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Summary Report
Biosparging System Operations at Old Navy Fuel Farm July-December 1998 Naval Air Station, Brunswick, Maine

Contract No. N62472-92-D-1296
Contract Task Order No. 0035

U.S. NAVAL AIR STATION
BRUNSWICK, MAINE

Prepared for

Department of the Navy
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Prepared by

EA Engineering, Science, and Technology
The Maple Building
3 Washington Center
Newburgh, New York 12550

February 2000
FINAL
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2/22/2000
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February 2000
FINAL
Project No. 296.0035

QUALITY REVIEW STATEMENT

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Activity: Naval Air Station, Brunswick, Maine

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Final Summary Report, Biosparging System Operations at Old Navy Fuel Farm, July-December 1998, Naval Air Station, Brunswick, Maine

EA CTO Manager: Charles E. McLeod, Jr., P.E.

In compliance with EA's Quality Procedures for review of deliverables outlined in the Quality Management Plan, and as per State of Maine Law, this final deliverable has been reviewed for quality by the undersigned Senior Technical Reviewer and reviewed for its technical content by the undersigned State of Maine Certified Professional. The information presented in this report/deliverable has been prepared in accordance with the approved Implementation Plan for the Contract Task Order (CTO) and reflects a proper presentation of the data and/or the conclusions drawn and/or the analyses or design completed during the conduct of the work. This statement is based upon the standards identified in the CTO and/or the standard of care existing at the time of preparation.

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2/22/2000

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1. BACKGROUND INFORMATION

1.1 INTRODUCTION

Under Contract No. N62472-92-D-1296, Northern Division, Naval Facilities Engineering Command issued Contract Task Order No. 0035 to EA Engineering, Science, and Technology to perform remedial system operations and monitoring at the Old Navy Fuel Farm, Naval Air Station (NAS) Brunswick, Maine. NAS Brunswick is located south of the Androscoggin River between Brunswick and Bath, Maine (Figure 1-1). The Old Navy Fuel Farm remedial system configuration and pertinent site features are shown on Figures 1-2 and 1-3.

NAS Brunswick is an active base for Naval air operations owned and operated by the Federal government through the Department of the Navy. In 1987, NAS Brunswick was placed on the National Priorities List by the U.S. Environmental Protection Agency (EPA) and is currently participating in the Navy's Installation Restoration Program. In August 1996, active *in situ* remediation was instituted utilizing biosparging technology for reduction of petroleum-related hydrocarbon concentrations in site soil and ground water at the Old Navy Fuel Farm.

This report provides the results of biosparging system operating and monitoring data, including ground-water chemical analyses, for the period of 1 July – 31 December 1998.

1.2 SITE HISTORY

The Old Navy Fuel Farm site is located on the northeast portion of NAS Brunswick grounds, and is bounded on the south by Fitch Avenue, on the west by 6th Street, and on the north and east by undeveloped land. The site was previously used as a petroleum bulk storage facility and was decommissioned in 1993. Currently, only components of the biosparging system (originally constructed as a soil vapor extraction[SVE]/aquifer air sparging [AAS] system), installed following fuel farm decommissioning, and a storm sewer system exist at the site. Surface grade is predominantly level and vegetated with grass cover.

1.2.1 Site Geologic Conditions

The topography surrounding NAS Brunswick is somewhat irregular due to erosion of surficial sand deposits by streams. East of NAS Brunswick, the topography becomes more rounded and controlled by bedrock. Topography at NAS Brunswick exhibits little relief. Major rivers in the area which receive drainage from NAS Brunswick consist of the Androscoggin River, located less than 1 mi to the north, and Mere Brook located less than 1 mi to the east-southeast. Drainage from the eastern part of NAS Brunswick, which includes the Old Navy Fuel Farm site, is toward Mere Brook, which discharges to Harpswell Cove about 3 mi to the south. Harpswell Cove is a tidally influenced marine inlet.

Previous hydrogeologic investigations (O'Brien & Gere Engineers, Inc. 1990, 1992) confirmed that the site is underlain by a sandy deposit which is continuous and is, in turn, underlain by a glacio-marine silty clay deposit (designated as the Presumpscot Formation by the Maine Geological Survey). The sandy deposit thickness ranges from 2.5 to 9 ft with thicker zones located at the northwest section of the site. The ground-water table occurs in the sandy zone and flows generally to the south-southeast.

1.2.2 Historical Petroleum Bulk Storage and Environmental Investigation Summary

Prior to decommissioning in 1993, the Old Navy Fuel Farm consisted of two separate petroleum bulk storage tank farms that, together, included nine mounded underground storage tanks. All underground storage tanks, piping, and associated appurtenances were removed during facility decommissioning. The older western tank farm included five underground storage tanks, previously identified as underground storage tanks T-101 through T-105. Underground storage tanks T-101 through T-103 were 100,000-gal capacity tanks used for storage of petroleum sludge, unleaded gasoline, and aviation gasoline, respectively. Underground storage tanks T-104 and T-105 were both 25,000-gal capacity tanks used for storage of ethylene glycol. The newer, eastern Fuel Farm included four underground storage tanks, previously identified as underground storage tanks T-202 through T-205. Each of these underground storage tanks was a 100,000-gal capacity tank used for storage of JP-5 fuel.

Previous environmental investigations (O'Brien & Gere Engineers, Inc. 1990, 1992) identified two distinct dissolved-phase hydrocarbon plumes. The first plume was located in the east-central portion of the Old Navy Fuel Farm and appeared to originate in the vicinity of former JP-5 underground storage tank T-202, extending downgradient toward the south-southeast. The plume exhibited primarily benzene, toluene, ethylbenzene, and xylene (BTEX) compounds. Monitoring well MW-NASB-211 (previously designated as MW-J) is currently located adjacent to former tank T-202.

The second dissolved-phase hydrocarbon plume was identified in the north-central portion of the western half of the Old Navy Fuel Farm and appeared to originate in the vicinity of former glycol tanks T-104 and T-105. This plume is characterized principally by BTEX compounds, although at significantly lower concentrations than the eastern hydrocarbon plume. Well point WP-5 is currently located near the former locations of tanks T-104 and T-105.

1.3 SUMMARY OF BIOSPARGING SYSTEM OPERATIONS

As currently configured, the biosparging system includes a 1,350 ft^2 treatment building and a network of lateral aeration trenches and vertical sparge wells located to the north and east of the treatment building as shown on Figure 1-2. Operation of the remedial system in a biosparging mode utilizes low-flow air injection from mechanical compressors located in the treatment building. Sparge air is delivered under positive pressure to a subsurface network of sparge wells.

The objective of biosparging at the Old Navy Fuel Farm is to aerate the ground water and limited vadose zone within the targeted remedial area to provide sufficient oxygen for indigenous aerobic micro-organisms to metabolize petroleum-related hydrocarbons. Monitoring tasks employed to evaluate the effectiveness of the biosparging system include water quality indicator parameter measurements, well riser headspace vapor analyses, and ground-water sampling. To provide sufficient ground-water sampling locations for biosparging effectiveness monitoring, 19 shallow well points located throughout the targeted remedial area are monitored in addition to 11 site monitoring wells. These monitoring locations are visited bi-monthly throughout the operational period to collect well point riser headspace and water quality indicator parameter measurements. Ground-water sampling is performed bi-annually at the well point and monitoring well locations. During this reporting period, from 1 July to 31 December 1998, monitoring well MW-NASB-056R was obstructed and could not be gauged or sampled; and well points WP-13 and WP-20 were destroyed in June 1998 and could not be gauged or sampled.

1.3.1 Aquifer Air Sparging System Enhancements

During 1997 and 1998, mechanical (piping and valving) modifications were made to the sparge air delivery system to enhance the distribution of sparge air to the remediation zones. A pilot study consisting of the installation and testing of air flow control valves was performed at 20 selected sparge line locations focused in the western remedial zone, an area previously recommended for enhanced biosparging (EA 1997a). The installation of air flow control valve assemblies allowed for selective modulation of sparging rates at individual biosparging wells and increased control of the overall biosparging process.

During the July-December 1998 operational period, additional control valves were installed in the eastern remedial zone. Air flow control valve installations in the western remedial zone (62 valves total) were completed on 18 September 1998. Air flow control valve installations in the eastern remedial zone (76 valves total) were completed on 4 November 1998.

Monitoring and analytical data collected during the previous reporting period (January-June 1998) indicated the presence of elevated hydrocarbon concentrations and anaerobic conditions in the vicinity of well points WP-2, WP-5, and WP-6, located to the northwest of the biosparging remedial zone. To provide active biosparging to this area, 6 additional biosparging wells (ASW-164 through ASW-169, Figure 1-3) were installed in October 1998. These biosparging wells are scheduled for activation during the January-June 1999 operational period.

1.3.2 Soil Vapor Extraction System Enhancements

Due to the shallow depth to ground water at the Old Navy Fuel Farm, combined SVE/AAS operations have not been possible given the existing configuration of process equipment. To facilitate use of the SVE technology, remedial system modifications are currently underway. These modifications include the installation of equipment necessary to complete a de-watering pilot study. The objective of the de-watering pilot study is to assess the potential for operation of the existing SVE network to facilitate capture of volatile organic compounds released during

the sparging process as per the original remedial design. The biosparging system was de-activated from 30 November to 31 December 1998 during which time the process equipment required for the de-watering pilot study process equipment was installed. The pilot study is scheduled for activation during the January - June 1999 operational period.

1.3.3 Biosparging System Operation and Maintenance Activities

Three sparge compressors (C-1A, C-1B, and C-2) are used to supply pressurized air to the sparge air injection wells. The compressors are operated at low pressure (7-12 psig) and moderate flow (250-300 cfm) sufficient to provide air injection to the sparge wells. The layout of the sparge compressor and injection manifold is provided on Figure 1-4.

When operated in the biosparging mode, sparging system flow rates and injection pressures are adjusted to affect the controlled distribution of oxygen to the ground water and limited vadose zone, while minimizing hydrocarbon volatilization effects. In this manner, *in situ* metabolism of hydrocarbons is theoretically maximized, while the release of volatilized hydrocarbons to the atmosphere is minimized. During operations and maintenance visits, technicians monitor injection pressures in conjunction with hydrostatic resistance (as a function of current well gauging data) and re-adjust the system as necessary. A Foxboro TVA-1000 photoionization detector (PID)/flame ionization detector (FID) is used to measure total volatile hydrocarbon (TVH) concentrations in the vadose zone soil (via well point riser headspace) to monitor for potential TVH release to atmosphere. A LandTec Model GA-90 methane/oxygen/carbon dioxide analyzer is used to measure well point headspace vapor to assess the effect of the biosparging system on methane and carbon dioxide production, and to identify differential areas of a reduced/depressed percent oxygen in the vadose zone.

1.3.4 Biosparging System Effectiveness Monitoring Procedures

Since biosparging is a low pressure *in situ* aeration process, the effectiveness of biosparging systems may be assessed through verification of increased microbial activity (via direct microbial population studies and/or biodegradation indicator parameters such as electron acceptor and nutrient studies) and confirmation of corresponding reduction in dissolved phase hydrocarbon concentration in ground water. Previous assessments of degrader microbial populations (EA 1997b) have served to confirm an increase in microbial activity in response to biosparging operations at the Old Navy Fuel Farm. Based on this prior confirmation, the collection and analysis of dedicated ground-water samples for microbial populations was discontinued following the 25-26 June 1997 sampling event. The effectiveness of biosparging operations is currently assessed by conducting ground-water sampling to quantify concentrations of petroleum-related hydrocarbons, iron, and manganese. Well gauging and water quality indicator parameter data (including dissolved oxygen, reduction-oxidation potential [redox], and pH) are

also obtained to assess the effect of the biosparging system on active subsurface metabolic processes. In addition, well riser headspace is analyzed for TVH, methane gas, oxygen, and carbon dioxide concentrations using field instrumentation.

Chemical analyses of ground-water samples include BTEX, methyl tertiary-butyl ether (MTBE), total petroleum hydrocarbons (TPH)-Gasoline Range Organics (GRO), and TPH-Diesel Range Organics (DRO).

1.4 REPORT ORGANIZATION

The remaining chapters of this report include the following: presentation of field monitoring and sampling activities, presentation of biosparging system performance data, summarization of analytical results, and assessment of biosparging system performance/effectiveness.

- Chapter 2, Monitoring and Sampling Procedures, provides a summary of the field activities, including water level gauging; measurement of water quality indicator parameters; monitoring for the presence of volatile hydrocarbons, methane, carbon dioxide, and oxygen; and ground-water sampling.

- Chapter 3, Discussion of Results, discusses biosparging system operations and results of the monitoring and sampling activities detailed in Chapter 2. An assessment of biosparging system performance is also provided in Chapter 3.

