



ANNUAL MONITORING REPORT

**Task Order No. 56
Soil and Groundwater Remediation
Building 900
Marine Corps Base
Camp Lejeune, North Carolina**

Prepared for

The Atlantic Division, Naval Facilities Engineering Command

October 2002 – Revised

Prepared by

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CERTIFICATION

Annual Monitoring Report

Task Order 056

Soil and Groundwater Remediation
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

The material and data in this Annual Monitoring Report was prepared under the direction of the undersigned.

J.A. Jones Environmental Services Company is submitting this Annual Monitoring Report to the Navy as required under task order 056, contract N62470-93-D-3033 for work performed at Building 900, Camp Lejeune, North Carolina. The report was prepared in conformance with J.A. Jones Environmental Services Company's quality assurance/quality control procedures to ensure that the report meets industry standards in terms of the methods used and the information presented. If you have any questions or comments concerning the report, please contact one of the individuals listed below.

Respectfully submitted,

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ACRONYM LIST

bls	below land surface
CAP	corrective action plan
cfh	cubic feet per hour
cfm	cubic feet per minute
HDPE	high density polyethylene
J.A. Jones	J.A. Jones Environmental Services Company
Law	Law Engineering and Environmental Services, Inc.
µg/l	micrograms per liter
mg/l	milligrams per liter
MTBE	methyl tert-butyl ether
NAVFACENGCOM	Navy Atlantic Division, Naval Facilities Engineering Command
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
PAH	Polynuclear Aromatic Hydrocarbons
Paradigm	Paradigm Analytical Laboratories, Inc.
ppm	parts per million
psi	pounds per square inch
PVC	polyvinyl chloride
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

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EXECUTIVE SUMMARY

From June 1, 1999 through April 2002, J.A. Jones Environmental Services Company (J.A. Jones) implemented the selected approach as outlined in the April 1, 1996 Corrective Action Plan (CAP) prepared by Law Engineering and Environmental Services, Inc. (Law) at the Building 900 site. The selected remedial approach consisted of the installation and operation of an air sparging and soil vapor extraction remediation treatment system. The soil and groundwater treatment system was designed to prevent migration of the dissolved groundwater contaminant plume and reduce groundwater contaminant concentrations in the area of Building 900 to site rehabilitation levels regulated by the NCDENR. Air sparging volatilizes dissolved hydrocarbons present in the groundwater and soil vapor extraction collects vapors generated during air sparging. Groundwater monitoring assists in maintaining optimum treatment system performance and tracks petroleum-impacted groundwater migration/attenuation in order to verify remediation progress.

J.A. Jones completed installation and began operation of the Building 900 treatment system on July 20, 1999. Groundwater samples were collected in June (baseline event prior to system start up), August, September and October of 1999 from each of the on-site monitoring wells during the first quarter of system operation and quarterly thereafter through April 2002. Samples were analyzed for volatile organic compounds (VOC's) by USEPA Methods 601 and 602; semivolatile organic compounds by USEPA Method 625; and lead by USEPA Method 504.1. Results from the quarterly events of groundwater analysis and air quality samples can be found under Appendix A and B respectively.

The interpreted extent of the dissolved volatile aromatic hydrocarbon contaminant plume, above the 15A NCAC 2L groundwater quality standards, encompassed the area from the location of UST 900 on the west side of Building 900, extending to the west and northwest to the locations of monitoring wells MW-10 and 78GW23. Since the June 23, 1999 sampling event, detected concentrations of volatile aromatic hydrocarbons have been reduced significantly.

The interpreted extent of the dissolved polynuclear aromatic hydrocarbon (PAH) contaminants, above the 15A NCAC 2L groundwater quality standards, in the vicinity of UST 900 has remained about the same since the initial groundwater sampling event conducted just prior to start up of the treatment system. Since December 2000, the concentrations of polynuclear aromatic hydrocarbons have, however, been reduced by up to 50% of their originally detected concentrations at all locations.

The interpreted extent of dissolved lead in the vicinity of the former location of UST 900 varies from one sampling event to the next; however, the most recent concentrations have

been reduced below the 15A NCAC 2L groundwater quality standards in the immediate vicinity of the treatment system in all monitoring wells except MW-6.

According to the groundwater elevation data collected by J.A. Jones, the direction of groundwater flow is estimated to be predominantly toward the west, in the direction of monitoring well 78GW23.

The total mass of VOCs removed by the soil vapor extraction system and the overall reduction in contaminant concentrations within the dissolved petroleum contaminant plume indicates that the air sparge/soil vapor extraction treatment system is effective in volatilizing the petroleum hydrocarbons present in the groundwater at the Building 900 site.

J.A. Jones recommends that monitoring wells in the network continue to be gauged on a monthly basis to evaluate groundwater flow directions and response to groundwater treatment system operation. J.A. Jones also recommends evaluating the Building 900 site conditions to determine whether the site can be reclassified to an "intermediate" or "low risk" based on Risk Based Assessment and Corrective Action for Petroleum (RBCA) Criteria.

SECTION 1.0

INTRODUCTION

As part of the installation, operation, and maintenance of the soil and groundwater treatment system at Building 900 located on Camp Lejeune, North Carolina, J.A. Jones Environmental Services Company (J.A. Jones) has been retained by the Department of the Navy Atlantic Division, Naval Facilities Engineering Command (NAVFACENGCOCOM), to prepare this Annual Monitoring Report. The purpose of this report is to present the findings and recommendations associated with the continuing operation of the soil and groundwater treatment system and groundwater monitoring activities, during the period from June 1999 through April 2002.

This Annual Monitoring Report is organized into four sections of text including tables that present historical analytical data from sampling events and groundwater elevations at the site. Figures provided in this report present groundwater elevation contour maps detailing groundwater flow patterns and dissolved contaminant plume isopleth maps, which present the distribution of the volatile aromatic and polynuclear aromatic hydrocarbons detected above North Carolina Department of Environment and Natural Resources (NCDENR) groundwater quality standards. Also included are two appendices that present the laboratory data from the groundwater monitoring wells and soil vapor extraction system sampling events.

Section 1.0 Introduction includes the site history, an operational overview of the soil and groundwater treatment system, the operations and maintenance objectives, the sampling and analyses requirements.

Section 2.0 Operations and Maintenance provides a summary of the operation of the soil and groundwater treatment system including any problems encountered and troubleshooting required during system operation.

Section 3.0 Analytical Summary presents a summary of the analytical results from the air effluent samples collected from the soil vapor extraction system and the groundwater samples collected from the on site monitoring wells.

Section 4.0 Conclusions and Recommendations addresses the conclusions and any recommendations from the annual operation of the soil and groundwater treatment system, and quarterly groundwater monitoring well sampling events.

1.1 SITE HISTORY

Building 900 is located on the Camp Lejeune Marine Corps Base North Carolina (N340,530, E 2,502,760 based on map measurement). **Figure 1-1** provides a layout of the Building 900 site.

According to information provided in the CAP, dated April 1, 1998, prepared by Law, petroleum-impacted soil and groundwater present at the site were suspected to be caused by a release of diesel fuel and possibly gasoline from the former 5,000-gallon underground storage tank (UST 900). UST 900 was reportedly installed in 1972, and was removed by Geoscience, Inc. on November 21, 1994. Approximately 33 cubic yards of petroleum-impacted soil was removed at the time of tank removal. The horizontal and vertical extent of the petroleum-impacted soil and groundwater are documented in the CAP.

A draft work plan, prepared by J.A. Jones, outlining the required construction activities associated with the installation of the groundwater treatment system, was submitted for approval in January 1999. The work plan was revised and approved on April 4, 1999. Construction activities, including installation of the air sparging and soil vapor extraction wells and installation of the air sparging and soil vapor extraction piping, and construction of the treatment building foundation were started on June 1, 1999 and completed on July 19, 1999. The treatment equipment was tested in the field, and the electrical service connections were completed on July 19, 1999. The soil and groundwater treatment system was started on July 20, 1999 and has operated continuously, except during occasional maintenance repairs, power outages, and quarterly groundwater sampling events.

This Annual Monitoring Report documents the operation and performance of the soil and groundwater treatment system throughout its operation from July 20, 1999 through April 2002.

1.2 SOIL AND GROUNDWATER TREATMENT SYSTEM

The soil and groundwater treatment system was designed to prevent migration of the dissolved groundwater contaminant plume and reduce groundwater contaminant concentrations in the area of Building 900 to site rehabilitation levels regulated by the NCDENR. These site rehabilitation levels are provided in the North Carolina Administrative Code (NCAC) Title 15A Subchapter 2L *Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina*. According to the Corrective Action Plan, dated April 1, 1998, prepared by Law, the primary groundwater contaminants identified at the site are benzene, toluene, ethylbenzene, xylenes (total), naphthalene, lead, and bis(2-ethylhexyl)phthalate. The maximum detected groundwater concentrations of these contaminants presented in the CAP, the maximum detected concentrations from the April 2002 sampling event, the percent reduction, and their

corresponding site rehabilitation levels, as established in NCAC Title 15A Subchapter 2L, are provided in the table below:

Summary Table
North Carolina Groundwater Quality Standards and Site Target Cleanup Concentrations

Groundwater Constituent	Maximum Detected from CAP	Maximum Detected Concentration April 2002	Percent Reduction	NCDENR Reg. Limit
Benzene	2,095 µg/l	330 µg/l	84.25%	1.0 µg/l
Toluene	6,525 µg/l	140 µg/l	97.85%	1,000 µg/l
Ethylbenzene	2,100 µg/l	760 µg/l	63.81%	29 µg/l
Total Xylenes	9,350 µg/l	1340 µg/l	85.67%	530 µg/l
Naphthalene	524 µg/l	170 µg/l	67.56%	21 µg/l
Lead	645 µg/l	15.7 µg/l	97.57%	15 µg/l
Bis(2-ethylhexyl)phthalate	10.7 µg/l	54 µg/l	<504.>	*
Cis-1,2-dichloroethene	4,500 µg/l	2400 µg/l	46.67%	70 µg/l

The asterisk (*) indicates that no numerical standard has been established. As a result, according to NCAC Title 15A Subchapter 2L, the target rehabilitation concentration is the laboratory detection limit.

The soil and groundwater treatment system installed at the site consists of four air sparge wells and four soil vapor extraction wells. Soil vapor is recovered through four 2-inch diameter, 0.02-inch slot width Circumslot™ polyvinyl chloride (PVC) well screens connected to a positive displacement blower. Moisture generated from the soil vapor extraction process is removed using an air/water separator and any particulate is removed through a filter prior to the positive displacement blower.

Compressed air is supplied to the four air sparge wells by a rotary vane air compressor located in the treatment building through 1-inch diameter Air-Pro™ high density polyethylene (HDPE) compressed air pipe. A coalescing filter inline with the compressed air removes trace oils and lubricants that may be present in the compressed air.

Each air sparge well is constructed of approximately 1 foot of 2-inch diameter schedule 40 PVC well casing coupled with 2-inch diameter, 0.02-inch slot width Circumslot™ PVC well screen installed to an approximate well completion depth of 5.5 feet below land surface (bls). A flush-mounted steel well vault protects and provides access to a flowmeter and air regulator with pressure gauge. In addition, the steel well vault maintains a surface seal protecting the integrity of the well at the surface. Recovered soil vapor is discharged directly to the atmosphere.

Moisture removed from the air/water separator is conveyed to a vertical polyethylene storage tank using a centrifugal transfer pump. An assembly of intrinsically safe water level switches within the air/water separator controls the centrifugal pump. The level switches cause the following responses based on water level conditions:

- The first (i.e., lowest) high-level switch will activate the centrifugal transfer pump, which will operate until the low level switch interrupts power to the pump;
- The second high-level switch will shut down the soil vapor extraction and air sparge systems, causing an alarm condition. Manual restart is required to continue operation after this switch is triggered.

Condensate accumulated in the compressed air receiver is transferred to the vertical storage tank using an electronically timed condensate drain. The polyethylene storage tank has a high-level switch that will shut down the soil vapor extraction and air sparge systems, causing an alarm condition. Like the air/water separator, manual restart is required to continue operation after the switch is activated.

The soil and groundwater treatment system is equipped with an auto-dialer located in the control panel to alert J.A. Jones in the event of an emergency or the system shuts down unexpectedly.

1.3 OPERATIONS AND MAINTENANCE REQUIREMENTS

Scheduled operation and maintenance inspections were performed weekly to maintain the performance and operation of the treatment equipment, to inspect moisture accumulation level in the storage tank, and to collect and record instrumentation readings. Instrumentation readings include air sparge and soil vapor extraction pressure, vacuum, and flow rate at the wells and within the treatment building. The frequency of the scheduled operations and maintenance inspections are presented as follows.

<u>Event Description</u>	<u>Frequency</u>
Record Instrumentation Readings	Monthly
Verify Proper Operation of Fail Safe Conditions	Monthly
Service Equipment	As Required by the Manufacturer's Instructions
Measure and Record Groundwater Elevations	Monthly
Collect Groundwater Monitoring Well Samples	Monthly for 1 st Quarter, then Quarterly thereafter
Collect Soil Vapor Extraction Effluent Sample	Monthly for 1 st Quarter, then Quarterly thereafter

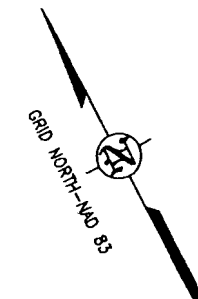
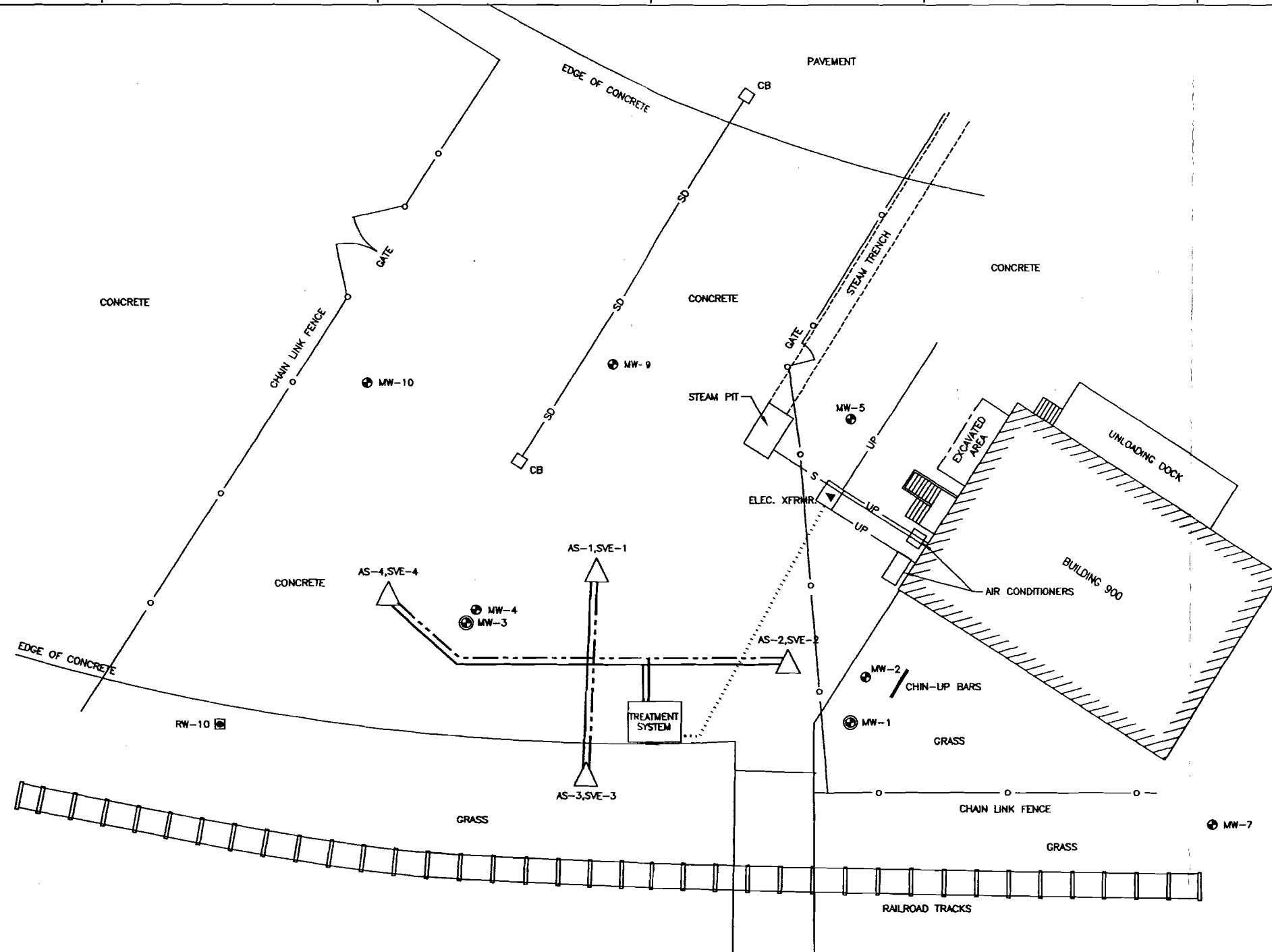
Non-scheduled operations and maintenance events were required to troubleshoot equipment and treatment system malfunctions and to repair and adjust treatment system equipment.

1.4 SAMPLING AND ANALYSES REQUIREMENTS

Groundwater monitoring well and soil vapor extraction effluent samples were collected monthly during the first quarter of operation of the treatment system and collected quarterly thereafter. Groundwater samples collected from on site monitoring wells were delivered by overnight carrier to Paradigm Analytical Laboratories, Inc. (Paradigm), and analyzed for: volatile aromatic hydrocarbons using United States Environmental Protection Agency (USEPA) Methods 601 and 602; for polynuclear aromatic hydrocarbons by USEPA Method 625; and lead by USEPA Method 504.1. A baseline sampling event, executed before installation of the treatment system, was conducted on June 23, 1999 with groundwater samples collected from wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, 78GW22, 78GW23, and RW-10. Once operation of the treatment system began, groundwater samples were collected from on-site monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-8, MW-9, MW-10, and 78GW23 monthly for the first quarter of operation. Starting in 2000, sampling was conducted on a quarterly basis.

The air quality effluent samples, collected on a monthly basis for the first quarter of system operation and quarterly thereafter from the soil vapor extraction system, were delivered by overnight carrier to Paradigm and analyzed for volatile aromatic hydrocarbons using USEPA Method 18.

In addition, groundwater elevations were measured during the baseline sampling event, and monthly during the operation of the treatment system.



▲ 78GW23

HORIZONTAL AND VERTICAL SURVEY CONTROL
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

SITE PLAN

GRAPHIC SCALE
 IF THIS DRAWING IS A REDUCTION, USE GRAPHIC SCALE
 1" = 15'-0"

BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065

- LEGEND**
- BUILDING
 - PREVIOUSLY INSTALLED MONITORING WELL
 - TYPE III MONITORING WELL
 - TYPE II MONITORING WELL
 - RECOVERY WELL
 - SVE/AIR SPARGE WELL PAIR
 - PAD MOUNTED ELECTRICAL TRANSFORMER
 - UP— UNDERGROUND ELECTRICAL LINE
 - SD— STORM DRAINAGE
 - S— STEAM LINE
 - SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 - SCH. 40 PVC ELECTRICAL CONDUIT
 - AIR-PRO™ HDPE AIR SPARGE HEADER
 - O— CHAIN LINK FENCE

ATLANTIC DIVISION
 NAVAL STATION NORFOLK, VIRGINIA

ANNUAL MONITORING REPORT
 BUILDING 900
 MARINE CORPS BASE
 CAMP LEJEUNE, NORTH CAROLINA

SITE PLAN

NO.	DATE	DESCRIPTION	BY	APP'D

1-1

SECTION 2.0

OPERATIONS AND MAINTENANCE

2.1 OPERATION HISTORY

Operation and maintenance of the soil and groundwater treatment system began on the system start-up date of July 20, 1999. Since July 20, 1999, the soil and groundwater treatment system has been inspected a minimum of once per week. Frequency of the operation and maintenance inspections increased during system repair and troubleshooting activities. In addition, scheduled inspections were conducted during the groundwater monitoring well and soil vapor extraction effluent sampling events.

