ND	0.04J	ND	ND
Iron (mg/L)	5.31	4.9	3.01	5.39	5.79	4.16	4.3
FIELD PARAMETERS							
Temperature (°C)	18.9	24.6	27.4	23.6	23.9	13.9	23.9
pH	6.06	5.56	5.84	5.31	5.51	6.3	5.3
Conductivity (mS/cm)	0.264	0.272	0.31	0.261	0.296	EM	0.2
Dissolved Oxygen (mg/L)	EM	0.50	1.5	EM	1.08	EM	1.4
Turbidity (NTU)	0	11	0	0	6	EM	19
Oxidation/Reduction Potential (mV)	37	NM	36.5	174	63.1	47.3	58

Notes:
J = Estimated value
B = Analyte in blank as well as in sample
ND = Not detected
NM = Not measured
EM = Equipment malfunction