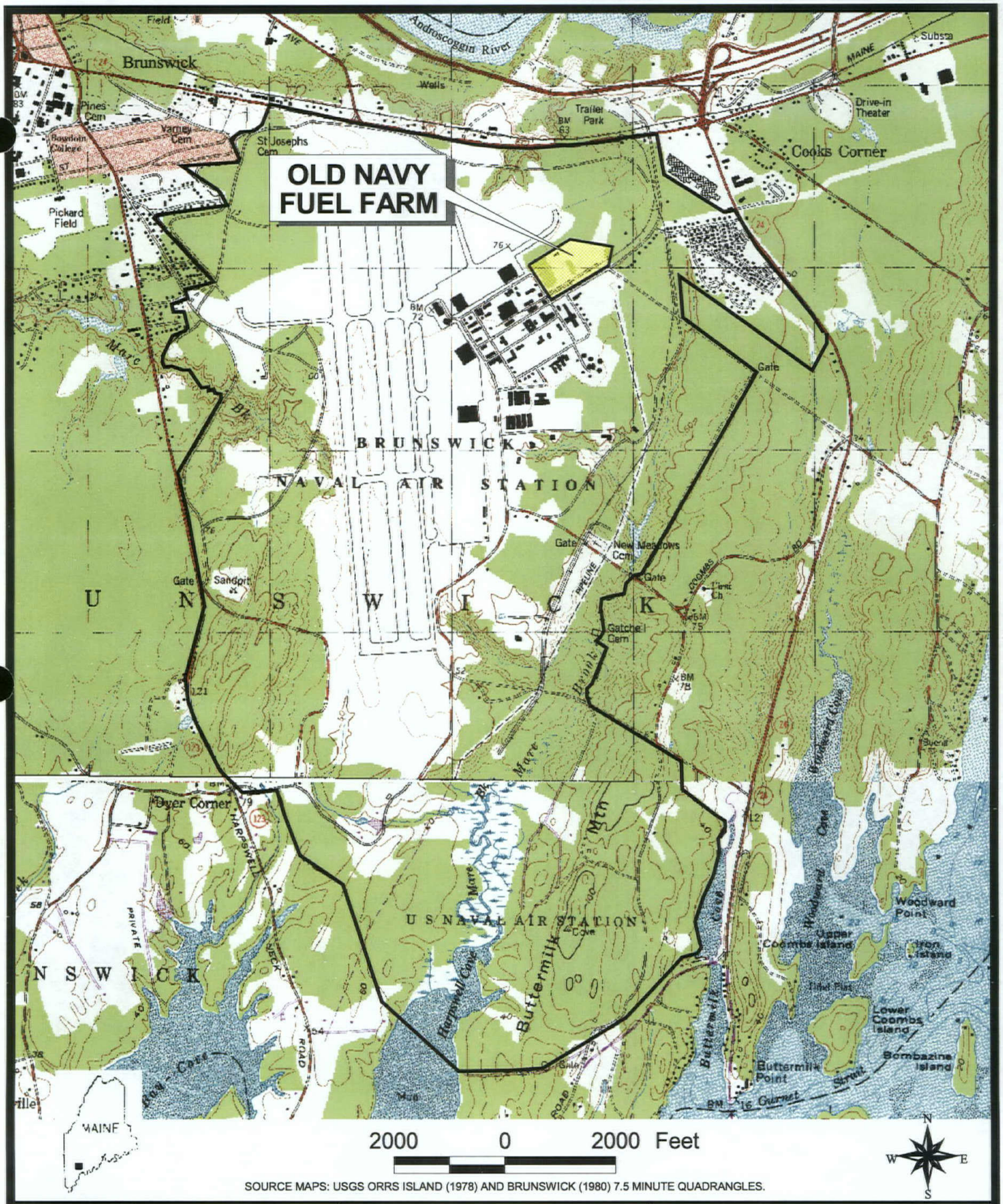
- Appendix A provides a copy of comments submitted by the State of Maine Department of Environmental Protection (letter dated 11 December 1998) for the previous biosparging system operations report (EA 1998) along with the Navy's responses.

- Appendix B provides the Field Record of Water Quality Analysis forms.

- Appendix C provides the Field Record of Biosparging Well Point Monitoring forms.

- The Field Record of Well Gauging, Purging, and Sampling forms completed during the sampling event are provided in Appendix D.

- The laboratory analytical narrative and Form I data are provided in Appendix E.



SOURCE MAPS: USGS ORRS ISLAND (1978) AND BRUNSWICK (1980) 7.5 MINUTE QUADRANGLES.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	OLD NAVY FUEL FARM NAVAL AIR STATION BRUNSWICK, MAINE	FIGURE 1 - 1 SITE LOCATION MAP

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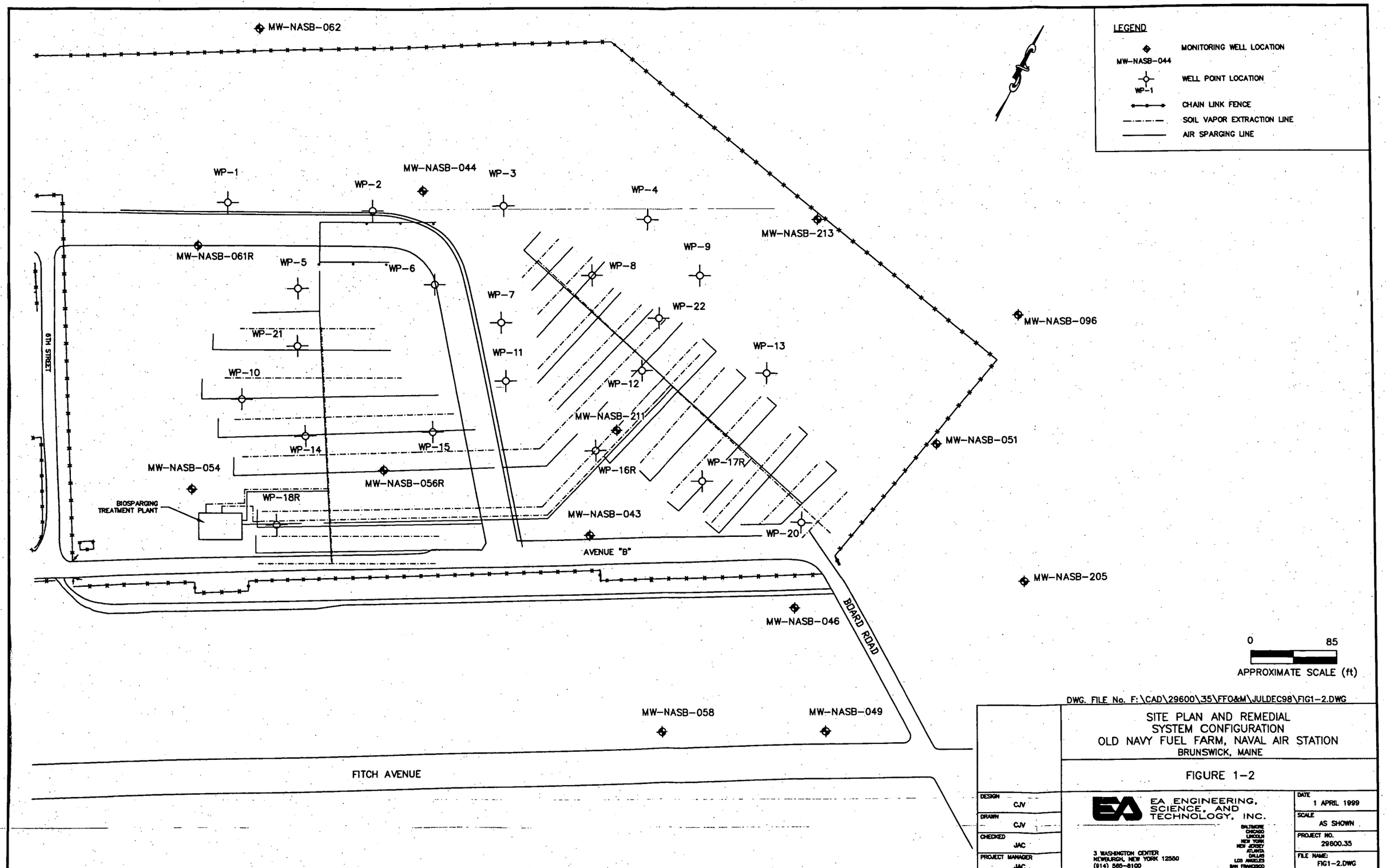
JAC	BT	BT	CEM	AS SHOWN	29 DEC. 1999	29600.35	I:\NASB_GIS \NAVY.APR



DWG. FILE No. F:\CAD\29600\35\FFO&M\JULDEC98\FIG1-2.DWG

SITE PLAN AND REMEDIAL SYSTEM CONFIGURATION
OLD NAVY FUEL FARM, NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 1-2

DESIGN	CJV
DRAWN	CJV
CHECKED	JAC
PROJECT MANAGER	JAC

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NEWBURGH, NEW YORK 12550
(914) 565-8100

DATE	1 APRIL 1999
SCALE	AS SHOWN
PROJECT NO.	29600.35
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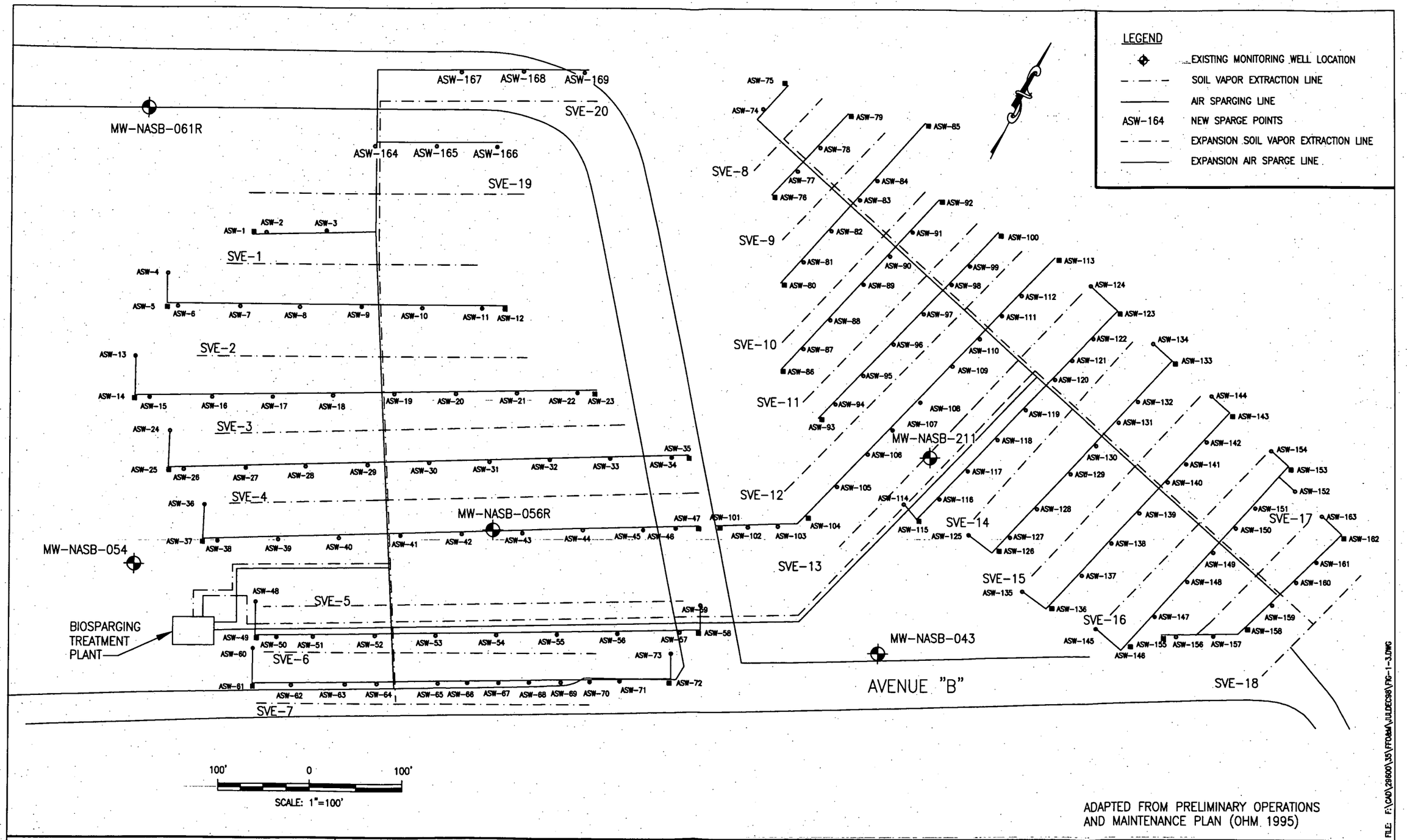
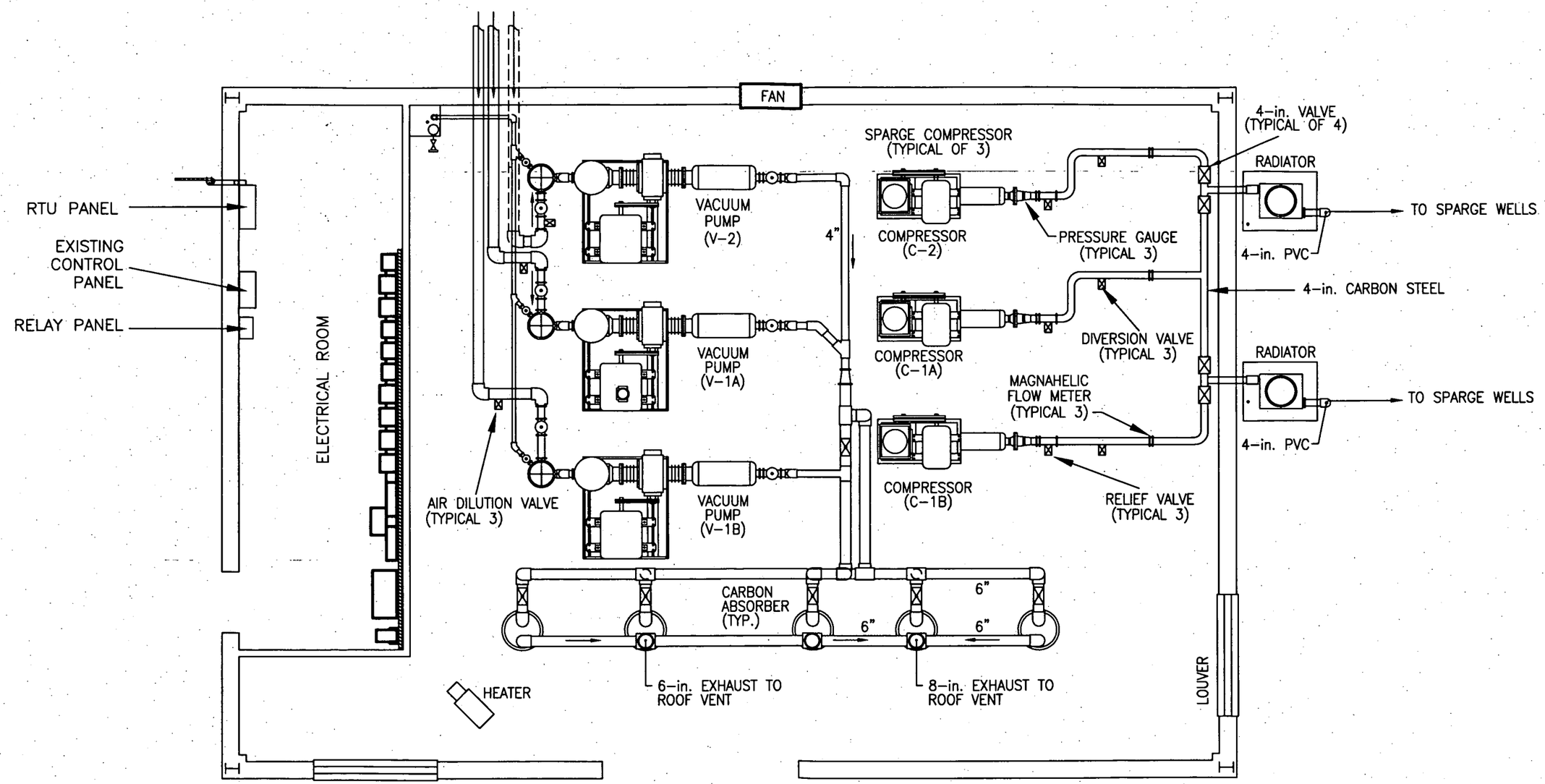