Based on the results from the July 15, 1997 air sparge pilot study, Law recommended, in their April 1, 1998 CAP, a total air injection flow rate of 22 cubic feet per minute (cfm) at 5.2 pounds per square inch (psi). At this design injection flow rate, Law estimated a 30-foot radius for each air sparge well. During treatment system operation by J.A. Jones, air sparge well injection flow rates were adjusted during routine site inspections to optimize the system's performance and prevent excessive groundwater mounding. In April 2002 the system was working at an average of 13.5 cubic feet per hour (cfh) at 5 psi.

Groundwater elevations were measured monthly from each of the on-site groundwater monitoring wells (MW-1 through MW-8, 78GW22, 78GW23, and RW-10) from July 19, 1999 to April 23, 2002. The groundwater elevation data is presented in **Table 2-1**. Representative yearly groundwater elevation contour maps are provided in **Figures 2-1 through 2-4**, from the monthly and quarterly sampling events. These figures depict groundwater elevations under static groundwater conditions following a one week period of treatment system shut down in preparation for the quarterly groundwater sampling event.

2.2 SYSTEM REPAIR AND TROUBLESHOOTING

Since the start-up of the soil and groundwater treatment system on July 20, 1999, there have been only two major repairs associated with the operation of the system. The first event occurred when the positive displacement blower was removed on January 26, 2000 and was replaced on February 28, 2000 due to a broken pulley shaft. The second event occurred when the system experienced a total shutdown from January 29, 2001 through February 28, 2001 due to power outage associated with demolition activities at the former Building 900. The system was restarted March 1, 2001 with no problems and has functioned properly, with only minor maintenance and repairs through April 2002.

2.3 SYSTEM-DERIVED WASTE

Since the startup of the system, approximately 14,269 gallons of groundwater accumulated during soil vapor extraction system operation. This waste was transported and treated at three different facilities: the Groundwater Treatment System at Former Rifle Range RR-72 and the Shaw North Treatment Plant Groundwater Recovery and Treatment System, and at the EMD treatment Plant.

The transportation and disposal log, presented as **Table 2-2**, provides the complete history of the waste material accumulated during construction activities and derived during treatment system operation including the transporter, waste treatment destination, date of shipment, volume and/or weight.

Table 2-1
Building 900
Marine Corps Base
Camp Lejeune, North Carolina
Water Level Measurement Survey

Sample Point	Top of Casing Elevation (ft., msl)	4/13/2002			3/13/2002			2/11/2002		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		10.80	19.34		10.35	19.79		10.92	19.22
MW-2	30.13		6.55	23.58		6.20	23.93		6.74	23.39
MW-3	29.96		10.70	19.26		Not Measured			10.80	19.16
MW-4	29.89		6.84	23.05		Not Measured			7.23	22.66
MW-5	29.97		6.44	23.53		6.72	23.25		6.63	23.34
MW-6	30.77		6.75	24.02		6.75	24.02		7.53	23.24
MW-7	29.82		Not Measured			6.01	23.81		5.34	24.48
MW-8	29.98		8.98	21.00		Not Measured			9.25	20.73
MW-9			9.01			9.26			8.10	
MW-10			6.85			7.09			6.75	
78GW22	32.36		8.41	23.95		7.33	25.03		7.48	24.88
78GW23	32.08		12.10	19.98		11.78	20.30		12.33	19.75
RW-10	26.76		Not Measured			6.95	19.81		7.51	19.25

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

Table 2-1
Building 900
Marine Corps Base
Camp Lejeune, North Carolina
Water Level Measurement Survey

Sample Point	Top of Casing Elevation (ft., msl)	1/21/2002			12/5/2001			11/6/2001		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		11.51	18.63		11.28	18.86		10.76	19.38
MW-2	30.13		7.20	22.93	7.06	7.09	23.04		8.73	21.40
MW-3	29.96		11.48	18.48		11.22	18.74		10.80	19.16
MW-4	29.89		7.44	22.45		10.82	19.07		6.80	23.09
MW-5	29.97		6.76	23.21		6.90	23.07		6.50	23.47
MW-6	30.77		7.80	22.97		8.04	22.73		7.67	23.10
MW-7	29.82		6.70	23.12		6.70	23.12		6.32	23.50
MW-8	29.98		9.92	20.06		9.37	20.61		8.74	21.24
MW-9			7.29			8.62			8.05	
MW-10			7.35			7.00			6.59	
78GW22	32.36		8.89	23.47		9.92	22.44		9.74	22.62
78GW23	32.08		12.80	19.28		12.27	19.81		11.64	20.44
RW-10	26.76		9.50	17.26		11.31			Not Measured	

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

**Table 2-1
Building 900
Marine Corps Base
Camp Lejeune, North Carolina
Water Level Measurement Survey**

Sample Point	Top of Casing Elevation (ft., msl)	10/25/2001			9/25/2001			8/9/2001		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		10.08	20.06		9.03	21.11		9.70	20.44
MW-2	30.13		6.34	23.79		5.18	24.95		5.26	24.87
MW-3	29.96		9.98	19.98		8.96	21.00		9.74	20.22
MW-4	29.89		6.40	23.49		5.18	24.71		5.02	24.87
MW-5	29.97		6.18	23.79		5.13	24.84		5.05	24.92
MW-6	30.77		7.28	23.49		6.10	24.67		6.37	24.40
MW-7	29.82		6.00	23.82		4.92	24.90		5.03	24.79
MW-8	29.98		8.40	21.58		7.23	22.75		7.33	22.65
MW-9			7.80			6.71			6.72	
MW-10			6.25			5.38			5.25	
78GW22	32.36		9.30	23.06		8.02	24.34		8.55	23.81
78GW23	32.08		11.16	20.92		9.96	22.12		10.46	21.62
RW-10	26.76		Not Measured			Not Measured			11.56	15.20

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

Table 2-1
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina
 Water Level Measurement Survey

Sample Point	Top of Casing Elevation (ft., msl)	7/19/2001			6/13/2001			5/23/2001		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		8.68	21.46		9.04	21.10		9.10	21.04
MW-2	30.13		4.70	25.43		4.74	25.39		4.87	25.26
MW-3	29.96		8.59	21.37		9.00	20.96		9.02	20.94
MW-4	29.89		4.74	25.15		4.60	25.29		5.04	24.85
MW-5	29.97		4.56	25.41		Not Measured			Not Measured	
MW-6	30.77		5.70	25.07		4.63	26.14		5.87	24.90
MW-7	29.82		4.50	25.32		5.72	24.10		4.62	25.20
MW-8	29.98		6.65	23.33		Not Measured			6.93	23.05
MW-9			6.08			6.32			6.38	
MW-10			4.67			4.93			5.09	
78GW22	32.36		7.82	24.54		7.46	24.90		7.73	24.63
78GW23	32.08		9.62	22.46		10.07	22.01		10.07	22.01
RW-10	26.76		4.95	21.81		5.43	21.33		9.23	17.53

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

Table 2-1
Building 900
Marine Corps Base
Camp Lejeune, North Carolina
Water Level Measurement Survey

Sample Point	Top of Casing Elevation (ft., msl)	4/23/2001			3/20/2001			3/6/2001		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		8.19	21.95		7.62	22.52		7.38	22.76
MW-2	30.13		4.50	25.63		3.52	26.61		3.35	26.78
MW-3	29.96		8.05	21.91		7.62	22.34		7.42	22.54
MW-4	29.89		5.40	24.49		3.16	26.73		2.90	26.99
MW-5	29.97		Not Measured			Not Measured			Not Measured	
MW-6	30.77		5.41	25.36		4.51	26.26		3.98	26.79
MW-7	29.82		4.30	25.52		Not Measured			2.88	26.94
MW-8	29.98		5.20	24.78		5.56	24.42		5.25	24.73
MW-9			5.75			5.14			5.07	
MW-10			4.52			4.26			4.04	
78GW22	32.36		7.36	25.00		5.72	26.64		5.30	27.06
78GW23	32.08		8.88	23.20		5.93	26.15		7.64	24.44
RW-10	26.76		4.45	22.31		4.02	22.74		3.61	23.15

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

**Table 2-1
Building 900
Marine Corps Base
Camp Lejeune, North Carolina
Water Level Measurement Survey**

Sample Point	Top of Casing Elevation (ft., msl)	1/23/2001			12/7/2000			11/30/2000		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		7.65	22.49		6.94	23.20		8.61	21.53
MW-2	30.13		4.20	25.93		3.49	26.64		5.35	24.78
MW-3	29.96		7.58	22.38		6.93	23.03		8.56	21.40
MW-4	29.89		4.50	25.39		3.97	25.92		5.24	24.65
MW-5	29.97		4.41	25.56		3.60	26.37		5.18	24.79
MW-6	30.77		4.87	25.90		3.86	26.91		6.14	24.63
MW-7	29.82		3.66	26.16		2.99	26.83		5.00	24.82
MW-8	29.98		Not Measured			5.80	24.18		Not Measured	
MW-9			5.76			5.85			Not Measured	
MW-10			4.56			4.46			5.48	
78GW22	32.36		6.01	26.35		5.36	27.00		7.22	25.14
78GW23	32.08		8.46	23.62		8.13	23.95		9.80	22.28
RW-10	26.76		Not Measured			6.25	20.51		7.15	19.61

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

Table 2-1
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina
 Water Level Measurement Survey

Sample Point	Top of Casing Elevation (ft., msl)	10/23/2000			9/11/2000			8/7/2000		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		7.81	22.33		7.53	22.61		8.15	21.99
MW-2	30.13		4.76	25.37		3.51	26.62		3.82	26.31
MW-3	29.96		7.78	22.18		7.48	22.48		5.02	24.94
MW-4	29.89		4.70	25.19		4.06	25.83		8.29	21.60
MW-5	29.97		4.62	25.35		3.39	26.58		3.89	26.08
MW-6	30.77		4.98	25.79		3.50	27.27		3.52	27.25
MW-7	29.82		4.57	25.25		3.13	26.69		3.14	26.68
MW-8	29.98		Not Measured			5.18	24.80		6.63	23.35
MW-9			Not Measured			5.57			6.80	
MW-10			Not Measured			4.31			4.73	
78GW22	32.36		Not Measured			5.01	27.35		5.27	27.09
78GW23	32.08		8.81	23.27		8.05	24.03		9.30	22.78
RW-10	26.76		6.12	20.64		6.72	20.04		6.72	20.04

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

**Table 2-1
Building 900
Marine Corps Base
Camp Lejeune, North Carolina
Water Level Measurement Survey**

Sample Point	Top of Casing Elevation (ft., msl)	7/24/2000			6/15/2000			5/17/2000		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		10.65	19.49		9.63	20.51		8.92	21.22
MW-2	30.13		6.23	23.90		5.60	24.53		4.98	25.15
MW-3	29.96		10.63	19.33		9.57	20.39		8.88	21.08
MW-4	29.89		6.10	23.79		5.21	24.68		4.72	25.17
MW-5	29.97		5.83	24.14		5.35	24.62		4.80	25.17
MW-6	30.77		6.85	23.92		6.61	24.16		5.90	24.87
MW-7	29.82		Not Measured			5.32	24.50		4.75	25.07
MW-8	29.98		8.44	21.54		7.70	22.28		8.85	21.13
MW-9			7.98			8.96			Not Measured	
MW-10			6.30			5.55			Not Measured	
78GW22	32.36		7.37	24.99		8.87	23.49		8.13	24.23
78GW23	32.08		11.80	20.28		10.54	21.54		9.96	22.12
RW-10	26.76		8.97	17.79		8.70			Not Measured	

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

Table 2-1
Building 900
Marine Corps Base
Camp Lejeune, North Carolina
Water Level Measurement Survey

Sample Point	Top of Casing Elevation (ft., msl)	4/19/2000			3/16/2000			2/16/2000		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		7.80	22.34		8.52	21.62		8.42	21.72
MW-2	30.13		4.22	25.91		5.09	25.04		5.11	25.02
MW-3	29.96		8.17	21.79		8.45	21.51		8.37	21.59
MW-4	29.89		4.76	25.13		5.30	24.59		4.90	24.99
MW-5	29.97		4.03	25.94		5.03	24.94		4.86	25.11
MW-6	30.77		4.11	26.66		5.71	25.06		4.78	25.99
MW-7	29.82		3.51	26.31		4.60	25.22		4.24	25.58
MW-8	29.98		6.39	23.59		7.11	22.87		6.96	23.02
MW-9			Not Measured							
MW-10			Not Measured							
78GW22	32.36		5.35	27.01		6.92	25.44		6.33	26.03
78GW23	32.08		9.34	22.74		9.10	22.98		9.81	22.27
RW-10	26.76		6.73	20.03		7.43	19.33		6.74	20.02

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

Table 2-1
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina
 Water Level Measurement Survey

Sample Point	Top of Casing Elevation (ft., msl)	1/24/2000			12/29/1999			11/22/1999		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		9.43	20.71		5.65	24.49		7.93	22.21
MW-2	30.13		5.42	24.71		5.52	24.61		4.76	25.37
MW-3	29.96		9.19	20.77		Not Measured			7.85	22.11
MW-4	29.89		5.30	24.59		Not Measured			4.73	25.16
MW-5	29.97		5.21	24.76		5.41	24.56		4.69	25.28
MW-6	30.77		6.12	24.65		6.25	24.52		5.41	25.36
MW-7	29.82		4.68	25.14		5.14	24.68		4.35	25.47
MW-8	29.98		7.73	22.25		7.22	22.76		6.07	23.91
MW-9										
MW-10										
78GW22	32.36		6.85	25.51		8.01	24.35		7.15	25.21
78GW23	32.08		10.42	21.66		7.93	24.15		8.83	23.25
RW-10	26.76		8.12	18.64		7.89	18.87		6.12	20.64

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

**Table 2-1
Building 900
Marine Corps Base
Camp Lejeune, North Carolina
Water Level Measurement Survey**

Sample Point	Top of Casing Elevation (ft., msl)	10/21/99 ¹			9/24/99 ¹			8/24/1999		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		6.65	23.49		6.52	23.62		10.81	19.33
MW-2	30.13		3.13	27.00		3.00	27.13		6.61	23.52
MW-3	29.96		6.56	23.40		6.46	23.50		11.15	18.81
MW-4	29.89		3.68	26.21		3.70	26.19		6.32	23.57
MW-5	29.97		3.21	26.76		3.17	26.80		6.38	23.59
MW-6	30.77		3.65	27.12		3.16	27.61		7.66	23.11
MW-7	29.82		2.28	27.54		2.69	27.13		5.98	23.84
MW-8	29.98		5.02	24.96		5.48	24.50		8.86	21.12
MW-9										
MW-10										
78GW22	32.36		4.01	28.35		4.42	27.94		8.02	24.34
78GW23	32.08		7.64	24.44		7.40	24.68		11.99	20.09
RW-10	26.76		7.48	19.28		7.73	19.03		11.62	15.14

Notes:

¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

**Table 2-1
Building 900
Marine Corps Base
Camp Lejeune, North Carolina
Water Level Measurement Survey**

Sample Point	Top of Casing Elevation (ft., msl)	7/19/1999			6/23/99 ¹		
		Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)	Depth to Hydrocarbon Product (ft. below toc)	Depth to Groundwater (ft. below toc)	Groundwater Elevation (ft., msl)
MW-1	30.14		10.40	19.74		10.02	20.12
MW-2	30.13		5.94	24.19		5.52	24.61
MW-3	29.96		10.30	19.66		9.95	20.01
MW-4	29.89		6.09	23.80		5.72	24.17
MW-5	29.97		5.77	24.20		5.35	24.62
MW-6	30.77		6.04	24.73		6.58	24.19
MW-7	29.82		5.57	24.25		5.11	24.71
MW-8	29.98		8.26	21.72		7.98	22.00
MW-9							
MW-10							
78GW22	32.36		7.68	24.68		7.36	25.00
78GW23	32.08		11.57	20.51		10.75	21.33
RW-10	26.76		11.21	15.55		6.62	20.14

Notes:

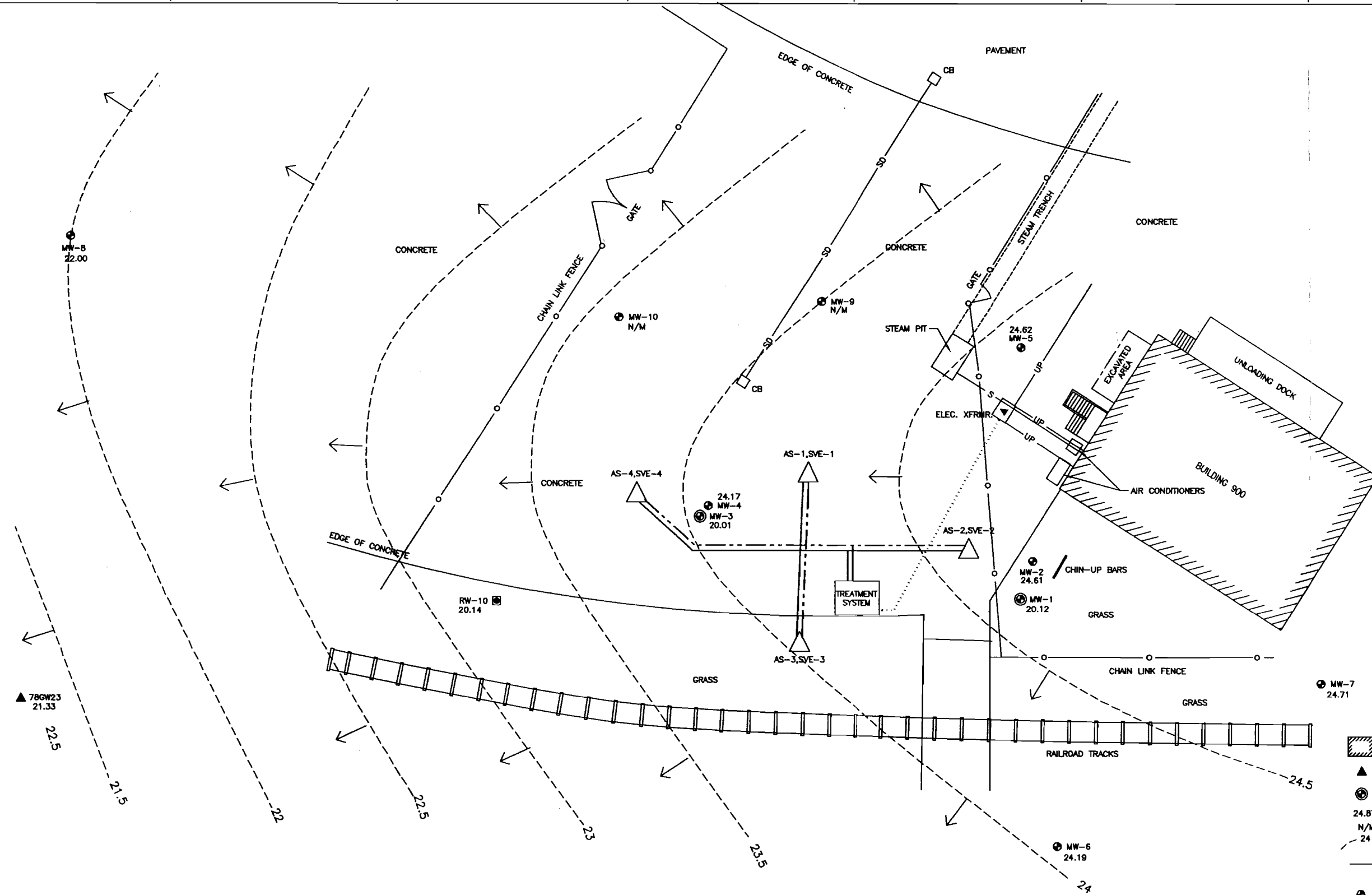
¹ System not operational during water level survey.

ft = feet

toc = top of casing elevation

msl = mean sea level

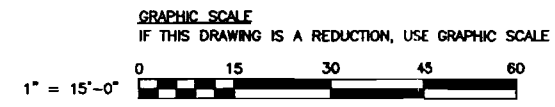
TABLE 2-2 TRANSPORTATION AND DISPOSAL LOG J.A. JONES ENVIRONMENTAL SERVICES COMPANY CAMP LEJEUNE, NORTH CAROLINA PROJECT NUMBER: 005-056								
				GALLONS TO DATE TONS TO DATE DRUMS TO DATE		14,569 0.00 0.00		
DATE SHIPPED	DISPOSAL FACILITY	HAULER	TONS	GALLONS	DRUMS	MANIFEST NUMBER	LOAD NUMBER	COMMENTS
9/23/1999	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		400		846	W-001	Groundwater collected from operation of SVE system.
11/19/1999	Groundwater Treatment System, Former Rifle Range RR-73	J.A. Jones Environmental Services Company		950		763	W-002	Groundwater collected from operation of SVE system.
1/5/2000	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		450		764	W-003	Groundwater collected from operation of SVE system.
1/11/2000	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		350		851	W-004	Groundwater collected from operation of SVE system.
2/14/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		600		1007	W-005	Groundwater collected from operation of SVE system.
3/8/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		219		1003	W-006	Groundwater collected from operation of SVE system.
4/4/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		430		1009	W-007	Groundwater collected from operation of SVE system.
4/19/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		320		1010	W-008	Groundwater collected from operation of SVE system.
5/25/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		250		946	W-009	Groundwater collected from operation of SVE system.
6/7/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		350		953	W-010	Groundwater collected from operation of SVE system.
6/12/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		100		954	W-011	Groundwater collected from operation of SVE system.
6/27/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		350		960	W-012	Groundwater collected from operation of SVE system.
7/10/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		275		966	W-013	Groundwater collected from operation of SVE system.
7/27/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		225		983	W-014	Groundwater collected from operation of SVE system.
8/23/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		425		991	W-015	Groundwater collected from operation of SVE system.
8/28/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		350		992	W-016	Groundwater collected from operation of SVE system.
9/6/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		300		996	W-017	Groundwater collected from operation of SVE system.
10/12/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		500		1048	W-018	Groundwater collected from operation of SVE system.
11/13/2000	Groundwater Treatment System, Former Rifle Range RR-72	J.A. Jones Environmental Services Company		400		1052	W-019	Groundwater collected from operation of SVE system.
3/26/2001	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		325		1451	W-020	Groundwater collected from operation of SVE system.
5/2/2001	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		225		2548	W-021	Groundwater collected from operation of SVE system.
6/12/2001	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		400		2577	W-022	Groundwater collected from operation of SVE system.
6/26/2001	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		450		2591	W-023	Groundwater collected from operation of SVE system.
8/13/2001	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		350		2632	W-024	Groundwater collected from operation of SVE system.
10/30/2001	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		3350		2693	W-025	Groundwater collected from operation of SVE system.
11/1/2001	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		275		2696	W-026	Groundwater collected from operation of SVE system.
12/20/2001	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		250		2736	W-027	Groundwater collected from operation of SVE system.
2/26/2002	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		400		2769	W-028	Groundwater collected from operation of SVE system.
2/7/2002	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		400		2758	W-029	Groundwater collected from operation of SVE system.
2/18/2002	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		400		2766	W-030	Groundwater collected from operation of SVE system.
4/2/2002	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		200		2792	W-031	Groundwater collected from operation of SVE system.
4/18/2002	Shaw North Treatment Plant	J.A. Jones Environmental Services Company		300		2805	W-032	Groundwater collected from operation of SVE system.
TOTAL as of 4/30/02			0.00	14569.00	0.00	SOIL: 0 WATER: 34 DRUMS: 0	0 Leads Leads Leads	



GROUNDWATER ELEVATION CONTOUR MAP
JUNE 23, 1999

HORIZONTAL AND VERTICAL SURVEY CONTROL
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

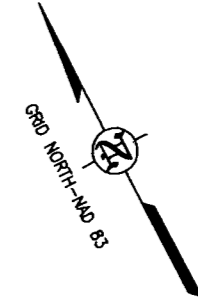
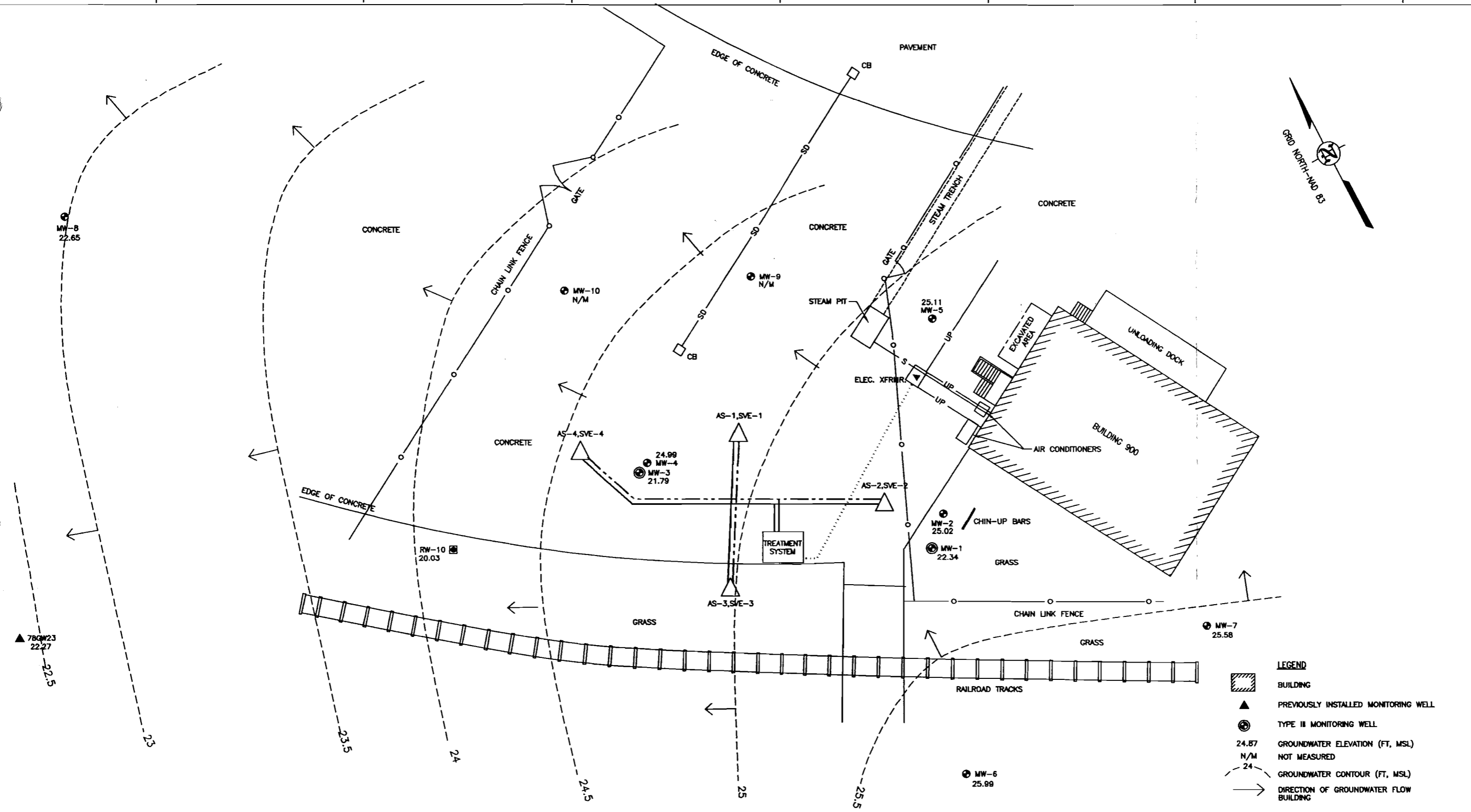
BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065



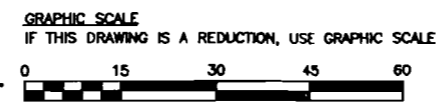
NOTE: MW-1, MW-3 AND RW-10 NOT USED FOR THIS GROUNDWATER FLOW DIAGRAM.

- LEGEND**
- BUILDING
 - PREVIOUSLY INSTALLED MONITORING WELL
 - TYPE III MONITORING WELL
 - 24.87 GROUNDWATER ELEVATION (FT, MSL)
 - N/M NOT MEASURED
 - 24 GROUNDWATER CONTOUR (FT, MSL)
 - DIRECTION OF GROUNDWATER FLOW BUILDING
 - TYPE II MONITORING WELL
 - RECOVERY WELL
 - SVE/AIR SPARGE WELL PAIR
 - PAD MOUNTED ELECTRICAL TRANSFORMER
 - UP UNDERGROUND ELECTRICAL LINE
 - SD STORM DRAINAGE
 - S STEAM LINE
 - - - SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 - SCH. 40 PVC ELECTRICAL CONDUIT
 - AIR-PRO™ HDPE AIR SPARGE HEADER
 - CHAIN LINK FENCE

 J.A. JONES CIVIL ENGINEERING 11111 FIFTH STREET FORT WORTH, TEXAS 76104-3033 PHONE: 817-335-3033 FAX: 817-335-3033		ATLANTIC DIVISION NAVAL STATION NORFOLK, VIRGINIA	
ANNUAL MONITORING REPORT BUILDING 900 MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA		GROUNDWATER ELEVATION CONTOUR MAP - JUNE 23, 1999	
SHEET NO. 2-1 OF 2	REVISIONS NO. DESCRIPTION DATE APPROVED	PROJECT MANAGER QUALITY CONTROL BRANCH MANAGER DESIGN DIRECTOR	



GROUNDWATER ELEVATION CONTOUR MAP APRIL 19, 2000



- LEGEND**
- BUILDING
 - PREVIOUSLY INSTALLED MONITORING WELL
 - TYPE II MONITORING WELL
 - 24.87
N/M
24
GROUNDWATER ELEVATION (FT, MSL)
 - 24
GROUNDWATER CONTOUR (FT, MSL)
 - DIRECTION OF GROUNDWATER FLOW BUILDING
 - TYPE II MONITORING WELL
 - RECOVERY WELL
 - SVE/AIR SPARGE WELL PAIR
 - PAD MOUNTED ELECTRICAL TRANSFORMER
 - UP— UNDERGROUND ELECTRICAL LINE
 - SD— STORM DRAINAGE
 - S— STEAM LINE
 - SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 - SCH. 40 PVC ELECTRICAL CONDUIT
 - AIR-PRO™ HDPE AIR SPARGE HEADER
 - O— CHAIN LINK FENCE

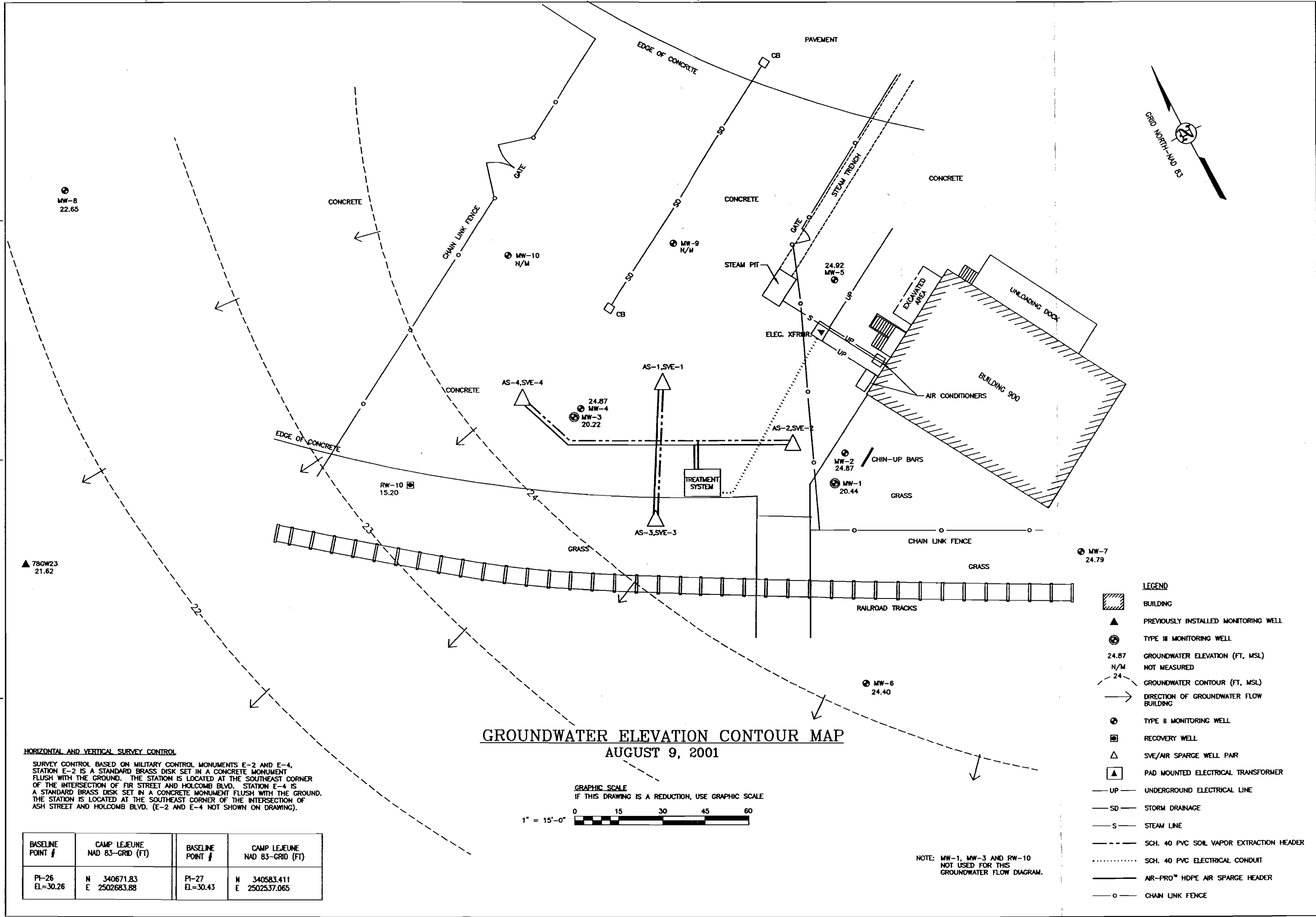
NOTE: MW-1, MW-3 AND RW-10
NOT USED FOR THIS
GROUNDWATER FLOW DIAGRAM.

HORIZONTAL AND VERTICAL SURVEY CONTROL
SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065

 J.A. JONES SURVEYING & CONSULTING 1101 W. 10TH ST. SUITE 100 FORT WORTH, TX 76102-3833 PHONE: 817-335-3333 FAX: 817-335-3333 WWW: www.jajones.com	
PROJECT NO.: PROJECT NAME: PROJECT MANAGER: PROJECT ENGINEER: PROJECT CHECKER: DATE:	SHEET NO.: OF: DATE:
ATLANTIC DIVISION NAVAL STATION ANNUAL MONITORING REPORT BUILDING 900 MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA GROUNDWATER ELEVATION CONTOUR MAP - APRIL 19, 2000	
REVISIONS	

SNO PFD001\DATA\DWG\VF\... FEB 16, 2001 1:40:04M PLOT: 1=180



BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065

ATLANTIC DIVISION

ANNUAL MONITORING REPORT
BUILDING 900
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

GROUNDWATER ELEVATION CONTOUR MAP -- AUGUST 9, 2001

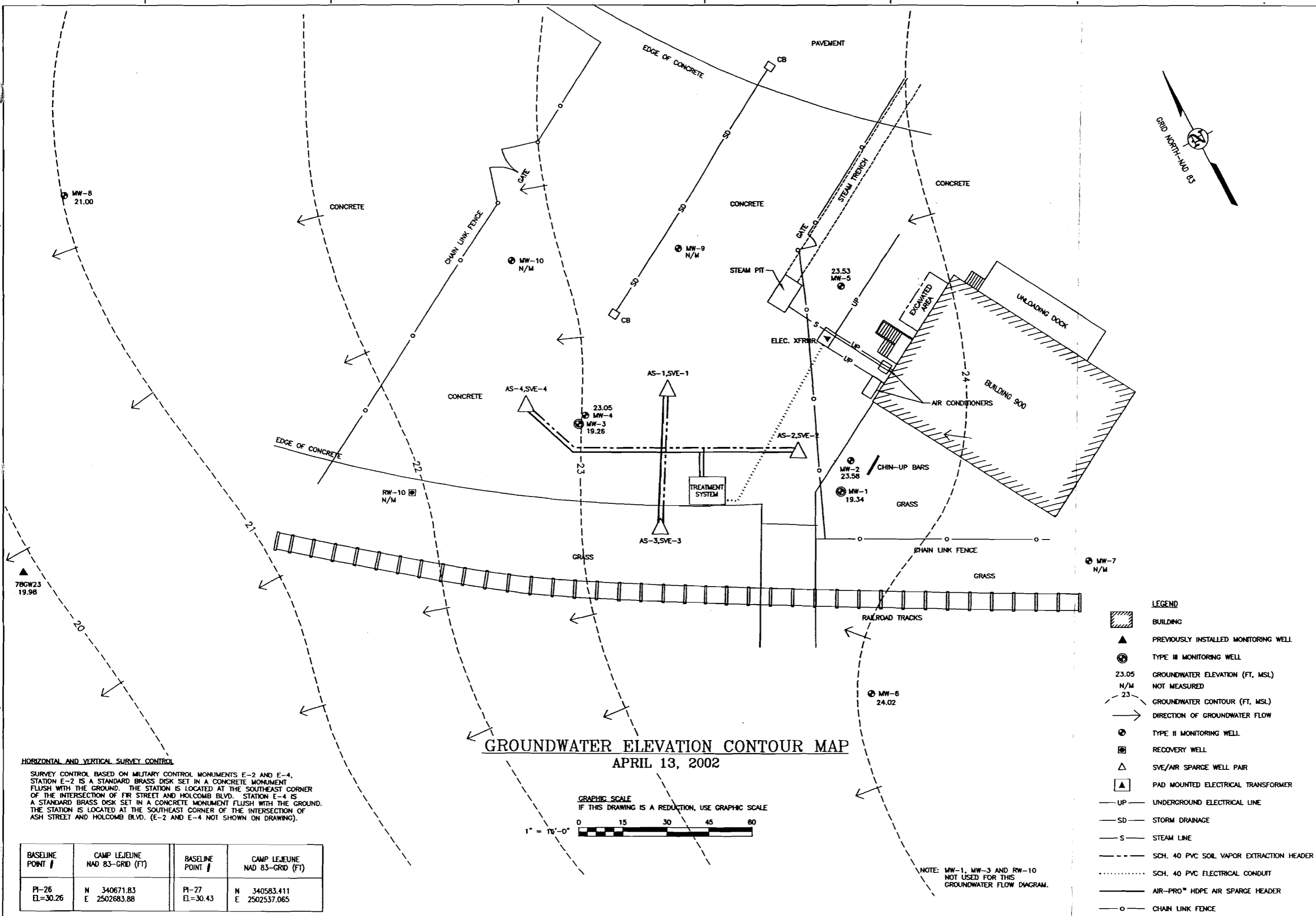
NORFOLK, VIRGINIA

NAVAL STATION

SCALE: AS NOTED

SHEET 2-3

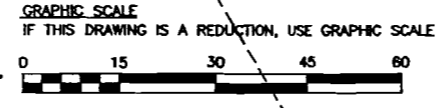
NO.	DATE	DESCRIPTION	BY	APPROVED



GROUNDWATER ELEVATION CONTOUR MAP
 APRIL 13, 2002

HORIZONTAL AND VERTICAL SURVEY CONTROL
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065



- LEGEND**
- BUILDING
 - PREVIOUSLY INSTALLED MONITORING WELL
 - TYPE II MONITORING WELL
 - 23.05 GROUNDWATER ELEVATION (FT, MSL)
 - N/M NOT MEASURED
 - 23 GROUNDWATER CONTOUR (FT, MSL)
 - DIRECTION OF GROUNDWATER FLOW
 - TYPE II MONITORING WELL
 - RECOVERY WELL
 - SVE/AIR SPARGE WELL PAIR
 - PAD MOUNTED ELECTRICAL TRANSFORMER
 - UNDERGROUND ELECTRICAL LINE
 - STORM DRAINAGE
 - STEAM LINE
 - SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 - SCH. 40 PVC ELECTRICAL CONDUIT
 - AIR-PRO™ HDPE AIR SPARGE HEADER
 - CHAIN LINK FENCE

NOTE: MW-1, MW-3 AND RW-10 NOT USED FOR THIS GROUNDWATER FLOW DIAGRAM.