ADAPTED FROM PRELIMINARY OPERATIONS AND MAINTENANCE PLAN (OHM 1995)

FILE: F:\CAD\29600\35\FFO&M\JULDEC98\FIG-1-3.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	OLD NAVY FUEL FARM NAVAL AIR STATION BRUNSWICK, MAINE	FIGURE 1-3 REMEDIAL SYSTEM CONFIGURATION	DESIGNED BY CEM	DRAWN BY SAP	DATE 1 APR 1999	PROJECT NO. 29600.35	FILE NAME FIG 1-3
			CHECKED BY DSS	PROJECT MGR. JAC	SCALE AS SHOWN	DRAWING NO. –	FIGURE 1-3



ADAPTED FROM PRELIMINARY OPERATIONS AND MAINTENANCE PLAN (OHM 1995)

FILE: F:\CAD\29600\35\FFD&M\JULDEC98\FIG1-3.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

OLD NAVY FUEL FARM
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 1-4
BIOSPARGING COMPRESSOR AND INJECTION MANIFOLD LAYOUT

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
CEM	SAP	5 JAN 1999	29600.35	FIG 1-4
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	FIGURE
DSS	JAC	NONE	–	1-4

2. MONITORING AND SAMPLING PROCEDURES

2.1 WELL GAUGING AND WATER QUALITY MONITORING PROGRAM

Well gauging and water quality indicator parameter data were collected during each of 12 site operations and monitoring visits during the 1 July – 31 December 1998 operational period. Field personnel gauged monitoring wells located within the vicinity of the Old Navy Fuel Farm (11 total) and well points (19 total) to determine depth to ground water and absence/presence of light, non-aqueous phase liquid (LNAPL). Immediately following well gauging, water quality indicator parameter data were recorded at these locations. Monitoring well and well point locations are shown on Figure 1-2.

2.1.1 Well Gauging Methodology

The elapsed time for the collection of well gauging data was minimized to the extent possible, thus assuring the representativeness of interpreted ground-water flow data. Well gauging was conducted using a Solinst Model 121 interface meter capable of detecting LNAPL at a minimum thickness of 0.01 ft. The data were recorded on the Field Record of Water Quality Analysis forms provided in Appendix B.

2.1.2 Water Quality Indicator Parameter Measurement Methodology

Field measurements of water quality indicator parameters were obtained from July through December 1998 to assess the variation in water quality among well points and monitoring wells. Indicator parameters, including temperature, pH, conductivity, dissolved oxygen, and redox, were measured *in situ* using a Yellow Springs Instrument Model 600D multiparameter water quality meter. The manufacturer-recommended instrument calibration procedures were conducted prior to the start of each day's field effort and after potentially erroneous readings. Field measurements were then obtained by immersing the instrument sonde below the water level at each test location. *In situ* water quality indicator parameter data were recorded on the Field Record of Water Quality Analysis forms provided in Appendix B.

As suggested by MEDEP for the previous reporting period (Appendix A), *in situ* measurement of water quality indicator parameters without prior well purging may not provide data fully representative of actual field conditions (particularly dissolved oxygen and redox) due to the potential for ground-water equilibration with air within the riser headspace. It should be noted that purging at the well points was impractical due to extremely low recharge rates. Thus, *in situ* water quality parameter data were collected with procedural consistency at well points and monitoring wells, while recognizing a potential for reduction in representativeness.

To improve water quality parameter representativeness and usability, additional monitoring wells are scheduled for installation at the Old Navy Fuel Farm to provide sufficient locations at which purging may be accomplished. The new monitoring wells may replace or supplement the existing well point network. Installation of the monitoring wells is scheduled to be performed during the January to June 1999 operational period.

2.2 WELL POINT AIR QUALITY MONITORING PROGRAM

From July to December 1998, bi-monthly field monitoring was performed at 19 well points for TVH using a Foxboro TVA-1000 PID/FID and for methane, oxygen, and carbon dioxide concentrations using a LandTec Model GA-90 analyzer. TVH concentrations were measured at 19 well points to assess the potential effects of active biosparging on partitioning/volatilization of hydrocarbons from ground water to the well point headspace. Increases in TVH concentration in well point riser headspace may be interpreted as excessive aeration of the saturated zone and may further indicate persistent conditions of elevated hydrocarbon concentrations. The presence of methane and/or depleted oxygen conditions within the well point riser headspace may be indicative of anaerobic locations requiring increased sparging rates. Elevated carbon dioxide measurements may indicate increased microbial activity. These data are detailed in Section 3.3 and recorded on the Field Record of Biosparging Well Point Monitoring forms provided in Appendix C.

2.3 GROUND-WATER SAMPLING PROGRAM

2.3.1 Overview

The effectiveness of the biosparging system is assessed through verification of long-term reduction in dissolved-phase hydrocarbon concentrations in site ground water. Baseline ground-water sampling (August 1996) and interim ground-water sampling (December 1996, June and December 1997, June and December 1998) was performed to provide data relative to biosparging system effectiveness and site ground-water quality at the Old Navy Fuel Farm. The ground-water sampling program includes sample collection and chemical analyses to assess the concentrations of dissolved-phase hydrocarbons.

During this reporting period, one ground-water sampling event was conducted (8-9 December 1998). Sampling was conducted at 10 monitoring wells and 18 selected well points located at or in the vicinity of the Old Navy Fuel Farm. The monitoring wells included in the ground-water sampling event were MW-NASB-044, MW-NASB-046, MW-NASB-049, MW-NASB-051, MW-NASB-054, MW-NASB-058, MW-NASB-061R, MW-NASB-062, MW-NASB-211, and MW-NASB-213. Eighteen well points were sampled during the ground-water sampling program (WP-1 through WP-12, WP-14, WP-15, WP-16R, WP-17R, WP-21, and WP-22). Well points WP-13, WP-19, and WP-20 were destroyed during NAS Brunswick base activities in early June 1998 and were unavailable for the ground-water sampling event. WP-18R was not sampled due to insufficient water volume. An insufficient volume of ground water was available for sampling

at monitoring well MW-NASB-043. Monitoring well MW-NASB-056R was obstructed during this reporting period and could not be sampled. Sampling methodologies performed in the field are discussed below. A summary of the ground-water analytical program is provided in Table 2-1.

2.3.2 Sampling Methodology

A complete round of well gauging and measurement of water quality indicator parameters was performed on 3 December 1998. Following the 3 December 1998 gauging event, monitoring wells and well points were sampled. Prior to ground-water sampling (8-9 December 1998), additional gauging and water quality indicator parameter data were collected. Monitoring wells were sampled using "low flow" techniques consistent with those employed during the base-wide Long-Term Monitoring Program. The standard operating procedures performed for this program were based on draft guidance prepared by EPA Region I (U.S. EPA 1994) which is in conformance with the procedures described in the Long-Term Monitoring Plan (ABB-ES 1994). This procedure incorporates the use of variable speed submersible pumps (Grundfos Rediflo) or peristaltic pump (ISCO Model 2700) and clean, dedicated polyethylene discharge tubing. Following the gauging task, well purging was initiated at a low flow pumping rate. As low flow purging proceeded, water quality indicator parameters, flow rate, and drawdown were monitored and recorded at 3- to 5-minute intervals until water quality parameter stabilization is achieved.

Well points were purged using new, dedicated polyethylene tubing and an ISCO Model 2700 peristaltic pump with dedicated Masterflex Silicone C-Flex® tubing. The pumping system was operated until all well points were purged dry. The well points were then allowed to recharge overnight and were sampled within 24 hours of purging. Well point ground-water sampling was performed using the ISCO peristaltic pump and polyethylene tubing as described for well point purging operations. Due to the very limited yield/recharge exhibited in many of the well points, low flow techniques are not used.

2.3.2.1 Summary of Ground-Water Sampling Conducted on 8-9 December 1998

The fifth interim ground-water sampling event was conducted on 8-9 December 1998 at 18 of 19 well points, 5 ground-water monitoring wells located within the remediation zone (MW-NASB-044, MW-NASB-054, MW-NASB-061R, MW-NASB-211, and MW-NASB-213), and 5 perimeter monitoring wells (MW-NASB-046, MW-NASB-049, MW-NASB-051, MW-NASB-058, and MW-NASB-062). Prior to sampling, each well was gauged to determine the absence/presence of LNAPL, depth to ground water, and depth to bottom using a Solinst Model 121 interface meter graduated at 0.01-ft intervals. Well gauging confirmed the absence of measurable LNAPL at all locations. The Field Record of Well Gauging, Purging, and Sampling forms completed during the sampling event are provided in Appendix D.

Ground-water samples were submitted to the laboratory under two sample delivery groups. One ground-water sample was collected from each of the monitoring wells/well points (28 total locations); in addition, duplicate ground-water samples (3 total) were collected from well points WP-2 and WP-7, and monitoring well MW-NASB-211. Two equipment rinsate blanks were collected by pouring de-ionized water through the sampling equipment and into the appropriate sample containers. To assess the potential for contamination during sample transport, two trip blanks were analyzed, one per sample delivery group. Upon completion of each sample delivery group, samples were shipped under chain-of-custody to the laboratory via overnight courier. Samples were submitted to EA Laboratories of Sparks, Maryland. Ground-water (including duplicate) samples and rinsate blanks were analyzed for BTEX plus MTBE by EPA Method 602, TPH-GRO by Maine Department of Human Services (DHS)–Health and Environmental Testing Laboratory (HETL) Method 4.2.17, and TPH-DRO by Maine DHS–HETL Method 4.1.25. Trip blank samples were analyzed only for BTEX plus MTBE by EPA Method 602. The analytical narrative and Form I data are provided in Appendix E.

Following sample collection for offsite laboratory analyses, additional well point grab samples (18 total) were collected to permit onsite colorimetric testing for ferrous iron and manganese. Following vacuum filtration to remove particulate matter and acidification with HCL, a Hach Model DR-2000 spectrometer was used to measure concentrations of ferrous iron and manganese in the filtrate by Hach Methods 8080 and 8034, respectively.

TABLE 2-1 SUMMARY OF GROUND-WATER ANALYTICAL PROGRAM
OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Chemical Analyses	
Analyte	Method
BTEX and MTBE	EPA 602
TPH-GRO	Maine DHS-HETL Method 4.2.17
TPH-DRO	Maine DHS-HETL Method 4.1.25
Ferrous Iron	HACH Method 8080
Manganese	HACH Method 8034
Methane (vapor phase)	LandTec GA-90

NOTE:
BTEX = Benzene, toluene, ethylbenzene, and total xylenes.
MTBE = Methyl tertiary-butyl ether.
EPA = U.S. Environmental Protection Agency
TPH = Total petroleum hydrocarbons.
GRO = Gasoline Range Organics.
DHS = Department of Human Services.
HETL = Health and Environmental Testing Laboratory.
DRO = Diesel Range Organics.

3. DISCUSSION OF RESULTS

This chapter summarizes the Old Navy Fuel Farm biosparging system field monitoring and analytical results, as well as operations and monitoring data for the period 1 July – 31 December 1998. An assessment of *in situ* biodegradation progress at the Old Navy Fuel Farm is also provided based on biosparging system monitoring data (July-December 1998) and results of ground-water-sampling conducted during 8-9 December 1998.

3.1 SUMMARY OF BIOSPARGING SYSTEM OPERATION AND MONITORING DATA

Field personnel performed a total 12 routine operations and monitoring site visits during the period 1 July – 31 December 1998. Operations and monitoring site visits were conducted on 13 and 21 July, 5 and 26 August, 10 and 25 September, 1 and 22 October, 11 and 23 November, and 3 and 21 December 1998. Tasks performed during each site visit included:

- Monitoring of biosparging system operational parameters
- Gauging of water levels and measurement of water quality indicator parameters at monitoring wells and well points
- Field analysis of well point headspace TVH, methane, oxygen, and carbon dioxide concentrations
- Inspection of biosparging system components and remedial area for evidence of active air injection (sparging)
- Inspection of biosparging system components for functionality and performance of repairs as necessary.

3.1.1 Biosparging System Operational Summary

The Old Navy Fuel Farm biosparging system was activated on 8 August 1996 using the injection of compressed air in both lateral aeration trenches and sparge wells. Lateral aeration was subsequently suspended, and enhancements to the sparge well network were accomplished. Currently, the system operates through a network of vertical sparge wells utilizing low flow air injection. Air injection is accomplished using three sparge compressors which supply air flow at individual rates of 250-300 cfm at 7-12 psig. During operations and maintenance visits, injection pressures and flow rates are measured at equipment service vaults using dedicated gauges. Audio/visual evidence (i.e., obvious standing water aeration and/or audible supply line air flow) was also used to assess system functionality. During this reporting period, the biosparging system operated continuously except during maintenance and repair activities requiring

temporary (i.e., <24 hours) system de-activation. It should be noted that the system was deactivated from 30 November to 31 December to accommodate the installation of the de-watering pilot study process equipment. Therefore, the system was inactive for 8 days prior to the 8-9 December 1998 sampling event.

3.1.2 Monitoring Well and Well Point Gauging Data

Field personnel gauged 19 well points and 11 shallow monitoring wells located at and in the vicinity of the Old Navy Fuel Farm during the 12 operations and maintenance visits. An additional gauging event was conducted in advance of the ground-water sampling event performed on 8-9 December 1998. Monitoring well MW-NASB-056R was physically blocked and not gauged during the reporting period. A summary of the well gauging data for the 6-month reporting period is provided in Table 3-1. Review of the gauging data indicates that the water table exhibited a slight decrease in elevation during the period of July–December 1998. LNAPL was not detected in any monitoring well or well point during the reporting period.

3.1.3 Water Quality Indicator Parameter Data

Field personnel measured water quality indicator parameters in 19 well points and 11 shallow monitoring wells located at and in the vicinity of the Old Navy Fuel Farm during the 12 operations and maintenance visits. The average temperature of ground water gradually decreased during the reporting period from 16.73°C on 13 July to 7.63°C on 21 December 1998. The monthly average pH and conductivity values remained consistent throughout the reporting period. As previously noted, water quality indicator parameter measurements may not be entirely representative of ground-water conditions since the well points and monitoring wells were not purged prior to data collection. Since the dissolved oxygen and redox measurements are especially sensitive to equilibration with the well point riser headspace, these parameters are not evaluated further. A summary of water quality indicator parameter data collected during the operation and maintenance visits is provided in Table 3-2.

As previously stated, low flow purging is not effectively accomplished at the well point locations due to slow recharge rates. To resolve this issue, additional monitoring wells are scheduled for installation at the Old Navy Fuel Farm to provide sufficient locations for more effective assessment of ground-water quality indicator parameters.

3.1.4 Well Point Headspace Vapor Measurements

Field personnel measured TVH, methane, carbon dioxide, and oxygen concentrations in the headspace of the 19 well points monthly during the reporting period. Well point headspace vapor measurements were conducted on 21 July, 5 August, 25 September, 22 October, 23 November, and 3 December 1998. TVH was measured using a Foxboro TVA-1000 PID/FID, and methane, carbon dioxide, and oxygen measurements were performed with a LandTec GA-90. The PID data collected on 21 July 1998 were not retained for analysis due to instrument response

error. The FID/PID instrument only meets EPA data quality level 1A: Qualitative Screening. General field applications for the FID/PID are limited to indications of general presence of contamination and for health and safety applications. However, some assumptions can be made from the operating principles of the instrumentation. While FIDs provide significant response to most organic vapors, they are more sensitive to aliphatic (or chained) hydrocarbons because these compounds burn more efficiently than aromatic (or ringed) hydrocarbons. FIDs are typically calibrated with methane. PIDs use an ultraviolet lamp to ionize organic vapors rather than a hydrogen flame. Ultraviolet lamps range in energy from 8.4 to 11.7 eV; the Navy Foxboro TVA 1000 PID currently uses a 10.6-eV lamp. Compounds with higher ionization potentials (e.g., aliphatics) require more energy for ionization; therefore, the strength of the ultraviolet lamp determines the compounds that are ionized. PID instruments are most sensitive to aromatic hydrocarbons (e.g., BTEX compounds), but some aliphatics can also be detected with the higher energy lamps. Therefore, elevated FID responses observed without corresponding PID responses were assumed to be indicative of the presence of aliphatic hydrocarbons, i.e., methane-based compounds. These instrument responses were correlated against actual methane measurements performed with the LandTec GA-90 methane detector. During the reporting period, TVH concentrations greater than 10 ppm_v (PID) were observed in each of the 19 well point risers. A summary of the well point headspace TVH measurements is provided in Table 3-3.

Methane, carbon dioxide, and oxygen measurements were performed with a LandTec GA-90. Percent methane measurements ranged from non-detect to 6.3 percent (WP-7, 23 November 1998). During the July-December 1998 reporting period, methane was sporadically detected throughout the biosparging remedial area. Many of the locations in which methane was reported have not exhibited a history of methane detection since activation of the biosparging system in August 1996. The FID/PID results did not correlate with or support the reported methane (LandTec GA-90) detections, except at well points with a history of methane gas. These locations are in suspected anaerobic areas outside of the biosparging zone of effectiveness (including well points WP-1, WP-2, WP-3, WP-5, WP-6, and WP-11). The majority of methane gas detections were reported at locations without a prior history of methane and exhibited concentrations of 0.1 percent, the minimum detection limit of the LandTec GA-90 instrument. Since the methane detections did not correlate to the FID/PID readings and were not supported by historical data (dating from August 1996), it is suspected that the baseline calibration setting of the LandTec GA-90 was slightly elevated. The LandTec GA-90 was re-calibrated prior to the November 1998 headspace monitoring event. Percent carbon dioxide measurements ranged from non-detect to 14.0 percent (WP-12, 3 December 1998). Percent oxygen measurements ranged from 9.7 percent (WP-5, 22 October 1998) to ambient concentrations (i.e., approximately 21 percent) at multiple locations. Well point riser headspace methane, carbon dioxide, and oxygen data are summarized in Table 3-4.

3.2 SUMMARY OF GROUND-WATER SAMPLING PROGRAM RESULTS

3.2.1 Well Gauging Results

Prior to ground-water sampling, field personnel gauged 11 monitoring wells located at and in the vicinity of the Old Navy Fuel Farm and 19 existing well points to determine depth to water and note absence/presence of LNAPL. Monitoring well MW-NASB-056R was not gauged due to physical obstruction of the well riser. LNAPL was not observed in any of the monitoring wells or well points. The ground-water elevation in the 11 monitoring wells ranged from 58.75 ft mean sea level in MW-NASB-049 to 72.92 ft mean sea level in MW-NASB-062. Monitoring well MW-NASB-043 was observed to be dry. Table 3-1 provides a summary of Old Navy Fuel Farm gauging data for the reporting period.

Figure 3-1 provides the interpreted water table elevations for the 3 December 1998 gauging event. Ground-water flow is interpreted to be to the south-southeast. The overall ground-water flow direction observed during the 3 December 1998 gauging event, when the biosparging system was inactive, was similar to that observed during the August 1996 gauging event (prior to activation of the biosparging system) and during subsequent periods of active biosparging.

3.2.2 Ground-Water Sampling Results

A total of 28 ground-water samples were collected from 10 monitoring wells (MW-NASB-044, MW-NASB-046, MW-NASB-049, MW-NASB-051, MW-NASB-054, MW-NASB-058, MW-NASB-061R, MW-NASB-062, MW-NASB-211, and MW-NASB-213) and 18 well points (WP-1 through WP-12, WP-14, WP-15, WP-16R, WP-17R, WP-21, and WP-22) during 8-9 December 1998. Analytical results for the 8-9 December 1998 ground-water sampling event are summarized in Table 3-5. Figures 3-2 through 3-4 provide interpreted concentration isopleths for total BTEX, TPH-GRO, and TPH-DRO, respectively.

Of particular note, several VOC were reported in the trip blank (toluene, ethylbenzene, m&p-xylene, and o-xylene) and in the rinse blank (toluene and total xylenes) at a concentration of 2 µg/L for samples submitted with the well point ground-water samples. It is suspected that the trip and rinse blanks acquired trace BTEX concentrations as a result of field contamination associated with fugitive hydrocarbon emissions (potentially from field equipment sources). The trip and rinsate blank BTEX concentrations were not included in calculations of total BTEX in the well point ground-water samples.

VOC were not reported in the trip and rinse blanks submitted with the monitoring well ground-water samples. However, several monitoring wells exhibited BTEX concentrations. The total BTEX concentrations were calculated consistent with the laboratory analytical results for monitoring well ground-water samples.

A summary of analytical results for ground-water samples collected at the Old Navy Fuel Farm during the period of 10 June 1996 – 9 December 1998 is provided in Table 3-6. To provide a comparison to historical analytical data for dissolved-phase BTEX, total BTEX calculations for the well point and monitoring well samples collected during 8-9 December 1998 included all data as reported, regardless of the laboratory reported trip blank and/or rinsate blank detections.

Based on the above discussion, total BTEX was reported in 27 of 28 ground-water samples at concentrations ranging from 3 μg/L (WP-3, WP-6, WP-9, WP-10, WP-14, and WP-15) to 12,747 μg/L (MW-NASB-211). Total BTEX was reported at a concentration greater than 100 μg/L in 5 of 28 samples: WP-5 (4,492 μg/L), WP-17R (118 μg/L), WP-21 (1,056 μg/L), WP-22 (1,144 μg/L), and MW-NASB-211 (12,747 μg/L). Benzene was reported in 13 of 28 samples at concentrations ranging from 3 μg/L (WP-2, WP-4, WP-8, WP-12, WP-16R, MW-NASB-054, and MW-NASB-061R) to 91 μg/L (WP-22). Ethylbenzene was reported in 16 of 28 samples. Toluene and total xylenes were the most frequently detected compounds, reported in 28 of 28 samples. As previously stated, these compounds were reported in the trip blank and rinsate blank from the well point sample delivery group and are not supported by historical analytical data. Therefore, the detection frequencies for toluene and total xylenes are likely not representative of actual conditions.

MTBE was detected in 4 of 28 ground-water samples at concentrations ranging from 4 μg/L (MW-NASB-061R) to 36 μg/L (MW-NASB-211). MTBE was not detected in the equipment rinsate blanks or the trip blank.

TPH-GRO were reported in 27 of 28 ground-water samples at concentrations ranging from 13 μg/L (MW-NASB-062 and MW-NASB-213) to 15,000 μg/L (MW-NASB-211). Concentrations of TPH-GRO were reported above 1,000 μg/L in 6 of 28 samples: WP-2 (8,500 μg/L), WP-5 (14,000 μg/L), WP-17R (2,400 μg/L), WP-21 (2,900 μg/L), WP-22 (8,900 μg/L), and MW-NASB-211 (15,000 μg/L). TPH-GRO were detected in the equipment rinsate blanks at concentrations of 35 μg/L (well point sample delivery group) and 53 μg/L (monitoring well sample delivery group).

TPH-DRO were reported in 25 of 26 ground-water samples at concentrations ranging from 56 μg/L (MW-NASB-062) to 18,000 μg/L (WP-17R). Insufficient sample volumes were collected at well points WP-9 and WP-16R to allow TPH-DRO analyses. Concentrations of TPH-DRO were reported greater than 1,000 μg/L at 6 locations: WP-2 (5,300 μg/L), WP-4 (5,000 μg/L), WP-5 (2,500 μg/L), WP-17R (18,000 μg/L), WP-21 (2,700 μg/L), and WP-22 (16,000 μg/L). A TPH-DRO concentration of 56 μg/L was reported in upgradient well MW-NASB-062, suggesting the potential detection of non-petroleum related hydrocarbons as a result of the TPH-DRO analytical method. TPH-DRO was not detected in the equipment rinsate blanks.

The reported concentrations of total BTEX, MTBE, TPH-GRO, and TPH-DRO for the duplicate ground-water samples collected at well points WP-2 and WP-7 were slightly higher than the original sample results. The reported concentrations of total BTEX, MTBE, TPH-GRO, and TPH-DRO for the duplicate ground-water sample collected at MW-NASB-211 indicated general agreement with analytical results for the original sample.

A Hach Model DR-2000 spectrometer was used for analysis of ferrous iron and manganese concentrations in the ground-water samples collected from 18 of 19 well points. Insufficient sample volume was collected from well point WP-18R to allow ferrous iron or manganese analysis. Samples were not collected from well points WP-13, WP-19, and WP-20 due to well point damage. Ferrous iron concentrations ranged from 0.15 mg/L in well point WP-8 to 3.13 mg/L in WP-17R. Manganese concentrations ranged from non-detect in 2 well points (WP-6 and WP-22) to 3.5 mg/L in WP-9. The duplicate samples collected at well points WP-2 and WP-7 indicated general agreement with analytical results for the original samples. There were no spatial distribution patterns observed for ferrous iron or manganese at the site. A summary of the ferrous iron and manganese data is provided in Table 3-7.

3.3 ASSESSMENT OF BIOSPARGING SYSTEM PERFORMANCE

Indicator parameters used to assess biosparging system performance during the July-December 1998 reporting period include: ground-water sampling results; well point headspace TVH; methane, carbon dioxide, and oxygen concentrations; and field observations. It should be noted that the variation in some indicator parameters, relative to the previous reporting period (January-June 1998), may be attributable to seasonal effects. However, the biosparging system was inactive during the period of 30 November - 31 December 1998 to allow completion of engineering modifications undertaken to enhance remedial system performance. Some variation in indicator parameters may also be attributable to the temporary system shutdown.

As discussed in Section 3.1.3, the reported water quality indicator parameter measurements may not be representative of actual field conditions since the well points and monitoring wells were not purged prior to data collection. Therefore, water quality indicator parameter data for the 13 July through 9 December 1998 reporting period are not included in the assessment of biosparging system performance. Future water quality indicator parameter data will be collected using low flow purging at monitoring well locations.

3.3.1 *In Situ* Biodegradation Conditions

Ground-water parameters and vapor monitoring data collected prior to biosparging system activation (i.e., August 1996) at the Old Navy Fuel Farm were indicative of advanced anaerobic (reduced) environmental conditions as evidenced by dissolved oxygen concentrations of less than 0.5 mg/L in 9 of 18 well points and less than 1.0 mg/L in 16 of 18 well points. In August 1996,

only 2 well points, WP-9 and WP-20, exhibited dissolved oxygen concentrations greater than 1.0 mg/L (5.4 and 3.1 mg/L, respectively) as recorded during the baseline (pre-biosparging) sampling event.

Anaerobic conditions prior to biosparging were also evidenced by significantly elevated methane gas concentrations in 13 of 20 well points, ranging from 0.1 to >90.0 percent (or from 1,000 to >900,000 ppm_v).