 J.A. JONES CIVIL ENGINEERING 1000 W. 10TH STREET WASHINGTON, DC 20004 TEL: (202) 462-1111 FAX: (202) 462-1112		PROJECT NO. 02-0033 PROJECT NAME: MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA SHEET NO. 2-4 OF 4	
CONTRACTOR DESIGN CHECK VERIFY PROJECT MANAGER FIELD SUPERVISOR QUALITY CONTROL RECORDS MANAGER OFFICE DIRECTOR	DATE DATE DATE DATE DATE DATE DATE	REVISIONS NO. DESCRIPTION DATE	D C B A

SECTION 3.0

ANALYTICAL SUMMARY

Groundwater samples were collected once prior to treatment system startup on July 19, 1999, monthly during the first quarter of treatment system operation from July 20, 1999 to October 21, 1999, and quarterly through April 2002. The baseline sampling event, prior to treatment system startup included samples from monitoring wells MW-1 through MW-10, 78GW22, 78GW23, and RW-10. Groundwater samples were collected from groundwater monitoring well MW-1 on June 1999 and quarterly from July 2000 to April 2002. Monthly and quarterly groundwater samples were collected from groundwater monitoring wells MW-2 through MW-6, MW-8 through MW-10, 78GW23, and RW-10. Groundwater samples were delivered by overnight carrier to Paradigm and analyzed for volatile aromatic hydrocarbons using USEPA Methods 601 and 602, polynuclear aromatic hydrocarbons using USEPA Method 625, and lead by USEPA Method 504.1. **Table 3-1** presents a summary of the detected contaminant concentrations from the groundwater samples. **Appendix A** provides the laboratory analytical data from the groundwater monitoring well sampling events.

Volatile aromatic hydrocarbons were not detected in any of the groundwater samples collected from monitoring wells MW-1 and MW-8 during any of the sampling events conducted at the site from June 1999 through April 2002. Polynuclear aromatic hydrocarbons were not detected in any of the groundwater samples collected from monitoring wells MW-6 and MW-8 during any of the sampling events conducted at the site from June 1999 through April 2002.

The following paragraphs address each well individually with regard to analytical results:

MW-1: The polynuclear aromatic hydrocarbon bis(2-ethylhexyl)phthalate was detected in the groundwater sample collected from monitoring well MW-1 during the initial June 23, 1999 sampling event at a concentration of 68 µg/l. While concentrations have varied during the different sampling events, bis(2-ethylhexyl)phthalate shows a concentration of 29 µg/l under the April 2002 sampling event. Acenaphthene has also been detected at this well but always below 15A NCAC 2L groundwater quality standards. Lead was not detected in the groundwater sample collected from this well during the initial June 23, 1999 sampling event; however, lead was detected in subsequent sampling events at concentrations of 0.0529 µg/l, 0.143 µg/l, 5.87 µg/l, and 13.7 µg/l in the July 2000, October, 2000, January 2001, and October 2001 sampling events, respectively. The April 2002 sampling event indicated the lead concentration was below laboratory quantitation limits.

MW-2: The volatile aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylenes were detected in the groundwater sample collected from monitoring well MW-2 during the initial June 23, 1999 sampling event at concentrations of 180 µg/l, 930 µg/l, 1,000 µg/l, and 2,400 µg/l, respectively. Benzene, ethylbenzene, toluene, and total xylenes concentrations detected in groundwater samples collected from monitoring well MW-2 on April 2002, approximately 34 months after treatment system startup, have decreased to 49 µg/l, 430 µg/l, 120 µg/l, and 420 µg/l, respectively based on the April 2002 results. The established 15A NCAC 2L groundwater quality standards for benzene, ethylbenzene, toluene, and total xylenes are 1 µg/l, 29 µg/l, 1,000 µg/l, and 530 µg/l, respectively. Therefore, levels of both toluene and total xylenes have been reduced and have remained below established 15A NCAC 2L groundwater quality standards.

The polynuclear aromatic hydrocarbons naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were detected in the groundwater sample collected from monitoring well MW-2 during the June 23, 1999 sampling event at concentrations of 230 µg/l, 32 µg/l, and 39 µg/l, respectively. Detected concentrations of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene have varied over the various sampling events. During the April 2002 sampling event, detected concentrations of naphthalene and 1-methylnaphthalene were 110 µg/l and 15 µg/l, respectively. The detected concentration of 2-methylnaphthalene has decreased below laboratory quantitation limit, and bis(2-ethylhexyl)phthalate was only recently detected at a concentration of 21 µg/l in the April 2002 event. The established 15A NCAC 2L groundwater quality standards for naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, and bis(2-ethylhexyl)phthalate are 21 µg/l, laboratory quantitation limit, 28 µg/l, and laboratory quantitation limit, respectively. Therefore, levels of 2-methylnaphthalene have remained below established 15A NCAC 2L groundwater quality standards.

Lead has been detected at various concentrations in groundwater samples collected from monitoring well MW-2 ranging in concentration from below laboratory quantitation limits to 24.3 mg/l during the October 2001 sampling event. The April 2002 result of 0.0144 µg/l is below the 15A NCAC 2L groundwater quality standard for lead of 0.015 µg/l.

MW-3: Volatile aromatic hydrocarbons, polynuclear aromatic hydrocarbons, and lead were not detected in the groundwater sample collected from monitoring well MW-3 during the June 23, 1999 sampling event. However, in subsequent events, the following analytes were detected at the following concentrations:

- July 24, 2000 sampling event, the volatile aromatic hydrocarbons benzene, ethylbenzene, toluene and total xylenes were detected at concentrations of 1 µg/l, 6 µg/l, 3 µg/l, and 14 µg/l, respectively. No detection of any of these constituents has been recorded since that event.

- The polynuclear aromatic hydrocarbon bis(2ethylhexyl)phthalate was detected at various concentrations, from 13 µg/l in the April 2000 sampling event to 53 µg/l in the April 2002 sampling event.
- Lead has been detected at concentrations from below quantitative limits to 2.43 mg/l at this well. The April 2002 results are below laboratory quantitative limits.

MW-4: The volatile aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylenes were detected in the groundwater sample collected from monitoring well MW-4 during the June 23, 1999 initial sampling event at concentrations of 730 µg/l, 1,100 µg/l, 160 µg/l, and 1,770 µg/l, respectively. Benzene, ethylbenzene, toluene, and total xylenes concentrations have decreased to 330 µg/l, 760 µg/l, 140 µg/l, and 1,340 µg/l, respectively. The detected concentration of toluene in the April 23, 2002 groundwater-sampling event is below the established 15A NCAC 2L standard of 1,000 µg/l.

The polynuclear aromatic hydrocarbons naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were detected during the June 23, 1999 initial sampling event at concentrations of 190 µg/l, 16 µg/l, and 24 µg/l, respectively. As of April 23, 2002, detected concentrations of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were 170 µg/l, 12 µg/l, and 22 µg/l, respectively. Concentrations of 2-methylnaphthalene are below the established 15A NCAC 2L standard of 28 µg/l. Bis(2-ethylhexyl)phthalate was not originally detected in the June 1999 sampling event but was present at 25 µg/l during the April 2002 sampling event.

Lead was detected in the groundwater sample collected in the initial sampling event of June 23, 1999 at a concentration of 0.0384 mg/l. Detected concentrations of lead have been below laboratory quantitative limits since the September 1999 sampling events.

MW-5: No volatile aromatic hydrocarbons, polynuclear aromatic hydrocarbons, nor lead were detected in the groundwater sample collected from monitoring well MW-5 during the June 23, 1999 initial sampling event. This well has remained clean except for benzene, naphthalene, acenaphthene, and lead at low concentrations. The April 2002 results detected concentrations of benzene, naphthalene, and acenaphthene at 2 µg/l, 46 µg/l, and 12 µg/l, respectively. The detected concentration of acenaphthene in the April 2002 groundwater sampling event is below the established 15A NCAC 2L standard of 80 µg/l.

MW-6: Lead was detected in the groundwater sample collected from monitoring well MW-6 during the June 23, 1999 initial sampling event at a concentration of 0.0792 mg/l. Lead was also detected in each subsequent sampling event at decreasing concentrations with a concentration of 0.157 mg/l in the April 2002 sampling event (still slightly above the established 15A NCAC 2L standard of 0.015 mg/l). No other analytes were detected above laboratory quantitation limits.

MW-7: Monitoring well MW-7 was sampled only during the initial sampling event on June 23, 1999. No volatile aromatic hydrocarbons or polynuclear aromatic hydrocarbons were detected in groundwater samples collected during this event. Lead was detected at a concentration of 0.0442 mg/l, which is only slightly above the established 15A NCAC 2L standard of 0.015 mg/l.

MW-8: Lead was detected in monitoring well MW-8 at a concentration of 0.0216 mg/l in groundwater samples collected during the initial sampling event on June 23, 1999. Subsequent samples have indicated varying concentrations both above and below both the quantitation limit and the established 15A NCAC 2L standard of 0.015 mg/l. The latest result from the April 2002 sampling event indicates below laboratory quantitative levels.

MW-9: The volatile aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylenes were detected in the groundwater sample collected from monitoring well MW-9 during the June 19, 2000 sampling event at concentrations of 32 µg/l, 24 µg/l, 3 µg/l, and 77 µg/l, respectively. Subsequent sampling events yielded similar results with volatile aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylenes being detected in the groundwater samples. The April 23, 2002 sampling event results were 45 µg/l, 15 µg/l, 3 µg/l, and 23 µg/l, respectively. These results have remained relatively constant since the installation of this well. Toluene and total xylenes are below the established 15A NCAC 2L groundwater quality standards of 1,000 µg/l, and 530 µg/l, respectively.

Polynuclear aromatic hydrocarbons naphthalene and bis(2-ethylhexyl)phthalate have been detected in groundwater samples collected from monitoring well MW-9. Concentrations of naphthalene ranging from 14 to 21 µg/l are at or below the established 15A NCAC 2L standards of 21 µg/l. The April 2002 result for naphthalene is below laboratory quantitative limits. Bis(2-ethylhexyl)phthalate was detected at 11µg/l during the April 2002 event. No other polynuclear aromatic hydrocarbons were detected in groundwater samples collected from monitoring well MW-9. Lead was detected above the established 15A NCAC 2L standards of 0.015 mg/l, at concentrations of 0.0239 mg/l and 10.9 mg/l at the July 19, 2001 and October 25, 2001 sampling events, respectively, but the April 2002 result is below laboratory quantitative limits.

MW-10: The volatile aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylenes were detected in the groundwater sample collected from monitoring well MW-10 during the June 19, 2000 sampling event at concentrations of 22 µg/l, 30 µg/l, 1 µg/l, and 22 µg/l, respectively. The volatile aromatic hydrocarbon benzene was detected during the April 2002 at a concentration of 15µg/l. Ethylbenzene, toluene and total xylenes have remained below the established groundwater quality standards.

The polynuclear aromatic hydrocarbon bis(2-ethylhexyl)phthalate was detected during sampling events from October 25, 2001 to April 23, 2002, at concentrations of 14 µg/l to 24 µg/l. Lead was detected in groundwater samples collected from monitoring well MW-

10 only during the sampling event conducted January 21, 2002, at a concentration of 0.0107 mg/l, which is below the established 15A NCAC 2L standard of 0.015 mg/l.

78GW23: The volatile aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylenes were detected in the groundwater sample collected from monitoring well 78GW23 during the initial sampling event on June 23, 1999 at concentrations of 18 µg/l, 1 µg/l, 4 µg/l, and 57 µg/l, respectively. Subsequent sampling events yielded similar results with volatile aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylenes being detected in the groundwater samples. The April 2002 result concentrations are 15 µg/l, 9 µg/l, 4 µg/l, and 56 µg/l, respectively. The established 15A NCAC 2L groundwater quality standards for benzene, ethylbenzene, toluene, and total xylenes are 1 µg/l, 29 µg/l, 1,000 µg/l, and 530 µg/l, respectively. Therefore, concentrations of ethylbenzene, toluene, and total xylenes have remained below the established 15A NCAC 2L groundwater quality standards.

The volatile aromatic hydrocarbon methyl-tert-butyl ether (MTBE) was detected in monitoring well 78GW23 during various sampling events, but always below the established 15A NCAC 2L groundwater quality standards for MTBE of 200 µg/l.

The volatile organic compound cis-1,2-dichloroethene was first detected in groundwater samples from monitoring well 78GW23 during September 24, 1999, sampling event. Detected concentrations of cis-1,2-dichloroethene have remained fairly constant, ranging from 2400 µg/l to 3900 µg/l during all sampling events up to April 23, 2002. All observed concentrations of cis-1,2-dichloroethene are above the established 15A NCAC 2L groundwater quality standards of 70 µg/l.

The polynuclear aromatic hydrocarbon bis(2-ethylhexyl)phthalate was detected during sampling events from July 19, 2001 to April 23, 2002, at concentrations ranging from 15 µg/l to 59 µg/l. Lead was detected in groundwater samples collected from monitoring well MW-10 only during the sampling event of October 25, 2001, at a concentration of 13.4 mg/l (above the established 15A NCAC 2L standard of 0.015 mg/l). The April 2002 sampling event resulted in lead concentrations below laboratory quantitative limits.

RW-10: The volatile aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylenes were detected in the groundwater sample collected from monitoring well RW-10 during the June 23, 1999 sampling event at concentrations of 240 µg/l, 94 µg/l, 13 µg/l, and 240 µg/l, respectively. Subsequent sampling events yielded similar but lower results with volatile aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylenes being detected in the groundwater samples. The April 2002 sampling event resulted in concentrations of 200 µg/l for benzene, 66 µg/l for ethylbenzene, and 68 µg/l for total xylenes. MTBE and toluene were below the laboratory qualitative limits. Concentrations of toluene, MTBE, and total xylenes have remained below the established standards; however, concentrations of benzene and ethylbenzene remained above the established standards.

The polynuclear aromatic hydrocarbons dimethylphthalate and phenol were detected in the groundwater sample collected from monitoring well RW-10 during the initial sampling event occurring on June 23, 1999 at concentrations of 13 µg/l and 18 µg/l, respectively. Neither compound was detected in subsequent sampling events. Lead was detected in the groundwater sample collected from monitoring well RW-10 during the sampling event of January 23, 2001 at a concentration of 2.15 mg/l, which is above the established 15A NCAC 2L standard of 0.015 mg/L. The April 2002 lead result is below laboratory quantitative limit.

Dissolved groundwater contaminant isopleths maps for volatiles and polynuclear aromatic hydrocarbons are presented in Figures 3-1 through 3-8.

During each groundwater sample collection event, from July 20, 1999 through April 23, 2002 an air quality sample was collected from the soil vapor extraction system effluent. Each air quality sample was delivered by overnight carrier to Paradigm and analyzed for volatile aromatic hydrocarbons using USEPA Method 18.

Volatile aromatic hydrocarbons were detected above laboratory quantitation limits in three of the fourteen air quality samples collected from the soil vapor extraction effluent. During the July 20, 1999 sampling event (date of system startup), there was a total xylenes concentration of 0.6 parts per million (ppm). On September 14, 1999, benzene and toluene were detected at concentrations of 1.2 ppm and 2.1 ppm, respectively. On October 16, 2000 (fourth quarter 2000 sampling event) there was a detected concentration of toluene of 1.6 ppm. **Table 3-2** presents a summary of the detected contaminant concentrations in the air quality samples collected from the soil vapor extraction system effluent.

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW-01								
		Sample ID	UST900-MW01-02B	UST900-MW01-02A	UST900-MW01-01D	UST900-MW01-01C	UST900-MW01-01B	UST900-MW01-01A	UST900-MW01-00D	UST900-MW01-00C	UST900-MW01-99B
		Sample Date	4/23/2002	1/21/2002	10/25/2001	7/19/2001	4/23/2001	1/23/2001	10/23/2000	7/24/2000	6/23/1999
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>											
cis-1,2-Dichloroethene	70		BQL	BQL	BQL	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>											
Benzene	1		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Ethylbenzene	29		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>											
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>											
Lead	0.015		BQL	BQL	13.7	BQL	BQL	5.87	0.143	0.0529	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW02						
		Sample ID	UST900-MW02-02B	UST900-MW02-02A	UST900-MW02-01D	UST900-MW02-01C	UST900-MW02-01B	UST900-MW02-01A	UST900-MW02-00D
	Sample Date	4/23/2002	1/21/2002	10/25/2001	7/19/2001	4/23/2001	1/23/2001	10/23/2000	
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70	BQL	BQL	BQL	NA	NA	NA	NA	
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1	49	47	47	20	48	37	37	
Ethylbenzene	29	410	510	510	180	280	450	290	
Methyl-tert-butyl ether (MTBE)	200	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
Toluene	1000	920	995	99	39	89	77	50	
Total Xylenes	530	420	560	560	120	240	450	420	
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21	110	200	130	37	36	100	100	
1-Methylnaphthalene	Detection Limit	15	21	12	10	13	19	21	
2-Methylnaphthalene	28	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
Bis(2-ethylhexyl)phthalate	Detection Limit	21	BQL	BQL	BQL	BQL	BQL	BQL	
Dimethylphthalate	Detection Limit	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
Diethylphthalate	5000	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2,4-Dimethylphenol	140	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
Acenaphthene	80	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
Phenol	300	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015	0.0144	BQL	24.3	BQL	0.0112	7.1400	0.0172	

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
Groundwater Monitoring Well Samples
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW-02						
		Sample ID	UST900-MW02-00C	UST900-MW02-00B	UST900-MW02-00A	UST900-MW02-99D	UST900-MW02-99C3	UST900-MW02-99C2	UST900-MW02-99B
		Sample Date	7/24/2000	4/19/2000	1/24/2000	10/21/1999	9/24/1999	8/24/1999	6/23/1999
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		170	280	99	120	69	250	180
Ethylbenzene	29		980	1300	510	510	420	1300	930
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		1550	890	270	350	260	910	1000
Total Xylenes	530		7400	3300	1400	1250	1100	3600	2400
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		270	250	220	200	110	280	230
1-Methylnaphthalene	Detection Limit		26	37	31	34	16	37	32
2-Methylnaphthalene	28		43	44	47	42	32	57	39
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		0.0210	0.0112	0.0105	0.0124	0.0151	0.152	0.137

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
Detected concentrations above the regulatory limits are indicated in boldface type.
NA indicates that the sample was not analyzed for the constituent.
BQL = Below Laboratory Quantitation Limit
Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
Groundwater Monitoring Well Samples
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW03						
		Sample ID	UST900-MW03-02B	UST900-MW03-02A	UST900-MW03-01D	UST900-MW03-01C	UST900-MW03-01B	UST900-MW03-01A	UST900-MW03-00D
		Sample Date	4/24/2002	1/21/2002	10/25/2002	7/19/2001	4/23/2001	1/23/2001	10/23/2000
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Ethylbenzene	29		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		5.3	17	120	120	13	24	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		BQL	BQL	0.0132	0.0132	BQL	2.43	0.0229

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
Detected concentrations above the regulatory limits are indicated in boldface type.
NA indicates that the sample was not analyzed for the constituent.
BQL = Below Laboratory Quantitation Limit
Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW03						
		Sample ID	UST900-MW03-00C	UST900-MW03-00B	UST900-MW03-00A	UST900-MW03-99D	UST900-MW03-99C3	UST900-MW03-99C2	UST900-MW03-99B
		Sample Date	7/24/2000	4/19/2000	1/24/2000	10/21/1999	9/24/1999	8/24/1999	6/23/1999
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Ethylbenzene	29		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		BQL	BQL	BQL	BQL	BQL	BQL	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW04						
		Sample ID	UST900-MW04-02B	UST900-MW04-02A	UST900-MW04-01D	UST900-MW04-01C	UST900-MW04-01B	UST900-MW04-01A	UST900-MW04-00D
		Sample Date	4/24/2002	1/21/2002	10/25/2001	7/19/2001	4/23/2001	1/23/2001	10/23/2000
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70					NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		310	270	730	520	550	500	450
Ethylbenzene	29		760	520	620	830	510	1200	830
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		180	110	120	190	180	140	110
Total Xylenes	530		1340	911	1058	1470	930	1320	1000
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		170	160	170	240	110	170	200
1-Methylnaphthalene	Detection Limit		12	10	12	16	10	14	23
2-Methylnaphthalene	28		12	19	26	28	BQL	17	28
Bis(2-ethylhexyl)phthalate	Detection Limit		25	38	31	130	93	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		BQL	BQL	BQL	BQL	BQL	BQL	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.

Detected concentrations above the regulatory limits are indicated in boldface type.

NA indicates that the sample was not analyzed for the constituent.

BQL = Below Laboratory Quantitation Limit

Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW-04						
		Sample ID	UST900-MW04-00C	UST900-MW04-00B	UST900-MW04-00A	UST900-MW04-99D	UST900-MW04-99C3	UST900-MW04-99C2	UST900-MW04-99B
		Sample Date	7/24/2000	4/19/2000	1/24/2000	10/21/1999	9/24/1999	8/24/1999	6/23/1999
Volatile Organic Compounds by USEPA Method 601, ug/L									
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA
Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L									
Benzene	1		430	590	420	500	560	520	730
Ethylbenzene	29		670	910	580	740	830	790	1100
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		110	160	110	120	150	120	160
Total Xylenes	530		1090	1380	980	1430	1460	1340	1770
Semivolatile Organic Compounds by USEPA Methods 625, ug/L									
Naphthalene	21		220	230	130	210	260	240	190
1-Methylnaphthalene	Detection Limit		20	21	BQL	24	22	21	16
2-Methylnaphthalene	28		22	30	13	33	34	29	24
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	10	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Lead by USEPA Method 504.1, mg/L									
Lead	0.015		BQL	BQL	BQL	BQL	BQL	0.0320	0.0384

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW05						
		Sample ID	UST900-MW05-02B	UST900-MW05-02A	UST900-MW05-01A	UST900-MW05-01C	UST900-MW05-01A	UST900-MW05-00D	UST900-MW05-00C
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>		Sample Date	4/23/2002	1/21/2002	10/25/2001	7/19/2001	1/23/2001	10/23/2000	7/24/2000
cis-1,2-Dichloroethene	70		BQL	BQL	BQL	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Ethylbenzene	29		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		BQL	0.030	13.7	0.0124	2.97	BQL	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
Groundwater Monitoring Well Samples
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW05					
		Sample ID	UST900-MW05-00B	UST900-MW05-00A	UST900-MW05-99D	UST900-MW05-99C3	UST900-MW05-99C2	UST900-MW05-99B
		Sample Date	4/19/2000	1/24/2000	10/21/1999	9/24/1999	8/24/1999	6/23/1999
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>								
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>								
Benzene	1		BQL	BQL	BQL	BQL	BQL	BQL
Ethylbenzene	29		BQL	BQL	BQL	BQL	BQL	BQL
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL	BQL	BQL	BQL	BQL	BQL
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>								
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>								
Lead	0.015		BQL	BQL	BQL	BQL	0.0135	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.

Detected concentrations above the regulatory limits are indicated in boldface type.

NA indicates that the sample was not analyzed for the constituent.

BQL = Below Laboratory Quantitation Limit

Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
Groundwater Monitoring Well Samples
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW06						
		Sample ID	UST900-MW06-02B	UST900-MW06-02A	UST900-MW06-01D	UST900-MW06-01C	UST900-MW06-01B	UST900-MW06-01A	UST900-MW06-00D
		Sample Date	4/23/2002	1/21/2002	10/25/2001	7/16/2001	4/23/2001	1/23/2001	10/23/2000
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70		BQL	BQL	BQL	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Ethylbenzene	29		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		0.0157	0.0471	45.9	0.0329	0.0262	4.86	0.0265

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
Detected concentrations above the regulatory limits are indicated in boldface type.
NA indicates that the sample was not analyzed for the constituent.
BQL = Below Laboratory Quantitation Limit
Shaded areas indicate detected concentrations above laboratory quantitation limits.

Title
 Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW-06						MW-7	
		Sample ID	UST900-MW06-00C	UST900-MW06-00B	UST900-MW06-00A	UST900-MW06-99D	UST900-MW06-99C3	UST900-MW06-99C2	UST900-MW06-99B	UST900-MW07-99B
		Sample Date	7/24/2000	4/19/2000	1/24/2000	10/21/1999	9/24/1999	8/24/1999	6/23/1999	6/23/1999
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>										
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>										
Benzene	1		39	13	5	BQL	1	2	BQL	BQL
Ethylbenzene	29				BQL	BQL	BQL	BQL	BQL	BQL
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL		BQL	BQL	BQL	BQL	BQL	BQL
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>										
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>										
Lead	0.015		0.0269	0.0383	0.0398	0.0178	0.0204	0.0734	0.0792	0.0442

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.

Detected concentrations above the regulatory limits are indicated in boldface type.

NA indicates that the sample was not analyzed for the constituent.

BQL = Below Laboratory Quantitation Limit

Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW08						
		Sample ID	UST900-MW08-02B	UST900-MW08-02A	UST900-MW08-01D	UST900-MW08-01C	UST900-MW08-01B	UST900-MW08-00C	UST900-MW08-00B
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>		Sample Date	4/23/2002	1/21/2002	10/25/2002	7/19/2001	4/23/2001	7/24/2000	4/19/2000
cis-1,2-Dichloroethene	70		BQL	BQL	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Ethylbenzene	29		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		BQL	0.018	BQL	BQL	BQL	BQL	0.0149

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
Groundwater Monitoring Well Samples
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW-08				
		Sample ID	UST900-MW08-00A	UST900-MW08-99D	UST900-MW08-99C3	UST900-MW08-99C2	UST900-MW08-99B
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>		Sample Date	1/24/2000	10/21/1999	9/24/1999	8/24/1999	6/23/1999
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>							
Benzene	1		BQL	BQL	BQL	BQL	BQL
Ethylbenzene	29		BQL	BQL	BQL	BQL	BQL
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL	BQL	BQL	BQL	BQL
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>							
Naphthalene	21		BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>							
Lead	0.015		0.0232	BQL	BQL	0.0198	0.0216

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
Detected concentrations above the regulatory limits are indicated in boldface type.
NA indicates that the sample was not analyzed for the constituent.
BQL = Below Laboratory Quantitation Limit
Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW-09								
		Sample ID	UST900-MW09-02B	UST900-MW09-02A	UST900-MW09-01D	UST900-MW09-01C	UST900-MW09-01B	UST900-MW09-01A	UST900-MW09-00D	UST900-MW09-00C	UST900-MW09-00B
		Sample Date	4/24/2002	1/21/2002	10/25/2001	7/19/2001	4/23/2001	1/23/2001	10/23/2000	7/24/2000	6/19/2000
Volatile Organic Compounds by USEPA Method 601, ug/L											
cis-1,2-Dichloroethene	70					NA	NA	NA	NA	NA	NA
Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L											
Benzene	1		45	15	74	64	88	65	51	42	32
Ethylbenzene	29		15	4	58	45	61	42	32	26	24
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000			BQL	17	8	12	6	4	3	3
Total Xylenes	530		23	3	41	47	91	75	79	84	77
Semivolatile Organic Compounds by USEPA Methods 625, ug/L											
Naphthalene	21		BQL	BQL	19	19	21	14	14	11	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		11	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Lead by USEPA Method 504.1, mg/L											
Lead	0.015		BQL	BQL	10.9	0.0239	BQL	BQL	BQL	BQL	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of **Lead** Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	MW10								
		Sample ID	UST900-MW10-02B	UST900-MW10-02A	UST900-MW10-01D	UST900-MW10-01C	UST900-MW10-01B	UST900-MW10-01A	UST900-MW10-00D	UST900-MW10-00C	UST900-MW10-00B
		Sample Date	4/23/2002	1/21/2002	10/25/2001	7/19/2001	4/23/2001	1/23/2001	10/23/2000	7/24/2000	6/19/2000
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>											
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>											
Benzene	1		15	17	11	23	23	21	24	22	22
Ethylbenzene	29		BQL	BQL	2	4	5	4	14	25	30
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		BQL	BQL	BQL	BQL	2	BQL	BQL	10	22
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>											
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		14	20	24	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>											
Lead	0.015		BQL	0.0107	BQL	BQL	BQL	BQL	BQL	BQL	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
Groundwater Monitoring Well Samples
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	78GW23						
		Sample ID	UST900-78GW23-02B	UST900-78GW23-02A	UST900-78GW23-01D	UST900-78GW23-01C	UST900-78GW23-01B	UST900-78GW23-01A	UST900-78GW23-00D
		Sample Date	4/23/2002	1/21/2002	10/25/2001	7/19/2001	4/23/2001	1/23/2001	10/23/2000
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70		2400	2400	3900	3400	3800	3300	5200
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		14	9	7	12	12	13	14
Ethylbenzene	29		102	7	BQL	7	6	5	5
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	110	BQL	130
Toluene	1000		4	4	BQL	4	4	2	3
Total Xylenes	530		68	38	28	52	55	38	43
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		54	59	59	15	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		BQL	BQL	13.4	BQL	BQL	BQL	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.

Detected concentrations above the regulatory limits are indicated in boldface type.

NA indicates that the sample was not analyzed for the constituent.

BQL = Below Laboratory Quantitation Limit

Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
Groundwater Monitoring Well Samples
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	78GW23						
		Sample ID	UST900-78GW23-00C	UST900-78GW23-00B	UST900-78GW23-00A	UST900-78GW23-99D	UST900-78GW23-99C3	UST900-78GW23-99C2	UST900-78GW23-99B
		Sample Date	7/24/2000	4/19/2000	1/24/2000	10/21/1999	9/24/1999	8/24/1999	6/23/1999
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70		7500	11600	16000	NA	14000	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		15	18	17	17	11	14	18
Ethylbenzene	29				9		BQL	12	1
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	160	BQL	BQL
Toluene	1000				4		BQL	4	4
Total Xylenes	530		56	63	65	59	32	63	57
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		BQL	BQL	BQL	BQL	BQL	BQL	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		BQL	BQL	BQL	BQL	BQL	BQL	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.

Detected concentrations above the regulatory limits are indicated in boldface type.

NA indicates that the sample was not analyzed for the constituent.

BQL = Below Laboratory Quantitation Limit

Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	RW10								
		Sample ID	UST900-RW10-02B	UST900-RW10-02A	UST900-RW10-01D	UST900-RW10-01C	UST900-RW10-01B	UST900-RW10-01A	UST900-RW10-00D	UST900-RW10-00C	UST900-RW10-99B
		Sample Date	4/23/2002	1/21/2002	10/25/2001	7/19/2001	4/23/2001	1/23/2001	10/23/2000	7/24/2000	6/23/1999
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>											
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>											
Benzene	1		200	220	140	99	60	37	67	110	240
Ethylbenzene	29		66	96	74	11	19	340	29	29	94
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes	530		68	90	59	22	54	440	114	47	240
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>											
Naphthalene	21		20	21	16	BQL	BQL	110	12	12	BQL
1-Methylnaphthalene	Detection Limit		BQL	BQL	BQL	BQL	BQL	20	BQL	BQL	BQL
2-Methylnaphthalene	28		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	13
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	18
<i>Lead by USEPA Method 504.1, mg/L</i>											
Lead	0.015		BQL	BQL	BQL	BQL	BQL	215	BQL	BQL	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits

Summary of Detected Concentrations
Groundwater Monitoring Well Samples
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	DUP1						
		Sample ID	UST900-DUP1-02B	UST900-DUP1-02A	UST900-DUP1-01D	UST900-DUP1-01C	UST900-DUP1-01B	UST900-DUP1-01A	UST900-DUP1-00D
		Sample Date	4/23/2002	1/21/2002	10/25/2001	7/19/2001	4/23/2001	1/23/2001	10/23/2000
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		47	47	69	24	51	36	36
Ethylbenzene	29		400	608	420	200	330	290	290
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		320	320	78	32	110	48	48
Total Xylenes	530		380	850	460	150	290	420	420
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		130	170	130	40	31	78	78
1-Methylnaphthalene	Detection Limit		18	22	11	10	BQL	16	16
2-Methylnaphthalene	28		105	138	23	BQL	BQL	17	17
Bis(2-ethylhexyl)phthalate	Detection Limit		17	33	35	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		0.015	BQL	BQL	BQL	BQL	0.014	0.014

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
Detected concentrations above the regulatory limits are indicated in boldface type.
NA indicates that the sample was not analyzed for the constituent.
BQL = Below Laboratory Quantitation Limit
Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
 Groundwater Monitoring Well Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	DUP1						
		Sample ID	UST900-DUP1-00C	UST900-DUP1-00B	UST900-DUP1-00A	UST900-DUP1-99D	UST900-DUP1-99C3	UST900-DUP1-99C2	UST900-DUP1-99B
		Sample Date	7/24/2000	4/19/2000	1/24/2000	10/21/1999	9/24/1999	8/24/1999	6/23/1999
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>									
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>									
Benzene	1		180	220	150	130	59	230	180
Ethylbenzene	29		990	890	690	630	350	1100	970
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		560	700	430	430	210	690	1200
Total Xylenes	530		2500	2400	1900	1500	870	3000	2500
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>									
Naphthalene	21		320	280	180	200	190	300	180
1-Methylnaphthalene	Detection Limit		30	34	23	33	26	39	26
2-Methylnaphthalene	28		44	51	33	39	26	58	32
Bis(2-ethylhexyl)phthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	14
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>									
Lead	0.015		0.012	0.012	0.023	0.010	0.012	0.010	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
 Detected concentrations above the regulatory limits are indicated in boldface type.
 NA indicates that the sample was not analyzed for the constituent.
 BQL = Below Laboratory Quantitation Limit
 Shaded areas indicate detected concentrations above laboratory quantitation limits.

Summary of Detected Concentrations
Groundwater Monitoring Well Samples
Building 900
Marine Corps Base
Camp Lejeune, North Carolina

Parameter	NCDENR Regulatory Limit	Sample Location	DUP2							
		Sample ID	UST900-DUP2-02B	UST900-DUP2-02A	UST900-DUP2-01D	UST900-DUP2-01C	UST900-DUP2-01B	UST900-DUP2-01A	UST900-DUP2-00D	UST900-DUP2-00C
		Sample Date	4/23/2002	1/21/2002	10/25/2001	7/19/2001	4/23/2001	1/23/2001	10/23/2000	7/24/2000
<i>Volatile Organic Compounds by USEPA Method 601, ug/L</i>										
cis-1,2-Dichloroethene	70		NA	NA	NA	NA	NA	NA	NA	NA
<i>Volatile Aromatic Hydrocarbons by USEPA Method 602, ug/L</i>										
Benzene	1		290	260	300	400	460	480	450	420
Ethylbenzene	29		660	520	600	690	730	790	820	650
Methyl-tert-butyl ether (MTBE)	200		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Toluene	1000		1100	1100	1110	1400	1500	1400	990	1000
Total Xylenes	530		1100	910	1000	1210	720	1220	990	1035
<i>Semivolatile Organic Compounds by USEPA Methods 625, ug/L</i>										
Naphthalene	21		190	180	160	190	120	160	120	250
1-Methylnaphthalene	Detection Limit		140	130	150	110	BQL	130	130	230
2-Methylnaphthalene	28		240	230	190	190	BQL	160	170	260
Bis(2-ethylhexyl)phthalate	Detection Limit		110	990	BQL	140	540	BQL	BQL	BQL
Dimethylphthalate	Detection Limit		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Diethylphthalate	5000		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
2,4-Dimethylphenol	140		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Acenaphthene	80		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
Phenol	300		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
<i>Lead by USEPA Method 504.1, mg/L</i>										
Lead	0.015		BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

Notes:

Duplicate sample (DUP-1) collected from monitoring well MW-2.
Detected concentrations above the regulatory limits are indicated in boldface type.
NA indicates that the sample was not analyzed for the constituent.
BQL = Below Laboratory Quantitation Limit
Shaded areas indicate detected concentrations above laboratory quantitation limits.