In December 1998, following approximately 28 months of active biosparging, methane gas was detected up to 0.1 percent (i.e., 1,000 ppm_v) at only 1 of 19 well points (WP-14) with the LandTec GA-90. Based on FID/PID responses, limited concentrations of methane-based compounds (i.e., ranging from <15 to approximately 450 ppm_v) were potentially indicated at well points WP-1, WP-2, WP-4, WP-5, WP-7, WP-8, and WP-10. With the exception of well points WP-8, WP-10, and WP-14, these elevated readings were located outside of the effective biosparging area of influence. It should also be noted that the presence of methane gas was only confirmed by direct measurement with the LandTec GA-90 at well point WP-14.

The area-wide observation of dissolved oxygen concentrations <1.0 mg/L and the presence of elevated methane concentrations in well point riser headspace reported during the baseline sampling event (August 1996) indicates that anaerobic conditions predominated throughout the Old Navy Fuel Farm remedial area prior to system activation. Results of the December 1996, June and December 1997, and June and December 1998 well point headspace monitoring events by comparison suggest that operation of the biosparging system has established and maintained aerobic biodegradation conditions (as evidenced by significant reduction and/or the elimination of methane gas).

Figure 3-5 provides an idealized illustration of microbial ground-water environments in the vicinity of a petroleum spill resulting from preferential use of electron acceptors. Facultative bacteria (i.e., able to metabolize hydrocarbons in both aerobic and anaerobic environments) utilize available electron acceptors preferentially according to energy availability per mole, beginning with oxygen (aerobic respiration) and proceeding in order through nitrate reduction, iron reduction, sulfate reduction, and then to methanogenesis (carbon dioxide reduction). Thus, the presence of methane is indicative of anaerobic conditions since all other available electron acceptors would have been exhausted and/or are not available for utilization by the indigenous microbes (NFESC 1996). Furthermore, methanogenic bacteria cannot tolerate oxygen and would have been depleted in areas subject to ground-water aeration, therefore, area-wide reductions/elimination of methane gas indicate the establishment of aerobic conditions enhanced by the operation of the biosparging system.

Depleted well point riser headspace oxygen concentrations may be indicative of areas exhibiting a negative diffusion gradient (i.e., riser headspace to ground water) resulting from biological oxygen demand and/or the presence of anaerobic ground water. During the July-December 1998 reporting period, depressed well point riser oxygen concentrations (i.e., <19 percent) were

reported at well points WP-1 through WP-6, WP-9, WP-10 through WP-12, WP-14, WP-15, and WP-17R. Riser headspace oxygen concentrations at these locations ranged from 9.7 percent (WP-5, 22 October 1998) to 18.9 percent (WP-17R, 21 July 1998). Ambient air typically exhibits oxygen concentrations of approximately 21 percent. Well points WP-1 through WP-6 and WP-9 are located outside of the biosparging area of influence, and anaerobic ground water is assumed to be present at these locations. The occurrence of anaerobic conditions is substantiated by the observation of methane at many of these outlying locations. Methane was also indicated at well points WP-10 and WP-14, which may have been anaerobic during the reporting period. The remaining well points in which depressed riser headspace oxygen measurements were reported are located within the biosparging area of influence and within areas of elevated dissolved-phase hydrocarbons. It is likely that biological oxygen demand, resulting from microbial degradation of subsurface hydrocarbons, contributed to the reduction in well riser oxygen at these locations.

Increased carbon dioxide within well riser headspace may be indicative of microbial activity since carbon dioxide is a final endproduct of many microbial metabolic processes. Elevated carbon dioxide concentrations in well point risers, ranging from 0.1 to 14 percent, were reported at all well point locations.

Manganese and ferric iron (Fe^{+3}) are often preferentially used as alternate electron acceptors (to oxygen) under anaerobic conditions. Increases in the concentrations of manganese and/or ferric iron may be indicative of reduced utilization rates associated with conversion from anaerobic to aerobic microbial activity. Based on the December 1998 ground-water sampling data, the manganese concentrations do not appear to have changed significantly during the reporting period, and were not significant indicators in previous sampling events (August 1996 - June 1998). Ferric iron is not directly measured for microbial assessments since it is not possible to quantify its availability to the microbial population without knowing its degree of crystallinity. Therefore, its reduced form, or ferrous iron (Fe^{+2}), is measured. An increase in ferrous iron concentration is an indication that iron reduction is likely occurring (NFESC 1996). Alternately, if ferrous iron concentrations are depleted, it may be inferred that dilution and/or oxidation may be taking place in the absence of continued ferrous iron production associated with anaerobic conditions. Based on the December 1998 ground-water sampling data, the ferrous iron concentrations have not changed significantly during the reporting period, and were not significant indicators in previous sampling events (August 1996 – June 1998).

Based on the lack of significant changes in ferrous iron and manganese concentrations, future sampling events will not include analysis for ferrous iron and manganese. It should also be noted that field personnel reported audio/visual evidence of active sparging conditions, including aeration of ground-water within well points, monitoring wells, and service vaults, throughout the biosparging area of influence during the July-December 1998 reporting period. Aeration of standing water in service vaults throughout the biosparging area was also observed during the June-December 1998 reporting period.

3.3.2 Assessment of Dissolved-Phase Hydrocarbon Removal

Analytical data collected during the August 1996 (baseline), December 1996, June and December 1997, and June and December 1998 ground-water sampling events at the Old Navy Fuel Farm indicate that progressive reductions in both the spatial distribution and localized concentrations of dissolved-phase BTEX, MTBE, TPH-GRO, and TPH-DRO have occurred since activation of the remedial system. Table 3-6 provides a historical summary of analytical results for these sampling events. Concentration isopleths for the 8-9 December 1998 sampling event are provided on Figures 3-2 through 3-4. Figures 3-6 through 3-8 provide trend analyses of concentration isopleth areas for BTEX, TPH-GRO, and TPH-DRO since biosparging system activation in August 1996.

The isopleth areas included in Figures 3-6 through 3-8 were calculated directly from electronic drawing files using AutoCad R-14® software. Each data point represents the total area (ft^2) encompassed by the respective concentration isopleth (i.e., >10, >100, >1,000, or >10,000 μg/L) for a given ground-water sampling event. As a result of the installation of supplemental well points WP-21 and WP-22 in areas of elevated dissolved-phase hydrocarbon concentrations following the June 1997 ground-water sampling event, an apparent "increase" in the spatial distribution of the concentration isopleths was observed. To normalize the concentration isopleth areas over time, a second line was included with each plot to illustrate the trends exhibited with and without inclusion of analytical data from supplemental well points WP-21 and WP-22.

Figure 3-6 provides total isopleth area plots for dissolved-phase BTEX concentrations from the period of activation of the biosparging system in August 1996 to the December 1998 ground-water sampling event. A significant decrease in the BTEX isopleth area is demonstrated for concentration increments greater than 10, 100, and 1,000 μg/L. As discussed above, the installation of well points WP-21 and WP-22 following the June 1997 ground-water sampling event resulted in an apparent "increase" in the area within the 1,000 μg/L BTEX isopleth. This is demonstrated in Figure 3-6 by the divergence of the isopleth area lines ocurring after June 1997. Nevertheless, the overall trend in the areas encompassed by the BTEX concentration isopleth(s) represents a progressive reduction. The dissolved-phase BTEX isopleth area plot for concentrations >10, 000 μg/L exhibits a slight increase during the first 6 months of active biosparging. It is suspected that this increase resulted from the mobilization of saturated hyrdrocarbons due to initial sparging activity. Following the December 1996 interim sampling event, the >10, 000 μg/L BTEX isopleth area plot exhibits a rapid reduction, to near non-detect levels by June 1998.

Figure 3-7 provides total isopleth area plots for dissolved-phase TPH-GRO concentrations from the period of activation of the biosparging system in August 1996 to the December 1998 ground-water sampling event. A significant and steady decrease in the TPH-GRO isopleth area is demonstrated for each of the concentration isopleth increments (i.e., TPH-GRO > 100, 1,000, and 10,000 μg/L) since biosparging system activation. The TPH-GRO isopleth area plots exhibit

slight increases during the first 6 months of active biosparging. As discussed above, it is suspected that these increases resulted from the mobilization of saturated hyrdrocarbons due to initial sparging activity.

Figure 3-8 provides total isopleth area plots for dissolved-phase TPH-DRO concentrations from the period of activation of the biosparging system in August 1996 to the December 1998 ground-water sampling event. The TPH-DRO isopleth area plots exhibit apparent increases during the first two interim sampling events. These increases may also have resulted from the mobilization of saturated hyrdrocarbons due to initial sparging activity. Following the June 1997 ground-water sampling event, significant decreases in the TPH-DRO isopleth area plots are exhibited for concentrations >1,000 and >10,000 μg/L. A slight decrease is exhibited for the >100 μg/L TPH-DRO concentration isopleth area.

Dissolved-phase MTBE was almost entirely absent from ground water at the Old Navy Fuel Farm by the June 1997 interim sampling event. During the most recent ground-water sampling event (8-9 December 1998), MTBE was detected in only 4 of 28 ground-water samples at concentrations of 4 μg/L (MW-NASB-061R) to 36 μg/L (MW-NASB-211).

Analysis of historical data trends indicate that for the five ground-water sampling events performed since biosparging system activation, the overall area affected by dissolved-phase hydrocarbons has been steadily decreasing. Further, the analytical data also demonstrate that dissolved-phase hydrocarbons have not migrated from the Old Navy Fuel Farm.

As discussed in previous summary reports and illustrated in Table 3-6, the reduction in the spatial extent of dissolved-phase hydrocarbons has occurred with a concurrent reduction in localized (i.e., monitoring point specific) concentrations.

3.4 CONCLUSIONS AND RECOMMENDATIONS

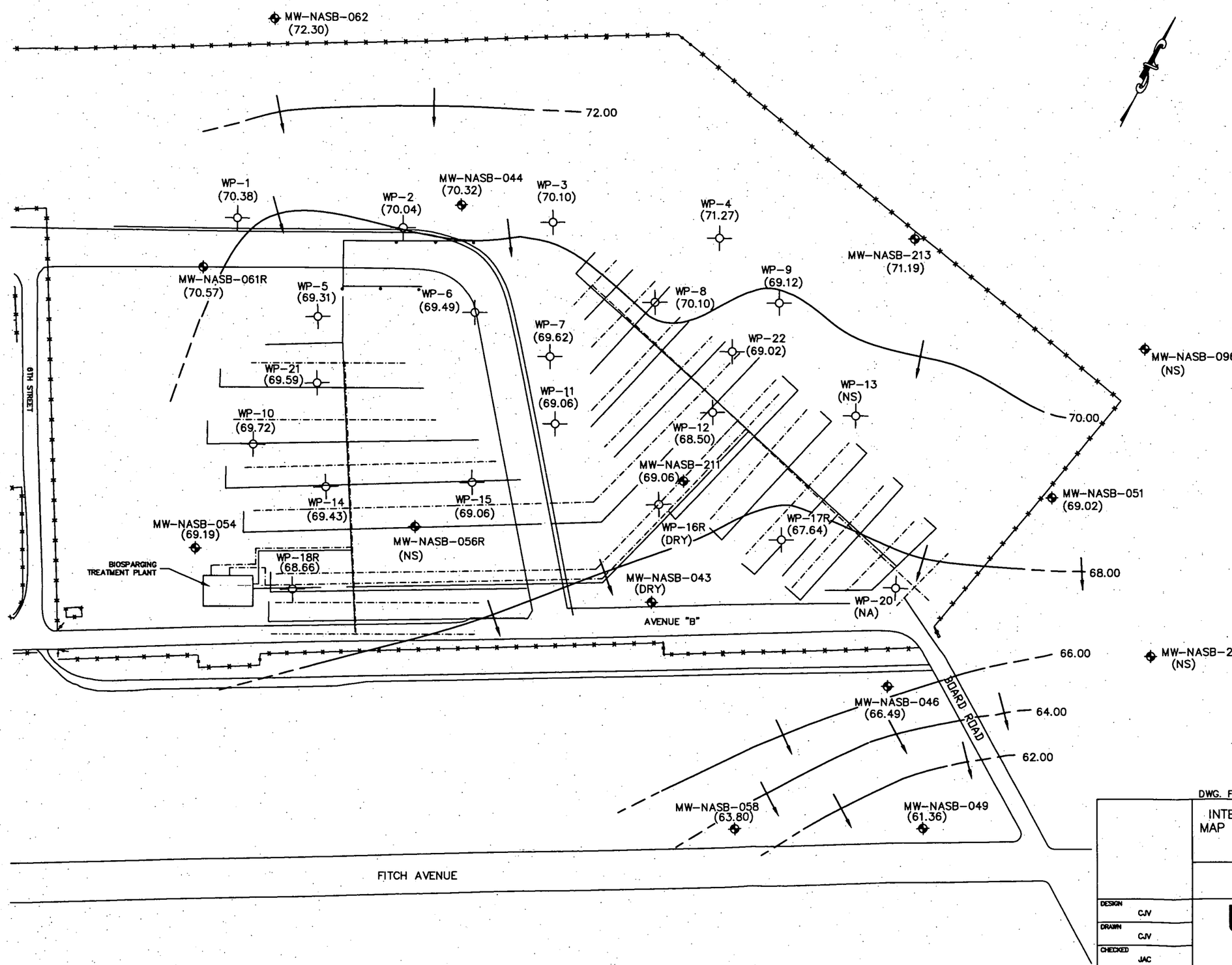
Significant reductions in the extent and concentrations of dissolved-phase hydrocarbons have been demonstrated since the commencement of biosparging activity in August 1996. This trend was sustained during the reporting period (1 July – 31 December 1998). The reductions may be attributable to the combined effects of volatilization and increased *in situ* biodegradation, both resulting from operation of the Old Navy Fuel Farm biosparging system. Additional hydrocarbon mitigation has likely occurred due to natural attenuation. Anaerobic conditions are probable evidence that natural attenuation is occurring. Well sampling conducted outside the influence of the biosparging system has shown decreased dissolved oxygen concentrations, evidence that anaerobic conditions exist. Although existing data are not sufficient to directly quantify the fraction of hydrocarbon reduction attributable to volatilization or biodegradation, inferences may be made for selected constituents based on chemical-specific vapor pressure and biodegradability. MTBE, BTEX, and TPH-GRO for which the most significant concentration reductions have been observed, are the most volatile analytes included in the sampling program. Although BTEX compounds are known to be readily biodegradable, MTBE is generally

considered to be recalcitrant (Mormile et al. 1994). The reduction in MTBE concentration may be principally attributable to volatilization. The majority of MTBE removal was observed early (i.e., by December 1996) in the biosparging system operational period, an operational period favoring volatilization of compounds characterized by relatively high vapor pressure. Continued *in situ* biodegradation of petroleum hydrocarbons has been evidenced by significant decreases in total BTEX, TPH-GRO, and TPH-DRO distribution and concentrations in the remedial zone.

As indicated in Section 3.3.2, dissolved-phase hydrocarbon removal has resulted in sustained progress toward MEDEP cleanup criteria. In order to enhance the effectiveness of the biosparging system, remedial system modifications/improvements have been initiated, including:

- Expansion of the SVE/AAS network to more fully encompass the two principal areas of concern exhibiting persistent hydrocarbon concentrations.
- Installation of 6 additional air sparging wells.
- Modifications to the SVE process equipment and the performance of a 2-month de-watering pilot study to permit combined SVE/AAS system operation.
- Installation of up to 6 new/replacement monitoring wells to assist in monitoring the progress/effectiveness of the remedial system and to replace the well point monitoring locations, which have exhibited increasingly poor recharge characteristics.

Ongoing system modifications will be completed during the January-June 1999 operational period. The June 1999 ground-water sampling event will incorporate data from new monitoring wells.



LEGEND

MW-NASB-044 (70.32) — MONITORING WELL LOCATION
WATER TABLE ELEVATION (FT, MSL)
NS = LOCATION NOT GAUGED.
DRY = WELL DRY DURING GAUGING EVENT

WP-1 (70.38) — WELL POINT LOCATION
WATER TABLE ELEVATION (FT, MSL)
NS = LOCATION NOT GAUGED.
DRY = WELL POINT DRY DURING GAUGING EVENT

CHAIN LINK FENCE

SOIL VAPOR EXTRACTION LINE

AIR SPARGING LINE

INTERPRETED DIRECTION OF GROUND-WATER FLOW

62.00 — WATER TABLE ELEVATION CONTOUR (FT, MSL); DASHED WHERE INFERRED

CONTOUR INTERVAL = 2.0 FT

NOTE:

1. BIOSPARGING SYSTEM WAS NOT ACTIVE DURING 3 DECEMBER 1998 GAUGING EVENT.
2. CONTOURS SHOWN REPRESENT EA'S EVALUATION OF THE PROBABLE CONDITIONS BASED UPON INTERPRETATION OF THE PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS COULD BE EXPECTED.

0 85
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFO&M\JULDEC98\FIG3-1.DWG

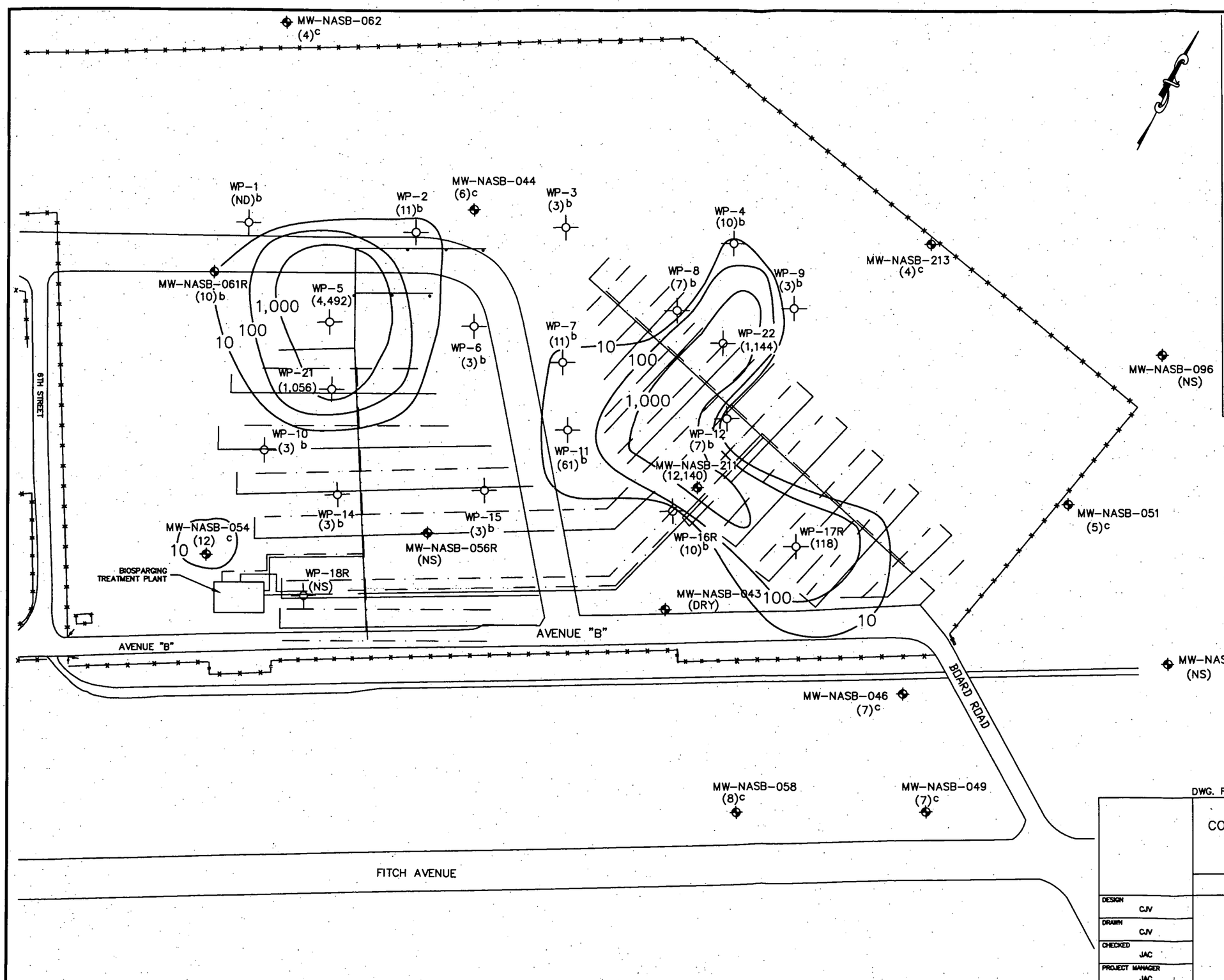
INTERPRETED GROUND-WATER ELEVATION CONTOUR MAP BASED ON DATA COLLECTED 3 DECEMBER 1998
OLD NAVY FUEL FARM, NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 3-1

DESIGN	CJV
DRAWN	CJV
CHECKED	JAC
PROJECT MANAGER	JAC

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
BALTIMORE CHICAGO LINCOLN NEW YORK NEW JERSEY ATLANTA DALLAS LOS ANGELES SAN FRANCISCO
3 WASHINGTON CENTER NEWBURGH, NEW YORK 12550 (914) 565-8100

DATE	15 JANUARY 1999
SCALE	AS SHOWN
PROJECT NO.	29600.35
FILE NAME:	FFWTDC99.DWG



LEGEND

MW-NASB-044 (6)	MONITORING WELL LOCATION DISSOLVED-PHASE BTEX CONCENTRATION, µg/L NS = LOCATION NOT SAMPLED ND = NOT DETECTED
WP-1 (ND)	WELL POINT LOCATION DISSOLVED-PHASE BTEX CONCENTRATION, µg/L NS = LOCATION NOT SAMPLED ND = NOT DETECTED
	CHAIN LINK FENCE
	SOIL VAPOR EXTRACTION LINE
	AIR SPARGING LINE
100	INTERPRETED GROUND-WATER DISSOLVED-PHASE BTEX CONCENTRATION ISOPLETH

NOTE:

a. BIOSPARGING SYSTEM NOT ACTIVE DURING 8-9 DECEMBER 1998 SAMPLING EVENT.

b. TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES REPORTED ≤2 µg/L NOT INCLUDED IN TOTAL BTEX DUE TO TRIP AND RINSATE BLANK DETECTIONS.

c. TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES CONCENTRATIONS SUSPECT ≤2 µg/L TOTAL BTEX CONCENTRATION MAY BE OVER-ESTIMATED.

d. CONTOURS SHOWN REPRESENT EA'S EVALUATION OF THE PROBABLE CONDITIONS BASED UPON INTERPRETATION OF THE PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS COULD BE EXPECTED.

BTEX INTERPRETED ISOPLETH INTERVAL

10 µg/L
100 µg/L
1,000 µg/L

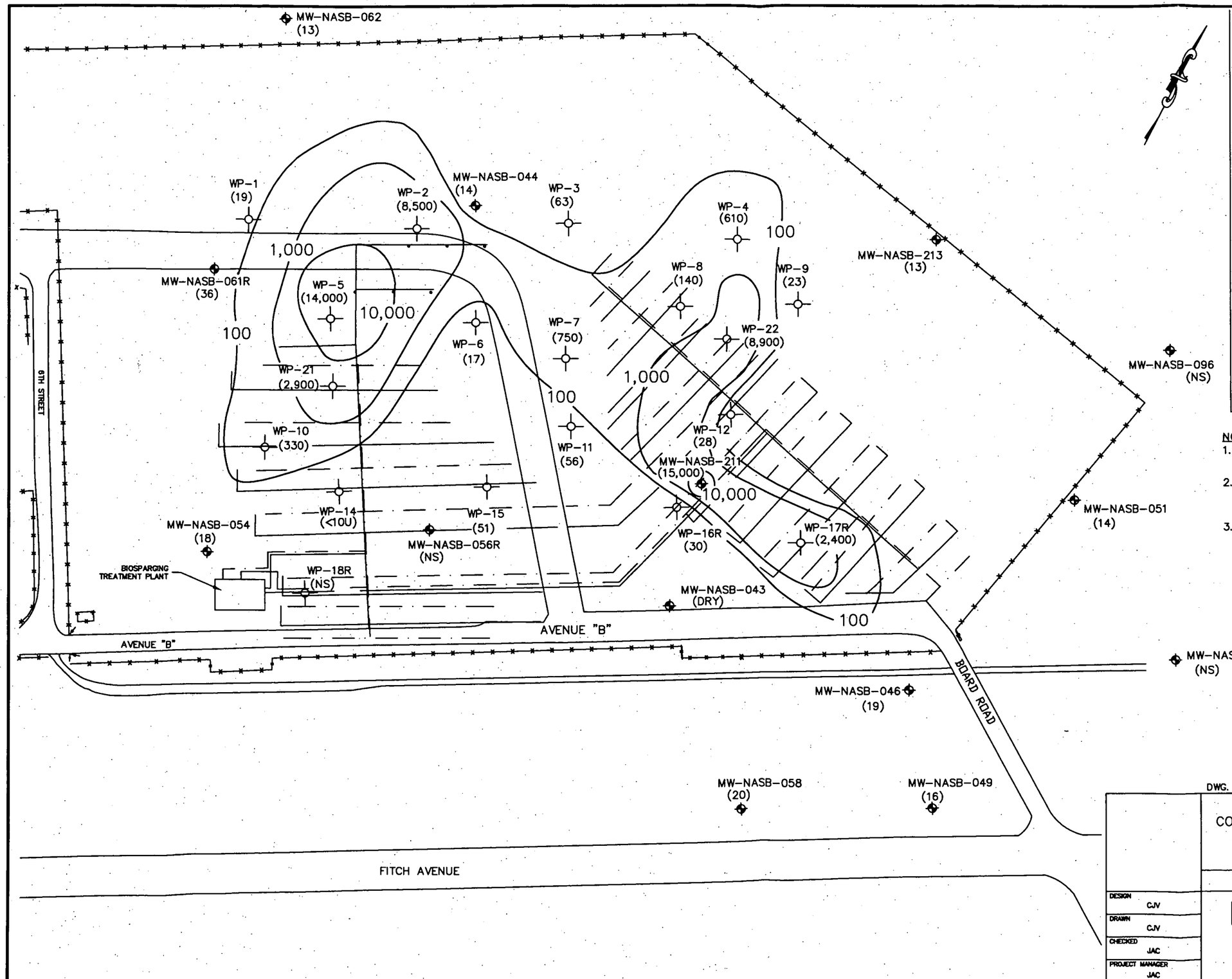
0 85
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\OLDNVYFF\JULDEC98\FIG3-2.DWG

INTERPRETED DISSOLVED-PHASE BTEX CONCENTRATION ISOPLETH MAP, GROUND-WATER SAMPLES COLLECTED 8-9 DECEMBER 1998
OLD NAVY FUEL FARM, NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 3-2

DESIGN CJV	EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.	DATE 10 FEBRUARY 1999
DRAWN CJV		SCALE AS SHOWN
CHECKED JAC	BALTIMORE CHICAGO LINCOLN NEW YORK NEW JERSEY ATLANTA DALLAS LOS ANGELES SAN FRANCISCO	PROJECT NO. 29600.35
PROJECT MANAGER JAC	3 WASHINGTON CENTER NEWBURGH, NEW YORK 12550 (914) 565-6100	FILE NAME: FFDECBTX.DWG



LEGEND

MW-NASB-044 (14) — MONITORING WELL LOCATION DISSOLVED-PHASE TPH-GRO CONCENTRATION, µg/L NS = LOCATION NOT SAMPLED

WP-1 (19) — WELL POINT LOCATION DISSOLVED-PHASE TPH-GRO CONCENTRATION, µg/L NS = LOCATION NOT SAMPLED (<10U) = NOT DETECTED > 10 µg/L

CHAIN LINK FENCE

SOIL VAPOR EXTRACTION LINE

AIR SPARGING LINE

100 — INTERPRETED GROUND-WATER DISSOLVED-PHASE TPH-GRO CONCENTRATION ISOPLETH

NOTE:

1. BIOSPARGING SYSTEM NOT ACTIVE DURING 8-9 DECEMBER 1998 SAMPLING EVENT.
2. TPH-GRO REPORTED AT 53 µg/L IN RINSATE BLANK FOR MONITORING WELL SAMPLES AND AT 35 µg/L IN RINSATE BLANK FOR WELL POINT SAMPLES.
3. CONTOURS SHOWN REPRESENT EA'S EVALUATION OF THE PROBABLE CONDITIONS BASED UPON INTERPRETATION OF THE PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS COULD BE EXPECTED.