Table 3-2
 Summary of Detected Concentrations
 Treatment System Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	Sample Location	SVE-E*				SVE1**	SVE2**
	Sample ID	UST900-SVE-E-02B	UST900-SVE-E-02A	UST900-SVE-E-01D	UST900-SVE-E-01C	UST900-SVE2-01B	UST900-SVE3-01B
<i>Volatile Aromatic Hydrocarbons by USEPA Method 18, ppm</i>	Sample Date	4/16/2002	1/18/2002	10/18/2001	7/11/2001	4/16/2001	4/16/2001
Benzene		BQL	BQL	BQL	BQL	BQL	BQL
Ethylbenzene		BQL	BQL	BQL	BQL	BQL	BQL
Toluene		BQL	BQL	BQL	BQL	BQL	BQL
Total Xylenes		BQL	BQL	BQL	BQL	BQL	BQL

NOTE:

- * Sample collected from Soil Vapor Extraction System Effluent.
 - ** Sample collected from Soil Vapor Extraction well vaults.
 - *** Sample collected from Soil Vapor Extraction System Influent.
- Shaded areas indicate detected concentrations above laboratory quantitation limits.
 BQL = Below Laboratory Quantitation Limit

Table 3-2
 Summary of Detected Concentrations
 Treatment System Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	Sample Location	SVE-E*				
	Sample ID	UST900-SVE4-01B	UST900-SVE-E-01A	UST900-SVE-E-00D	UST900-SVE-E-00C	UST900-SVE-E-00B
<i>Volatile Aromatic Hydrocarbons by USEPA Method 18, ppm</i>	Sample Date	4/16/2001	1/15/2001	10/16/2000	7/17/2000	4/11/2000
Benzene		BQL	BQL	BQL	BQL	BQL
Ethylbenzene		BQL	BQL	BQL	BQL	BQL
Toluene		BQL	BQL	1.6	BQL	BQL
Total Xylenes		BQL	BQL	BQL	BQL	BQL

NOTE:

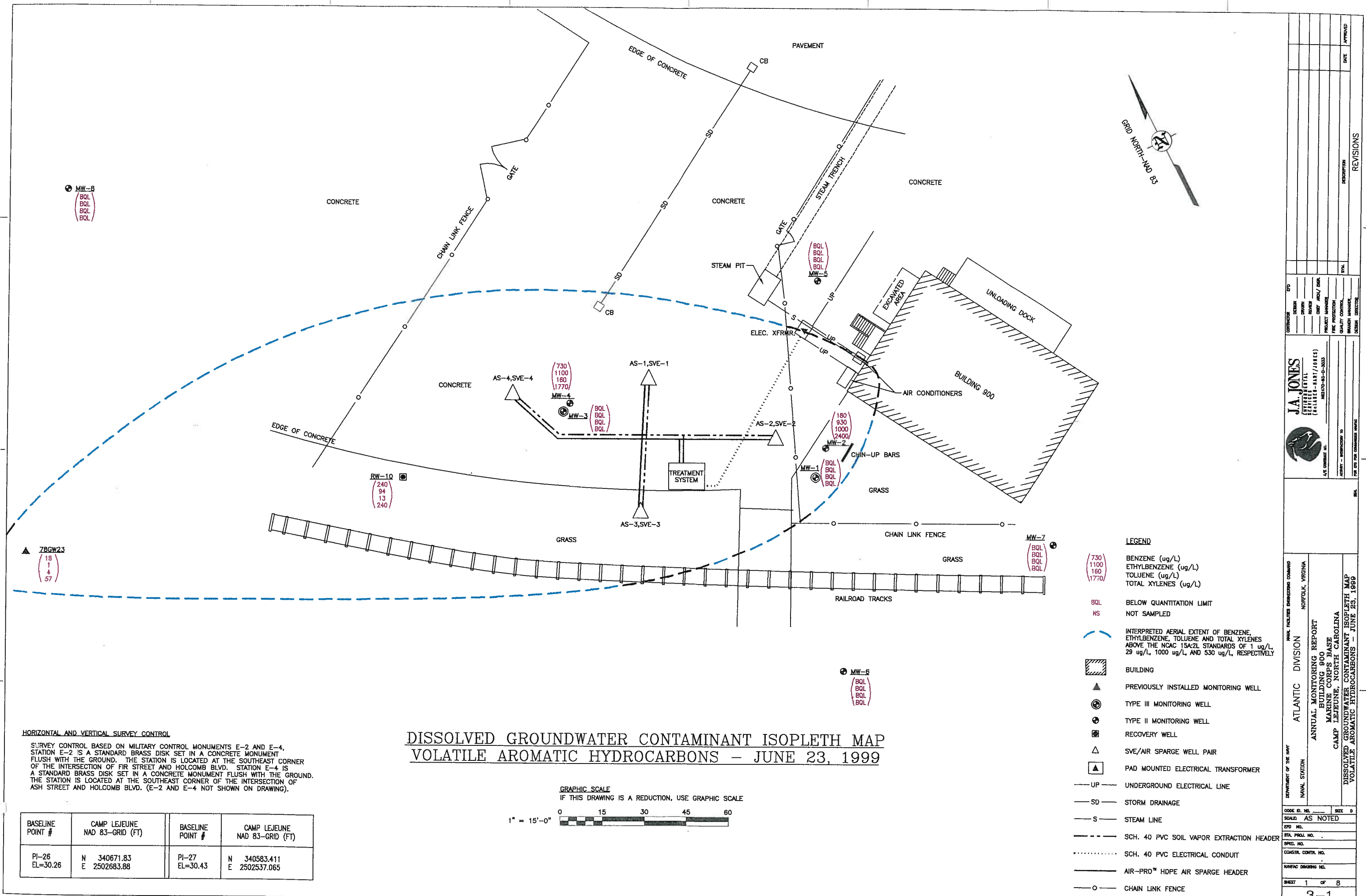
- * Sample collected from Soil Vapor Extraction System Effluent.
 - ** Sample collected from Soil Vapor Extraction well vaults.
 - *** Sample collected from Soil Vapor Extraction System Influent.
- Shaded areas indicate detected concentrations above laboratory
 quantitation limits.
 BQL = Below Laboratory Quantitation Limit

Table 3-2
 Summary of Detected Concentrations
 Treatment System Samples
 Building 900
 Marine Corps Base
 Camp Lejeune, North Carolina

Parameter	Sample Location	SVE-E*				
	Sample ID	UST900-SVE-E-00A	UST900-SVE-E-99D	UST900-SVE-E-99C3	UST900-SVE-E-99C2	UST900-SVE-E-99C1
<i>Volatile Aromatic Hydrocarbons by USEPA Method 18, ppm</i>	Sample Date	1/17/2000	10/13/1999	9/14/1999	8/16/1999	7/20/1999
Benzene		BQL	BQL	1.2	BQL	BQL
Ethylbenzene		BQL	BQL	BQL	BQL	BQL
Toluene		BQL	BQL	2.1	BQL	BQL
Total Xylenes		BQL	BQL	BQL	BQL	0.6

NOTE:

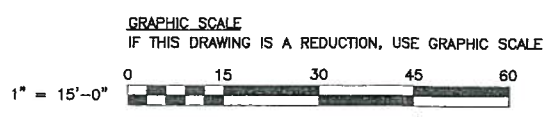
- * Sample collected from Soil Vapor Extraction System Effluent.
 - ** Sample collected from Soil Vapor Extraction well vaults.
 - *** Sample collected from Soil Vapor Extraction System Influent.
- Shaded areas indicate detected concentrations above laboratory quantitation limits.
 BQL = Below Laboratory Quantitation Limit



HORIZONTAL AND VERTICAL SURVEY CONTROL
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4, STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

**DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP
 VOLATILE AROMATIC HYDROCARBONS - JUNE 23, 1999**

BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065



- LEGEND**
- (730)
(1100)
(160)
(1770)
 - BENZENE (ug/L)
 - ETHYLBENZENE (ug/L)
 - TOLUENE (ug/L)
 - TOTAL XYLENES (ug/L)
 - BQL BELOW QUANTITATION LIMIT
 - NS NOT SAMPLED
 - (---) INTERPRETED AERIAL EXTENT OF BENZENE, ETHYLBENZENE, TOLUENE AND TOTAL XYLENES ABOVE THE NCAC 15A:2L STANDARDS OF 1 ug/L, 29 ug/L, 1000 ug/L, AND 530 ug/L, RESPECTIVELY
 - [Hatched Box] BUILDING
 - [Triangle] PREVIOUSLY INSTALLED MONITORING WELL
 - [Circle with dot] TYPE III MONITORING WELL
 - [Circle with cross] TYPE II MONITORING WELL
 - [Square with dot] RECOVERY WELL
 - [Triangle] SVE/AIR SPARGE WELL PAIR
 - [Triangle] PAD MOUNTED ELECTRICAL TRANSFORMER
 - (---) UP UNDERGROUND ELECTRICAL LINE
 - (---) SD STORM DRAINAGE
 - (---) S STEAM LINE
 - (---) SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 - (---) SCH. 40 PVC ELECTRICAL CONDUIT
 - (---) AIR-PRO™ HDPE AIR SPARGE HEADER
 - (---) O CHAIN LINK FENCE

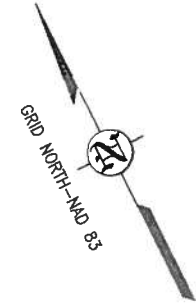
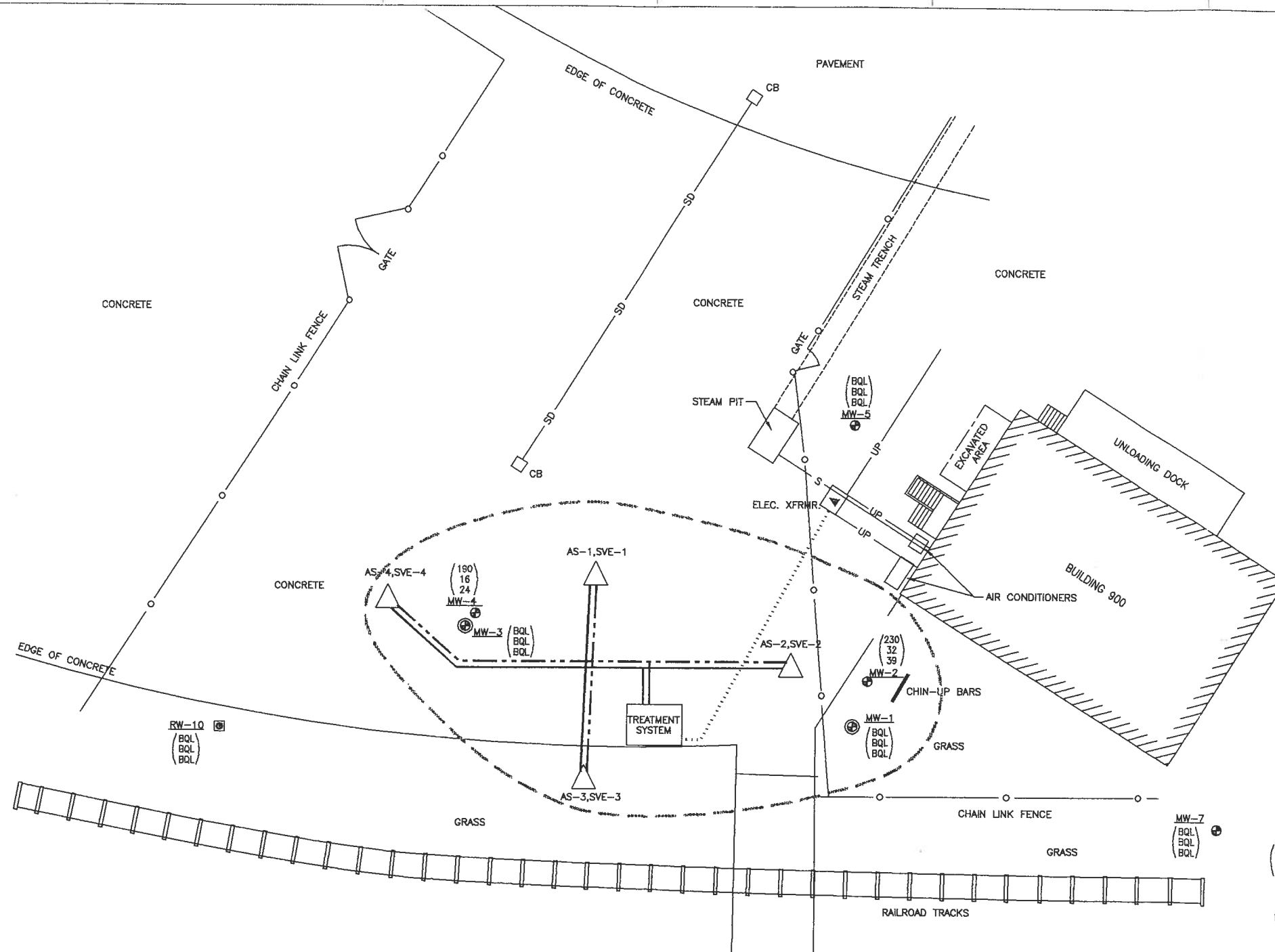
REVISIONS

NO.	DESCRIPTION	DATE	APPROVED

J.A. JONES
 ENGINEERING & CONSULTING
 (REGISTERED - PART 1/JOINES)
 1425-93-D-3033
 1425-93-D-3033

ATLANTIC DIVISION
 ANNUAL MONITORING REPORT
 BUILDING 900
 MARINE CORPS BASE
 CAMP LEJEUNE, NORTH CAROLINA
 DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP
 VOLATILE AROMATIC HYDROCARBONS - JUNE 23, 1999

SHEET 1 OF 8
 3-1

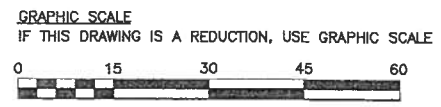


MW-8
(BQL)
(BQL)
(BQL)

ZBGW23
(BQL)
(BQL)
(BQL)

HORIZONTAL AND VERTICAL SURVEY CONTROL
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP POLYNUCLEAR AROMATIC HYDROCARBONS - JUNE 23, 1999



BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065

- LEGEND**
- (230
32
39) NAPHTHALENE (ug/L)
1-METHYLNAPHTHALENE (ug/L)
2-METHYLNAPHTHALENE (ug/L)
 - BQL BELOW QUANTITATION LIMIT
 - NS NOT SAMPLED
 - (Dashed line) INTERPRETED AERIAL EXTENT OF NAPHTHALENE, 1-METHYLNAPHTHALENE, AND 2-METHYLNAPHTHALENE ABOVE THE NCAC 15A:2L STANDARDS OF 21 ug/L DETECTION LIMIT, AND 28 ug/L, RESPECTIVELY
 - [Hatched box] BUILDING
 - [Triangle with dot] PREVIOUSLY INSTALLED MONITORING WELL
 - [Circle with dot] TYPE III MONITORING WELL
 - [Circle with cross] TYPE II MONITORING WELL
 - [Square with dot] RECOVERY WELL
 - [Triangle] SVE/AIR SPARGE WELL PAIR
 - [Square with X] PAD MOUNTED ELECTRICAL TRANSFORMER
 - UP— UNDERGROUND ELECTRICAL LINE
 - SD— STORM DRAINAGE
 - S— STEAM LINE
 - SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 - SCH. 40 PVC ELECTRICAL CONDUIT
 - AIR-PRO™ HOPE AIR SPARGE HEADER
 - O— CHAIN LINK FENCE

CONTRACTOR: J.A. JONES
 DESIGN: J.A. JONES
 DRAWN: J.A. JONES
 CHECKED: J.A. JONES
 PROJECT MANAGER: J.A. JONES
 QUALITY CONTROL: J.A. JONES
 REVISIONS: J.A. JONES

ATLANTIC DIVISION
 ANNUAL MONITORING REPORT
 BUILDING 900
 MARINE CORPS BASE
 CAMP LEJEUNE, NORTH CAROLINA
 DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP
 POLYNUCLEAR AROMATIC HYDROCARBONS - JUNE 23, 1999

DEPARTMENT OF THE NAVY
 NAVAL STATION
 NAVAL FACILITIES ENGINEERING COMMAND
 NORFOLK, VIRGINIA

CODE ID. NO. _____ SIZE 0
 SCALE: AS NOTED
 ETD NO. _____
 STA. PROJ. NO. _____
 SPEC. NO. _____
 CONSTR. CONTR. NO. _____
 MANUF. DRAWING NO. _____
 SHEET 2 OF 8
 3-2

DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP VOLATILE AROMATIC HYDROCARBONS - APRIL 19, 2000

HORIZONTAL AND VERTICAL SURVEY CONTROL

SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHWEST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

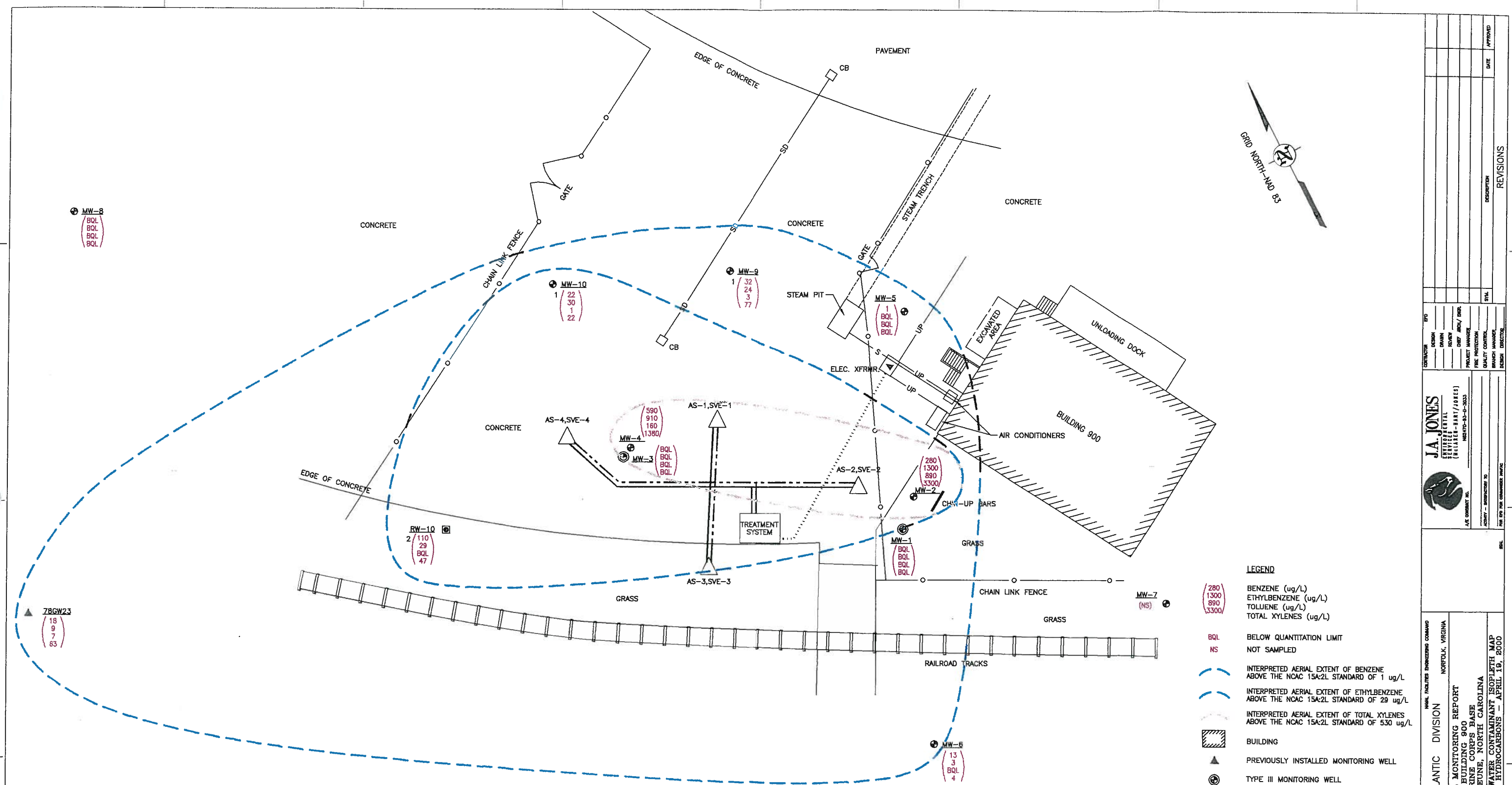
BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065

GRAPHIC SCALE
IF THIS DRAWING IS A REDUCTION, USE GRAPHIC SCALE

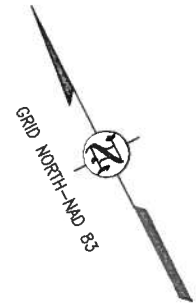
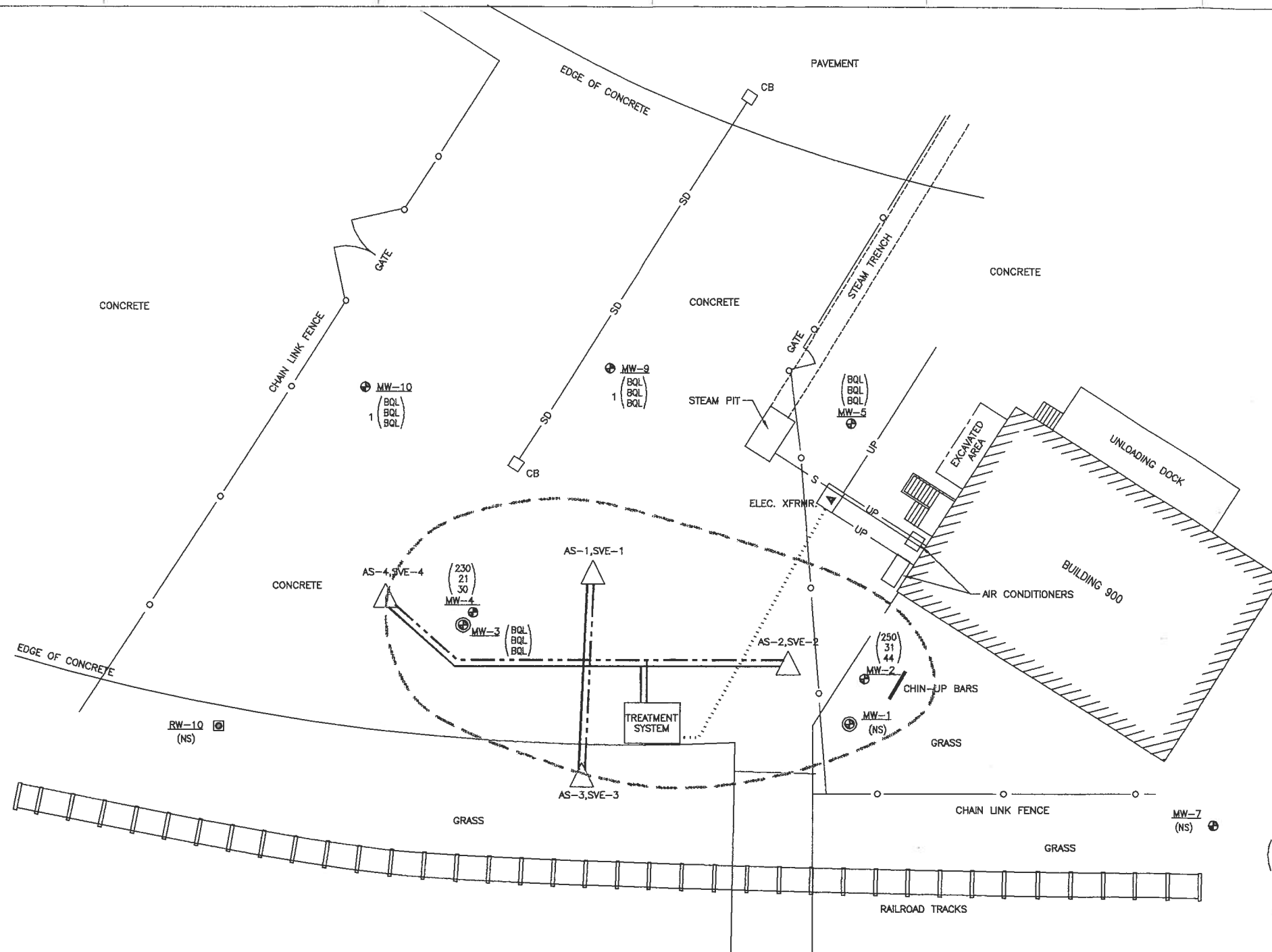


- LEGEND**
- (280
1300
890
3300)
 - BENZENE (ug/L)
 - ETHYLBENZENE (ug/L)
 - TOLUENE (ug/L)
 - TOTAL XYLENES (ug/L)
 - BQL
 - BELOW QUANTITATION LIMIT
 - NS
 - NOT SAMPLED
 - (---)
 - INTERPRETED AERIAL EXTENT OF BENZENE ABOVE THE NCAC 15A:2L STANDARD OF 1 ug/L
 - (---)
 - INTERPRETED AERIAL EXTENT OF ETHYLBENZENE ABOVE THE NCAC 15A:2L STANDARD OF 29 ug/L
 - (---)
 - INTERPRETED AERIAL EXTENT OF TOTAL XYLENES ABOVE THE NCAC 15A:2L STANDARD OF 530 ug/L
 - [Hatched Box]
 - BUILDING
 - [Triangle]
 - PREVIOUSLY INSTALLED MONITORING WELL
 - [Circle with dot]
 - TYPE III MONITORING WELL
 - [Circle with cross]
 - TYPE II MONITORING WELL
 - [Square with dot]
 - RECOVERY WELL
 - [Triangle]
 - SVE/AIR SPARGE WELL PAIR
 - [Square with A]
 - PAD MOUNTED ELECTRICAL TRANSFORMER
 - UP—
 - UNDERGROUND ELECTRICAL LINE
 - SD—
 - STORM DRAINAGE
 - S—
 - STEAM LINE
 -
 - SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 -
 - SCH. 40 PVC ELECTRICAL CONDUIT
 -
 - AIR-PRO™ HDPE AIR SPARGE HEADER
 - O—
 - CHAIN LINK FENCE

- NOTES:**
1. SAMPLE COLLECTED 6/19/2000
 2. SAMPLE COLLECTED 7/24/2000



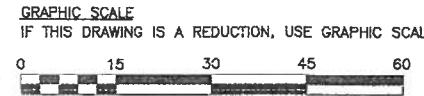
J.A. JONES ENVIRONMENTAL SERVICES - PART/JONES (RELEASER - PART/JONES) 10000 W. WOODBRIDGE BLVD. SUITE 100 NORFOLK, VIRGINIA 23515-1000 TEL: 757/644-3000 FAX: 757/644-3003	
CONTRACTOR DESIGN DRAWING REVIEW CHECK PROJECT MANAGER FIRE PROTECTION QUALITY CONTROL BRANCH MANAGER DESIGN DIRECTOR	DATE APPROVED REVISIONS DESCRIPTION DATE APPROVED
ANNUAL MONITORING REPORT BUILDING 900 MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP VOLATILE AROMATIC HYDROCARBONS - APRIL 19, 2000	
DEPARTMENT OF THE NAVY NAVAL STATION ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA	
CODE ID. NO. _____ SIZE D SCALE: AS NOTED EFD NO. _____ STA. PROJ. NO. _____ SPEC. NO. _____ CONST. CONTR. NO. _____ MANUF. DRAWING NO. _____ SHEET 3 OF 8	
3-3	



▲ 78GW23
(BQL)
(BQL)
(BQL)

HORIZONTAL AND VERTICAL SURVEY CONTROL
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP POLYNUCLEAR AROMATIC HYDROCARBONS - APRIL 19, 2000

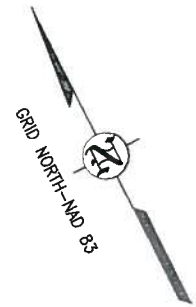
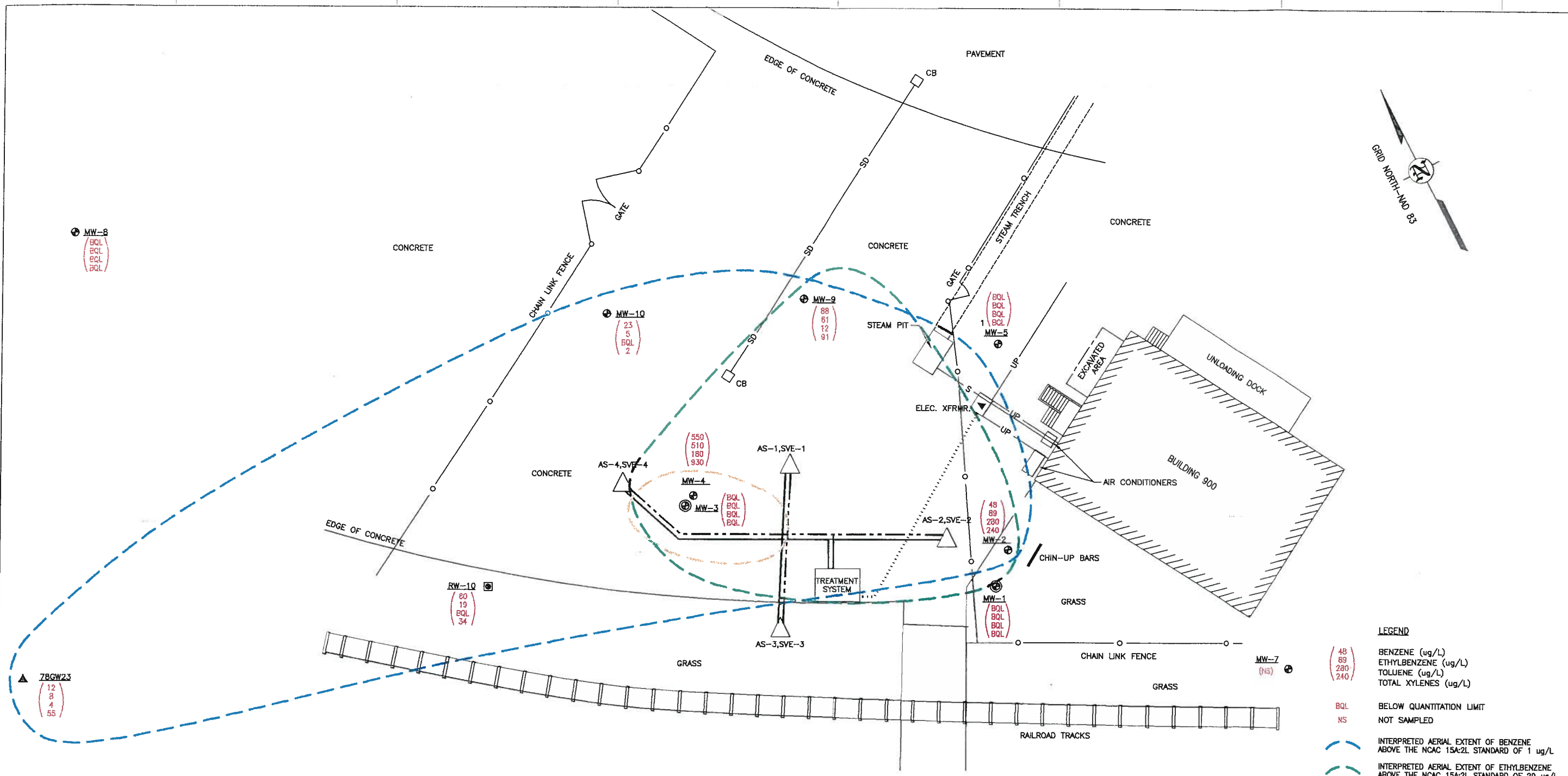


BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-28 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065

- LEGEND**
- (250
31
44) NAPHTHALENE (ug/L)
1-METHYLNAPHTHALENE (ug/L)
2-METHYLNAPHTHALENE (ug/L)
 - BQL BELOW QUANTITATION LIMIT
 - NS NOT SAMPLED
 - (Dashed line) INTERPRETED AERIAL EXTENT OF NAPHTHALENE, 1-METHYLNAPHTHALENE, AND 2-METHYLNAPHTHALENE ABOVE THE NCAC 15A-2L STANDARDS OF 21 ug/L, DETECTION LIMIT, AND 28 ug/L, RESPECTIVELY
 - [Hatched box] BUILDING
 - ▲ PREVIOUSLY INSTALLED MONITORING WELL
 - ⊕ TYPE III MONITORING WELL
 - ⊙ TYPE II MONITORING WELL
 - ⊗ RECOVERY WELL
 - △ SVE/AIR SPARGE WELL PAIR
 - ▲ PAD MOUNTED ELECTRICAL TRANSFORMER
 - UP— UNDERGROUND ELECTRICAL LINE
 - SD— STORM DRAINAGE
 - S— STEAM LINE
 - SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 - SCH. 40 PVC ELECTRICAL CONDUIT
 - AIR-PRO™ HDPE AIR SPARGE HEADER
 - O— CHAIN LINK FENCE

NOTES:
 1. SAMPLE COLLECTED 6/19/2000

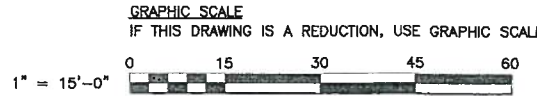
 J.A. JONES ENGINEERING & CONSTRUCTION 10101 W. BAYVIEW BLVD., SUITE 100 NORFOLK, VIRGINIA 23513 TEL: 757/637-1111 FAX: 757/637-1112		ANNUAL MONITORING REPORT BUILDING 900 MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP POLYNUCLEAR AROMATIC HYDROCARBONS - APRIL 19, 2000	
CONTRACTOR	DESIGN	DRAWN	CHECKED
PROJECT MANAGER	QUALITY CONTROL	SEARCH MANAGER	DESIGN DIRECTOR
DATE	DATE	DATE	DATE
REVISIONS		DATE	
DESCRIPTION		DATE	
BY		DATE	



HORIZONTAL AND VERTICAL SURVEY CONTROL
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHWEST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP VOLATILE AROMATIC HYDROCARBONS - APRIL 23, 2001

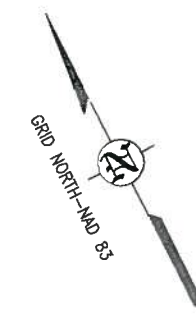
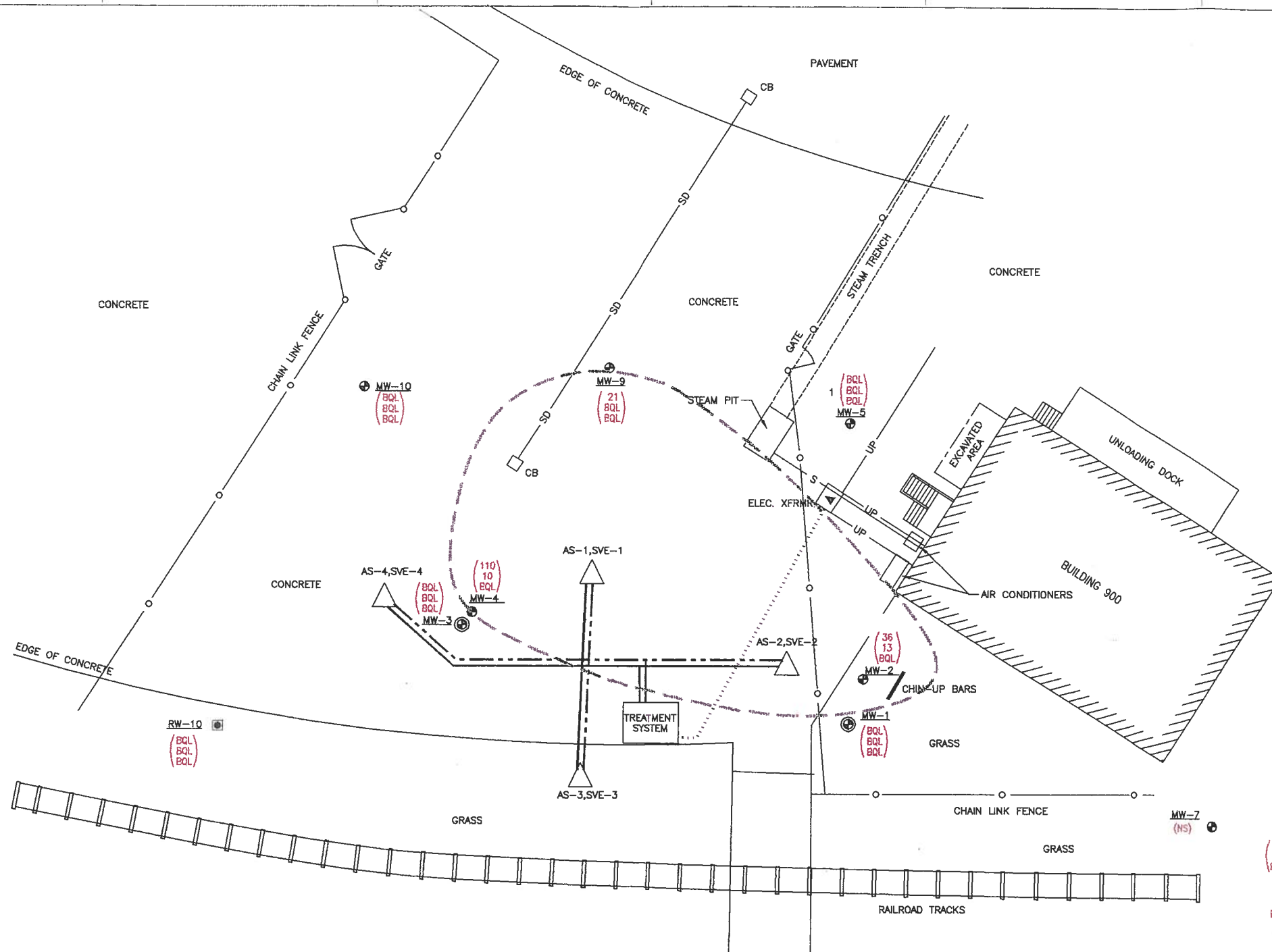
BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065



- LEGEND**
- (48
89
280
240) BENZENE (ug/L)
 - (48
89
280
240) ETHYLBENZENE (ug/L)
 - (48
89
280
240) TOLUENE (ug/L)
 - (48
89
280
240) TOTAL XYLENES (ug/L)
 - BQL BELOW QUANTITATION LIMIT
 - NS NOT SAMPLED
 - (Blue dashed line) INTERPRETED AERIAL EXTENT OF BENZENE ABOVE THE NCAC 15A:2L STANDARD OF 1 ug/L
 - (Green dashed line) INTERPRETED AERIAL EXTENT OF ETHYLBENZENE ABOVE THE NCAC 15A:2L STANDARD OF 29 ug/L
 - (Orange dashed line) INTERPRETED AERIAL EXTENT OF TOTAL XYLENES ABOVE THE NCAC 15A:2L STANDARD OF 530 ug/L
 - [Hatched box] BUILDING
 - [Triangle with dot] PREVIOUSLY INSTALLED MONITORING WELL
 - [Circle with dot] TYPE III MONITORING WELL
 - [Circle with cross] TYPE II MONITORING WELL
 - [Square with dot] RECOVERY WELL
 - [Triangle] SVE/AIR SPARGE WELL PAIR
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 - UP— UNDERGROUND ELECTRICAL LINE
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 - SCH. 40 PVC ELECTRICAL CONDUIT
 - AIR-PRO™ HDPE AIR SPARGE HEADER
 - O— CHAIN LINK FENCE

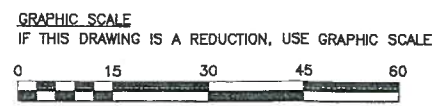
NOTES:
 1. SAMPLE COLLECTED 7/19/2001

		ATLANTIC DIVISION ANNUAL MONITORING REPORT BUILDING 900 MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP VOLATILE AROMATIC HYDROCARBONS - APRIL 23, 2001	
CONTRACT NO.	DESIGN NO.	DATE	APPROVED
DESIGNER	CHECKED	DATE	APPROVED
DRAWN	REVIEW	DATE	APPROVED
PROJECT MANAGER	PROJECT MANAGER	DATE	APPROVED
QUALITY CONTROL	QUALITY CONTROL	DATE	APPROVED
BRANCH MANAGER	BRANCH MANAGER	DATE	APPROVED
DESIGNER	DESIGNER	DATE	APPROVED
SCALE: AS NOTED STA. PROJ. NO. CONSTR. CONTR. NO. NAVFAC DRAWING NO.		SHEET 5 OF 8 3-5	



- LEGEND**
- (38
13
BQL)
 - BQL
 - NS
 - (Interpreted Aerial Extent of Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene above the NCAC 15A:2L standards of 21 ug/L detection limit, and 28 ug/L, respectively)
 - [Hatched Box] BUILDING
 - [Triangle] PREVIOUSLY INSTALLED MONITORING WELL
 - [Circle with Center] TYPE III MONITORING WELL
 - [Circle with Dot] TYPE II MONITORING WELL
 - [Square with Center] RECOVERY WELL
 - [Triangle with Center] SVE/AIR SPARGE WELL PAIR
 - [Triangle with Center] PAD MOUNTED ELECTRICAL TRANSFORMER
 - UP— UNDERGROUND ELECTRICAL LINE
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 - S— STEAM LINE
 - SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 - SCH. 40 PVC ELECTRICAL CONDUIT
 - AIR-PRO™ HDPE AIR SPARGE HEADER
 - O— CHAIN LINK FENCE


DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP POLYNUCLEAR AROMATIC HYDROCARBONS - APRIL 23, 2001



HORIZONTAL AND VERTICAL SURVEY CONTROL
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065

NOTES:
1. SAMPLE COLLECTED 7.19/2001

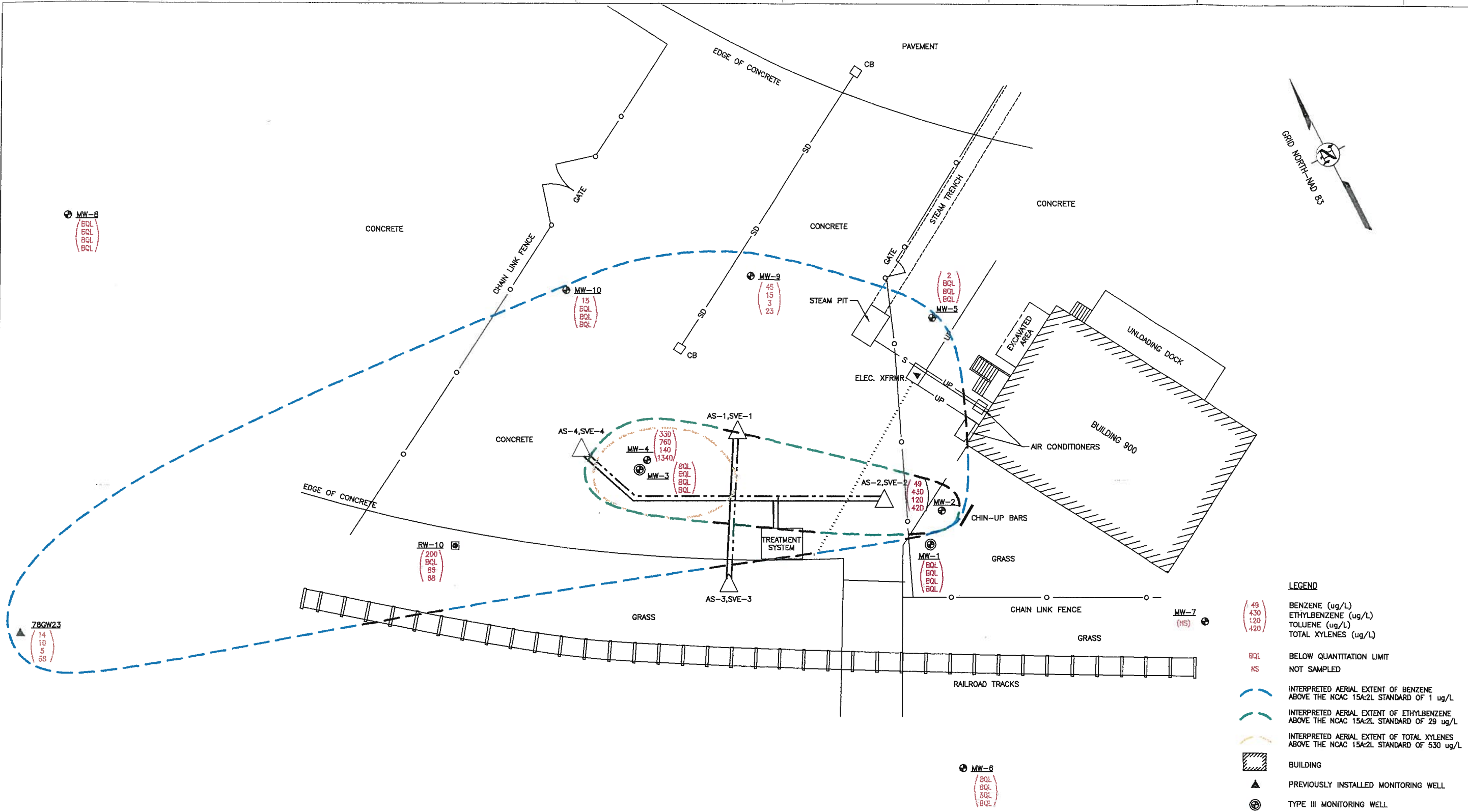
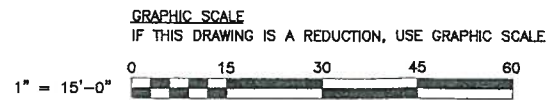
		REVISIONS NO. DESCRIPTION DATE APPROVED	
CONTRACTOR: J.A. JONES ENGINEERING COMPANY DESIGN: [] DRAWN: [] REVIEW: [] PROJECT MANAGER: [] QUALITY CONTROL: [] BRANCH MANAGER: [] DESIGN DIRECTOR: []		DIVISION: ATLANTIC PROJECT: ANNUAL MONITORING REPORT BUILDING 900 MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP POLYNUCLEAR AROMATIC HYDROCARBONS - APRIL 23, 2001	
STATE PROJ. NO.: CONSTR. CONTR. NO.: MANFC DRAWING NO.:		SHEET 6 OF 8 3-6	

DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP VOLATILE AROMATIC HYDROCARBONS - APRIL 23, 2002

HORIZONTAL AND VERTICAL SURVEY CONTROL

SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4. STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)	BASELINE POINT #	CAMP LEJEUNE NAD 83-GRID (FT)
PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065



- LEGEND**
- (49) BENZENE (ug/L)
 - (430) ETHYLBENZENE (ug/L)
 - (120) TOLUENE (ug/L)
 - (420) TOTAL XYLENES (ug/L)
 - BQL BELOW QUANTITATION LIMIT
 - NS NOT SAMPLED
 - (Blue dashed line) INTERPRETED AERIAL EXTENT OF BENZENE ABOVE THE NCAC 15A:2L STANDARD OF 1 ug/L
 - (Green dashed line) INTERPRETED AERIAL EXTENT OF ETHYLBENZENE ABOVE THE NCAC 15A:2L STANDARD OF 29 ug/L
 - (Yellow dashed line) INTERPRETED AERIAL EXTENT OF TOTAL XYLENES ABOVE THE NCAC 15A:2L STANDARD OF 530 ug/L
 - [Hatched box] BUILDING
 - [Triangle with dot] PREVIOUSLY INSTALLED MONITORING WELL
 - [Circle with dot] TYPE III MONITORING WELL
 - [Circle with cross] TYPE II MONITORING WELL
 - [Square with cross] RECOVERY WELL
 - [Triangle] SVE/AIR SPARGE WELL PAIR
 - [Triangle with dot] PAD MOUNTED ELECTRICAL TRANSFORMER
 - [Line with 'UP'] UNDERGROUND ELECTRICAL LINE
 - [Line with 'SD'] STORM DRAINAGE
 - [Line with 'S'] STEAM LINE
 - [Dashed line] SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 - [Dotted line] SCH. 40 PVC ELECTRICAL CONDUIT
 - [Line with 'AIR-PRO'] AIR-PRO™ HDPE AIR SPARGE HEADER
 - [Line with 'O'] CHAIN LINK FENCE

ATLANTIC DIVISION
ANNUAL MONITORING REPORT
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA
DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP
VOLATILE AROMATIC HYDROCARBONS - APRIL 23, 2002

NORFOLK, VIRGINIA

REVISIONS

NO.	DATE	DESCRIPTION	BY	APP'D

CONTRACTOR: J.A. JONES ENVIRONMENTAL SERVICES (A DIVISION OF JONES & JONES)

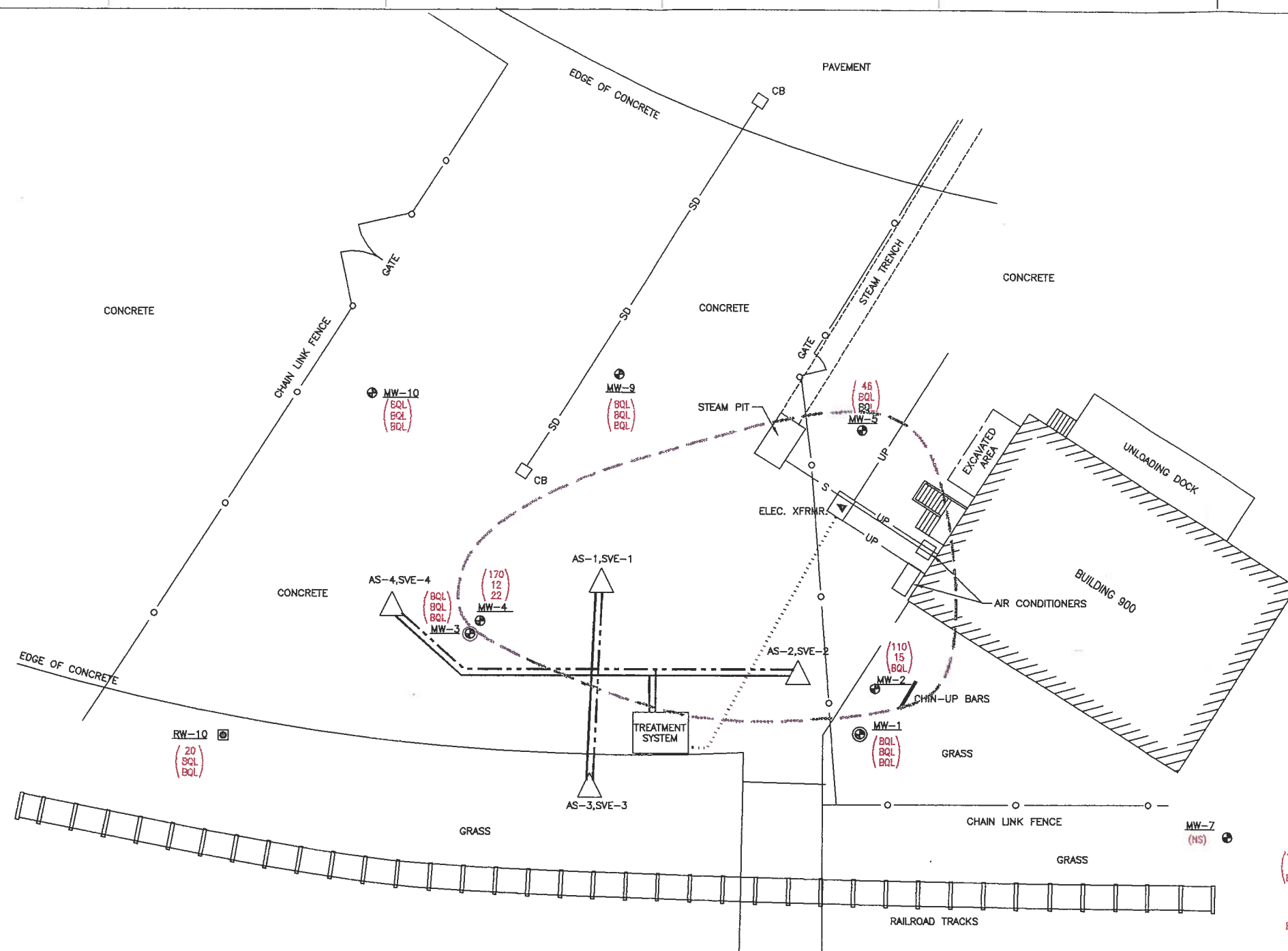
PROJECT: ANNUAL MONITORING REPORT FOR VOLATILE AROMATIC HYDROCARBONS AT CAMP LEJEUNE, NORTH CAROLINA

DATE: APRIL 23, 2002

SCALE: AS NOTED

SHEET: 7 OF 8

3-7

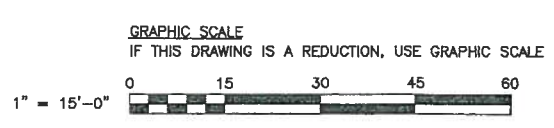



- LEGEND**
- (110)
(15)
(BQL)
 - (BQL)
 - (NS)
 - (dashed line)
 - ▭ (hatched)
 - ▲
 - ⊕
 - ⊙
 - ⊗
 - △
 - ▲
 - UP—
 - SD—
 - S—
 - (dashed line)
 - (dotted line)
 - AIR-PRO™ HDPE AIR SPARGE HEADER
 -
- NAPHTHALENE (ug/L)
 1-METHYLNAPHTHALENE (ug/L)
 2-METHYLNAPHTHALENE (ug/L)
- BELOW QUANTITATION LIMIT
 NOT SAMPLED
- INTERPRETED AERIAL EXTENT OF NAPHTHALENE,
 1-METHYLNAPHTHALENE, AND 2-METHYLNAPHTHALENE
 ABOVE THE NCAC 15A:2L STANDARDS OF 21 ug/L
 DETECTION LIMIT, AND 28 ug/L, RESPECTIVELY
- BUILDING
 PREVIOUSLY INSTALLED MONITORING WELL
 TYPE III MONITORING WELL
 TYPE II MONITORING WELL
 RECOVERY WELL
 SVE/AIR SPARGE WELL PAIR
 PAD MOUNTED ELECTRICAL TRANSFORMER
 UNDERGROUND ELECTRICAL LINE
 STORM DRAINAGE
 STEAM LINE
 SCH. 40 PVC SOIL VAPOR EXTRACTION HEADER
 SCH. 40 PVC ELECTRICAL CONDUIT
 AIR-PRO™ HDPE AIR SPARGE HEADER
 CHAIN LINK FENCE

**DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP
POLYNUCLEAR AROMATIC HYDROCARBONS - APRIL 23, 2002**

HORIZONTAL AND VERTICAL SURVEY CONTROL
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS E-2 AND E-4, STATION E-2 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FIR STREET AND HOLCOMB BLVD. STATION E-4 IS A STANDARD BRASS DISK SET IN A CONCRETE MONUMENT FLUSH WITH THE GROUND. THE STATION IS LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF ASH STREET AND HOLCOMB BLVD. (E-2 AND E-4 NOT SHOWN ON DRAWING).

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PI-26 EL=30.26	N 340671.83 E 2502683.88	PI-27 EL=30.43	N 340583.411 E 2502537.065



		ATLANTIC DIVISION ANNUAL MONITORING REPORT BUILDING 900 MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP POLYNUCLEAR AROMATIC HYDROCARBONS - APRIL 23, 2002	
CONTRACTOR DESIGN DRAWING REVIEW PROJECT MANAGER FIRE PROTECTION QUALITY CONTROL BRANCH MANAGER DESIGN DIRECTOR	DESIGNED BY DRAWN BY CHECKED BY PROJECT MANAGER FIRE PROTECTION QUALITY CONTROL BRANCH MANAGER DESIGN DIRECTOR	APPROVED DATE DESCRIPTION REVISIONS	
NAVY DIVISION NAVAL STATION NORFOLK, VIRGINIA		CODE ID. NO. _____ SIZE D SCALE: AS NOTED ETD. NO. _____ STA. PROJ. NO. _____ SPEC. NO. _____ CONSTR. CONTR. NO. _____ NAVFAC DRAWING NO. _____ SHEET 8 OF 8	
		3-8	

SECTION 4.0

CONCLUSIONS AND RECOMMENDATIONS

From June 1999 through April 2002, J.A. Jones implemented the selected remedial approach as outlined in the April 1, 1996 CAP prepared by Law at the Building 900 site. The selected remedial approach consisted of air sparging and soil vapor extraction to volatilize dissolved hydrocarbons present in the groundwater and to collect the vapors generated during air sparging. The goal is to maintain optimum treatment system performance and to track petroleum-impacted groundwater migration/attenuation in order to verify remediation progress.

J.A. Jones completed installation and began operation of the Building 900 treatment system on July 20, 1999. Groundwater samples were collected in June 1999 as part of a baseline event prior to system start up, August 1999, September 1999, and October 1999 from each of the on-site monitoring wells during the first quarter of system operation and quarterly thereafter through April of 2002. Samples were analyzed for volatile aromatic hydrocarbons by USEPA Methods 601 and 602; polynuclear aromatic hydrocarbons by USEPA Method 625; and lead by USEPA Method 504.1.

The dissolved petroleum hydrocarbon groundwater concentrations at the Building 900 site have decreased by over 60% from the CAP concentrations except for bis(2-ethylhexyl)phthalate, which has increased slightly.

During the most recent quarterly groundwater sampling event of April 23, 2002, the interpreted extent of the dissolved volatile aromatic hydrocarbon contaminant plume, above the 15A NCAC 2L groundwater quality standards, encompassed the site from the location of UST 900 on the west side of Building 900, extending to the west and northwest to the locations of monitoring wells MW-10 and 78GW23. Since the June 23, 1999 sampling event, detected concentrations of volatile aromatic hydrocarbons (USEPA Method 602 compounds) have been reduced from 4,510 µg/l to 430 µg/l in monitoring well MW-2 and from 3,760 µg/l to 1,340 µg/l in monitoring well MW-4. Dissolved concentrations of benzene have been reduced from 180 µg/l to 49 µg/l and from 730 µg/l to 330 µg/l in MW-2 and MW-4, respectively, over the same time period. Monitoring wells MW-2 and MW-4 had the highest concentrations of hydrocarbon contaminants.

The interpreted extent of the dissolved polynuclear aromatic hydrocarbon contaminants in the vicinity of UST 900 has been reduced slightly overall. The plume for the polynuclear aromatic hydrocarbon concentrations is considerably smaller than that of the volatile aromatic hydrocarbon plume.

The interpreted extent of dissolved lead in the vicinity of the former location of UST 900 varied from one sampling event to the next; however, the concentrations have been reduced below the 15A NCAC 2L groundwater quality standards in the immediate vicinity of the treatment system in all monitoring wells except MW-6.

According to the groundwater elevation data collected by J.A. Jones, the direction of groundwater flow is estimated to be predominantly toward the west, in the direction of monitoring well 78GW23.

Air quality samples were collected from the treatment system effluent, which contained dilution air applied prior to effluent air sampling. Dilution air is added as the airflow passes through the moisture separator tank in order to reduce total system vacuum and prevent the collection of groundwater in the treatment system. Due to the addition of dilution air to the SVE system effluent, recovered concentrations of VOCs may not be detected above the laboratory quantitation limits in the samples collected. Therefore, the concentrations of VOCs recovered appear to zero. For this reason, J.A. Jones recommends the collection of air quality samples prior to the addition of dilution air in order to obtain a more accurate measurement of VOCs recovered during system operation.

Although volatile aromatic and polynuclear aromatic hydrocarbons continue to be present above the 15A NCAC 2L groundwater quality standards, review of historical analytical data indicates the detected concentrations are generally decreasing, although the interpreted extent remains nearly unchanged. The total mass of VOC's removed by the soil vapor extraction system and the overall reduction in contaminant concentrations within the dissolved petroleum contaminant plume indicates that the air sparge/soil vapor extraction treatment system is effective in volatilizing the petroleum hydrocarbons present in the groundwater at the Building 900 site.

J.A. Jones recommends that monitoring wells in the network continue to be gauged on a monthly basis to evaluate groundwater flow directions and response to groundwater treatment system operation. J.A. Jones recommends evaluating the Building 900 site conditions to determine whether the site can be reclassified to an "intermediate" or "low risk" based on RBCA Criteria.