TPH AS GASOLINE RANGE ORGANICS (TPH-GRO) ISOPLETH INTERVAL

100 µg/L
1,000 µg/L
10,000 µg/L

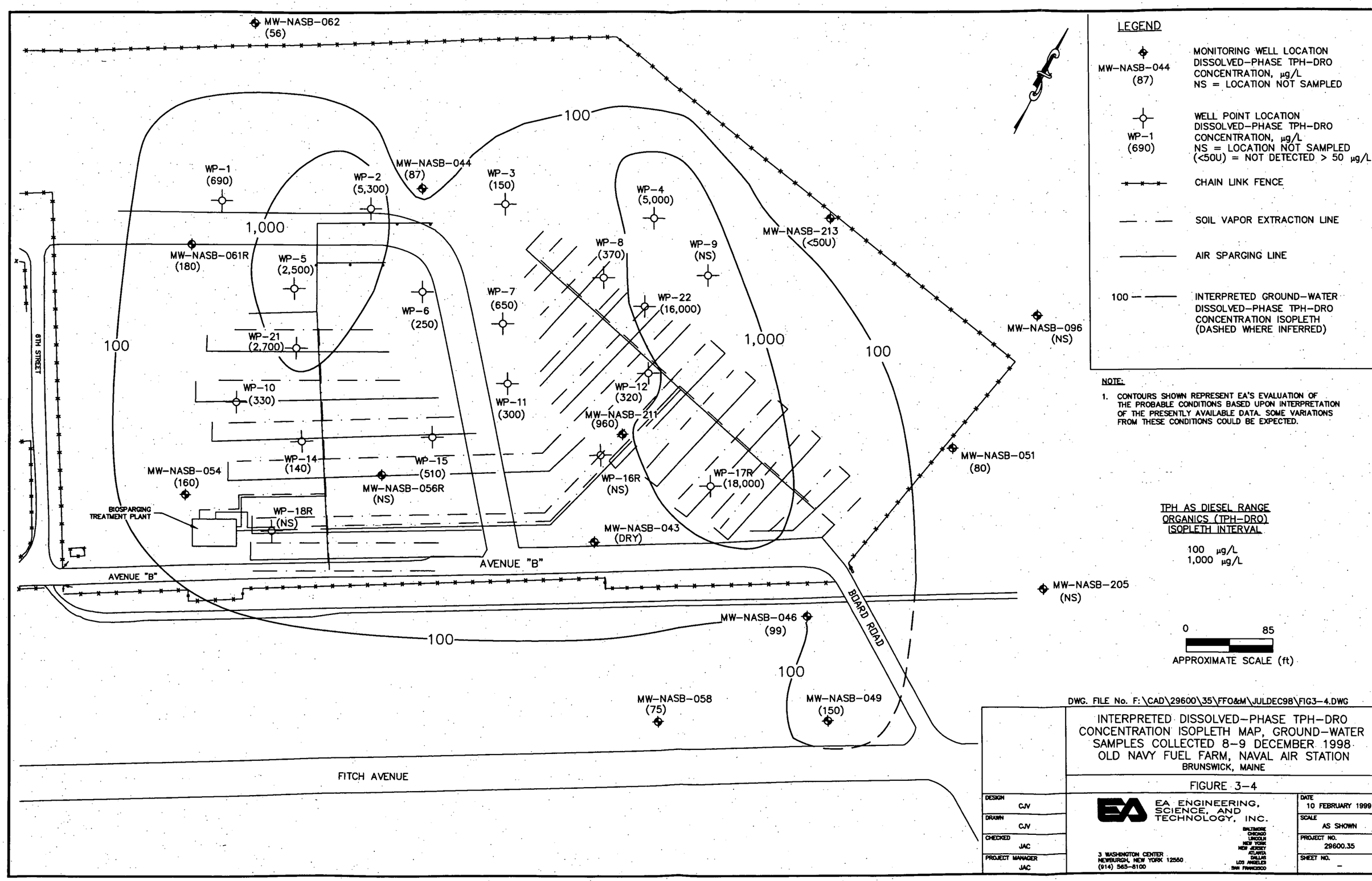
0 — 85
APPROXIMATE SCALE (ft)

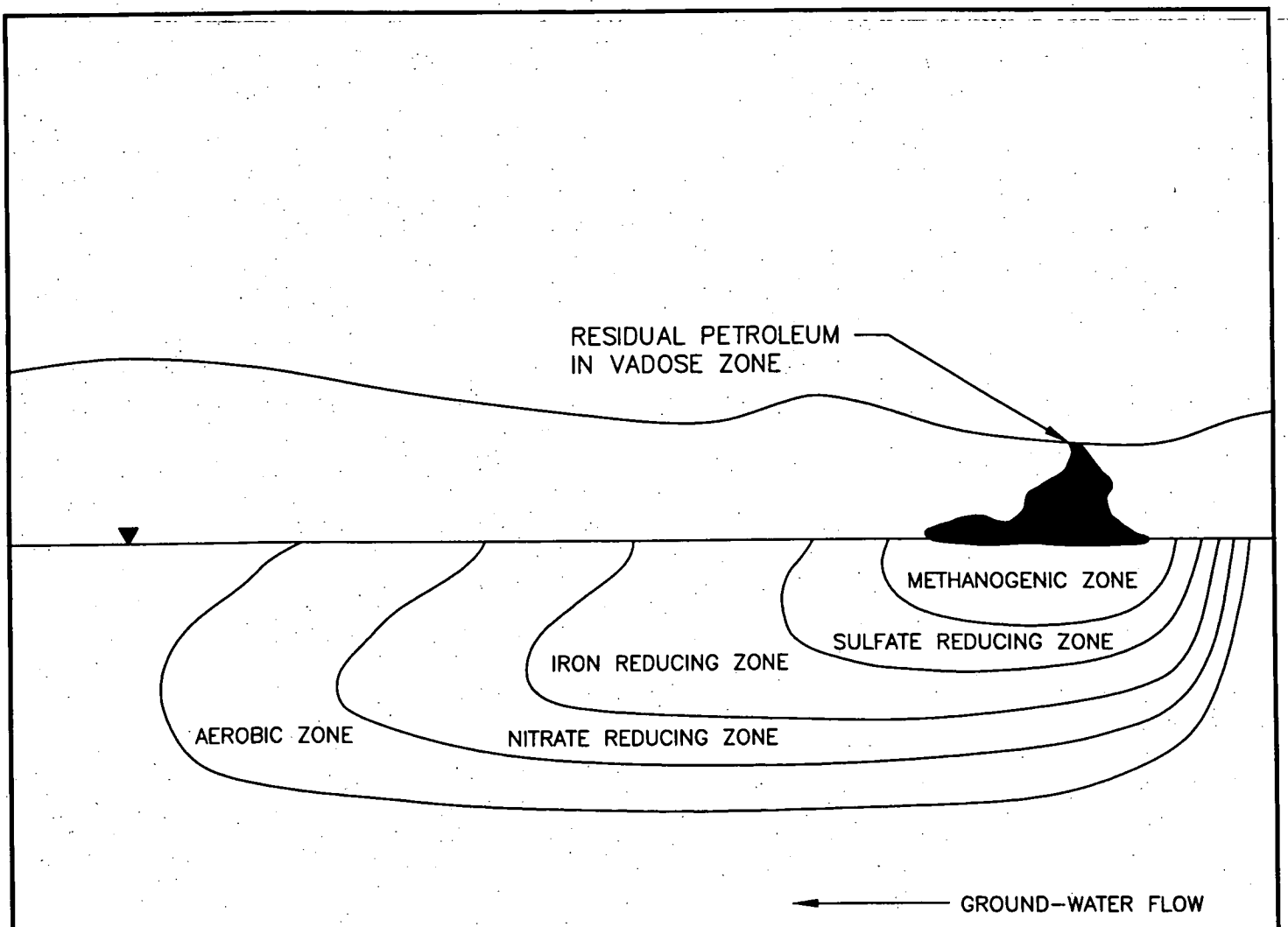
DWG. FILE No. F:\CAD\29600\35OLDNVYFF\JULDEC98\FIG3-3.DWG

INTERPRETED DISSOLVED-PHASE TPH-GRO CONCENTRATION ISOPLETH MAP, GROUND-WATER SAMPLES COLLECTED 8-9 DECEMBER 1998
OLD NAVY FUEL FARM, NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 3-3

DESIGN: CJV	EA ENGINEERING, SCIENCE, AND TECHNOLOGY	DATE: 10 FEBRUARY 1999
DRAWN: CJV	BALTIMORE, CHICAGO, LINCOLN, NEW YORK, NEW JERSEY, ATLANTA, DALLAS, LOS ANGELES, SAN FRANCISCO	SCALE: AS SHOWN
CHECKED: JAC	3 WASHINGTON CENTER NEWBURGH, NEW YORK 12550 (914) 565-8100	PROJECT NO. 29600.35
PROJECT MANAGER: JAC		FILE NAME: FFDECGRO.DWG


MW-NASB-062
(56)
100
MW-NASB-044
(87)
WP-1
(690)
WP-2
(5,300)
WP-3
(150)
WP-4
(5,000)
1,000
MW-NASB-061R
(180)
WP-5
(2,500)
WP-6
(250)
WP-7
(650)
WP-8
(370)
WP-9
(NS)
WP-22
(16,000)
MW-NASB-213
(<50U)
MW-NASB-096
(NS)
WP-21
(2,700)
WP-10
(330)
WP-11
(300)
WP-12
(320)
MW-NASB-211
(960)
WP-14
(140)
WP-15
(510)
MW-NASB-056R
(NS)
MW-NASB-054
(160)
WP-16R
(NS)
WP-17R
(18,000)
MW-NASB-051
(80)
BIOSPARGING TREATMENT PLANT
WP-18R
(NS)
MW-NASB-043
(DRY)
8TH STREET
AVENUE "B"
BOARD ROAD
MW-NASB-205
(NS)
MW-NASB-046
(99)
MW-NASB-058
(75)
MW-NASB-049
(150)
FITCH AVENUE
LEGEND
MW-NASB-044 (87) — MONITORING WELL LOCATION DISSOLVED-PHASE TPH-DRO CONCENTRATION, µg/L NS = LOCATION NOT SAMPLED
WP-1 (690) — WELL POINT LOCATION DISSOLVED-PHASE TPH-DRO CONCENTRATION, µg/L NS = LOCATION NOT SAMPLED (<50U) = NOT DETECTED > 50 µg/L
CHAIN LINK FENCE
SOIL VAPOR EXTRACTION LINE
AIR SPARGING LINE
100 — INTERPRETED GROUND-WATER DISSOLVED-PHASE TPH-DRO CONCENTRATION ISOPLETH (DASHED WHERE INFERRED)
NOTE:
1. CONTOURS SHOWN REPRESENT EA'S EVALUATION OF THE PROBABLE CONDITIONS BASED UPON INTERPRETATION OF THE PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS COULD BE EXPECTED.
TPH AS DIESEL RANGE ORGANICS (TPH-DRO) ISOPLETH INTERVAL
100 µg/L
1,000 µg/L
0
85
APPROXIMATE SCALE (ft)
DWG. FILE No. F:\CAD\29600\35\FFO&M\JULDEC98\FIG3-4.DWG
INTERPRETED DISSOLVED-PHASE TPH-DRO CONCENTRATION ISOPLETH MAP, GROUND-WATER SAMPLES COLLECTED 8-9 DECEMBER 1998 OLD NAVY FUEL FARM, NAVAL AIR STATION BRUNSWICK, MAINE
FIGURE 3-4
DESIGN CJV
DRAWN CJV
CHECKED JAC
PROJECT MANAGER JAC
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
BALTIMORE CHICAGO LINCOLN NEW YORK NEW JERSEY ATLANTA DALLAS LOS ANGELES SAN FRANCISCO
3 WASHINGTON CENTER NEWBURGH, NEW YORK 12550 (914) 565-8100
DATE 10 FEBRUARY 1999
SCALE AS SHOWN
PROJECT NO. 29600.35
SHEET NO. –



NOTES:

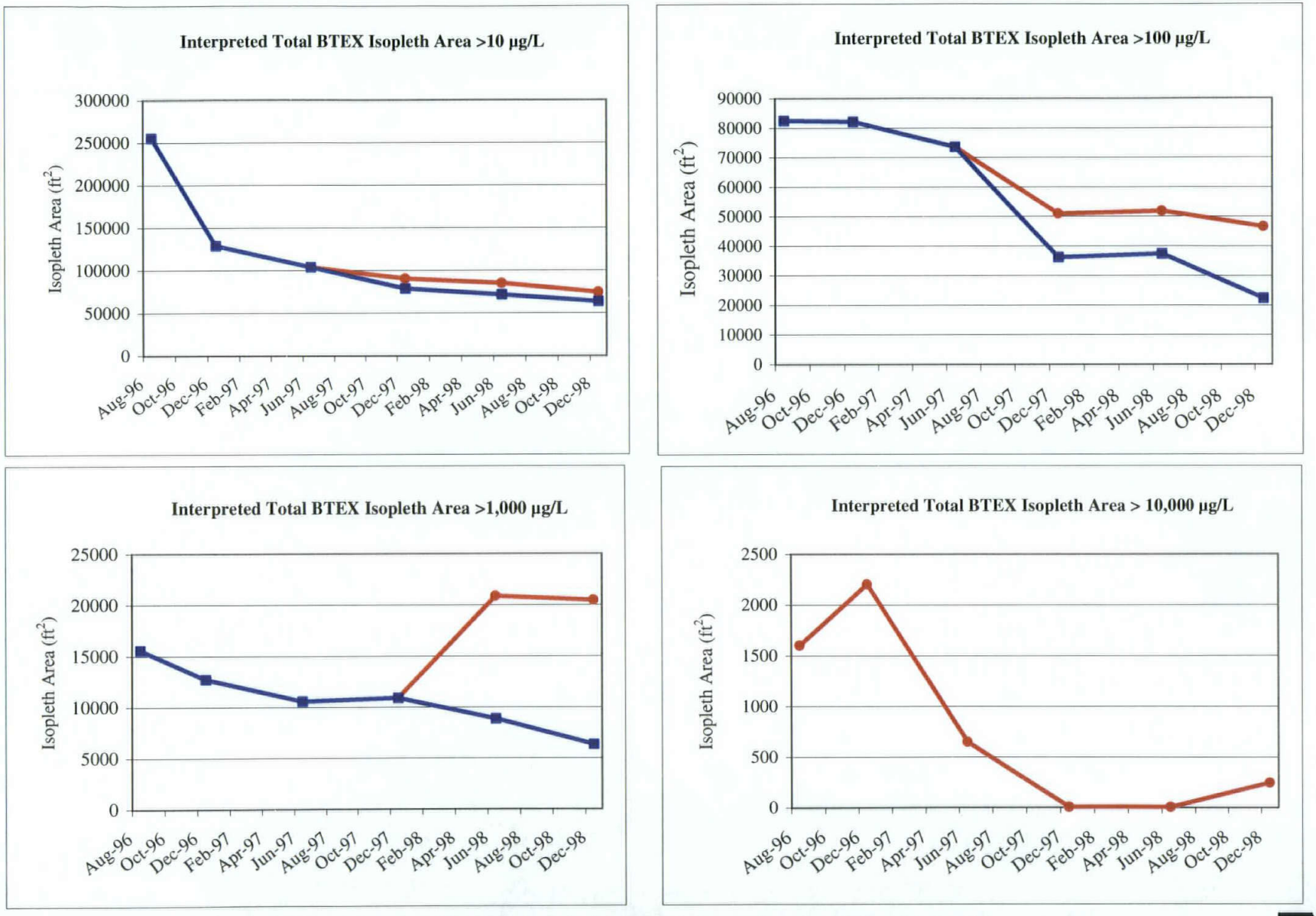
1) FIGURE TAKEN FROM NAVAL FACILITIES ENGINEERING SERVICE CENTER TECHNICAL REPORT ENTITLED "INTRINSIC BIOREMEDIATION OF PETROLEUM HYDROCARBONS" (JUNE 1996).

2) GROUND-WATER ZONES REPRESENT IDEALIZED CONDITIONS.

DWG. FILE No. P:\CAD\29600\35\FFOAM\JULDEC96\FIG3-5.DWG

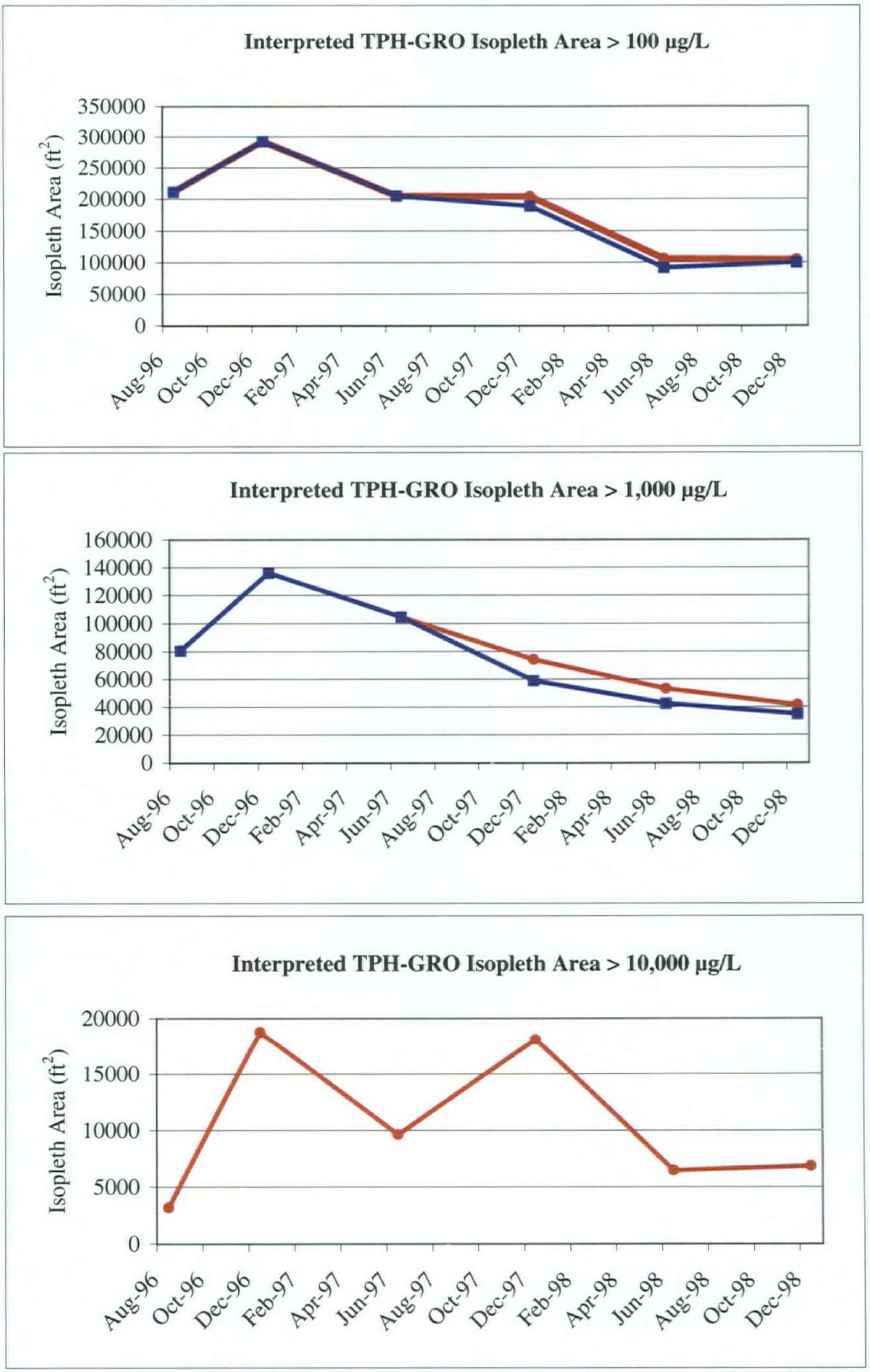
EA ENGINEERING, SCIENCE, AND TECHNOLOGY	OLD NAVY FUEL FARM NAVAL AIR STATION BRUNSWICK, MAINE	FIGURE 3-5 GROUND-WATER ZONES RESULTING FROM PREFERENTIAL USE OF ELECTRON ACCEPTORS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
JAC	CJV	CJV	JAC	N.T.S.	15 AUG. 97	29600.35	FIG3-5



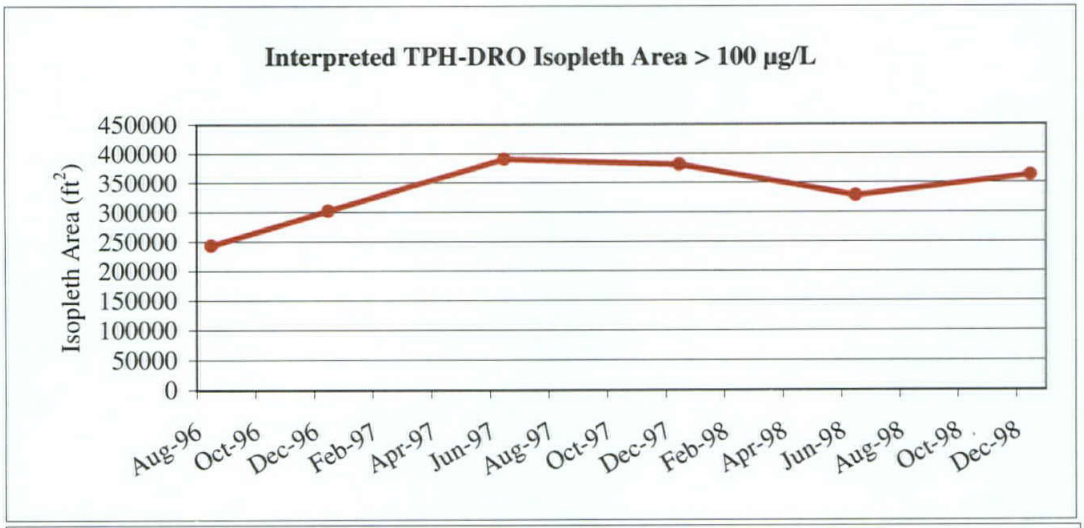
NOTE: Red line (●) includes WP-21 and WP-22 data. Blue line (■) excludes WP-21, installed prior to December 1997 sampling event.

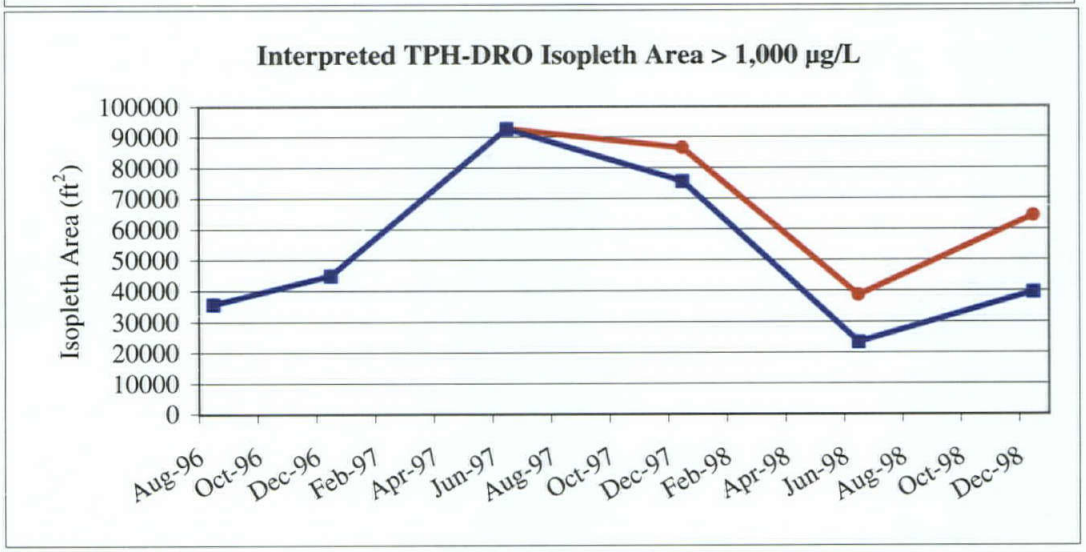
Figure 3-6. Historical dissolved-phase BTEX concentrations in ground water, Old Navy Fuel Farm, Naval Air Station, Brunswick, Maine.

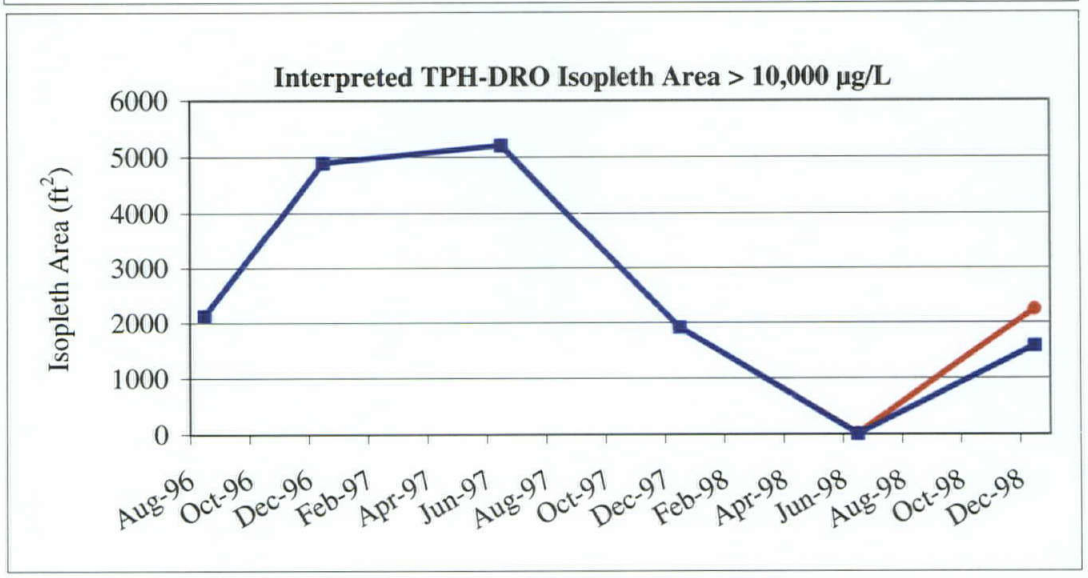


NOTE: Red line includes WP-21 and WP-22 data. Blue line excludes WP-21, installed prior to December 1997 sampling event.

Figure 3-7. Historical dissolved-phase TPH-GRO concentrations in ground water, Old Navy Fuel Farm, Naval Air Station, Brunswick, Maine.







NOTE: Red line includes WP-21 and WP-22 data. Blue line excludes WP-21, installed prior to December 1997 sampling event.

Figure 3-8. Historical dissolved-phase TPH-DRO concentrations in ground water, Old Navy Fuel Farm, Naval Air Station, Brunswick, Maine.

TABLE 3-1 SUMMARY OF WELL GAUGING DATA COLLECTED FROM 1 JULY THROUGH 31 DECEMBER 1998 OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
WP-1					
13 JUL 1998	74.84	4.23	---	---	70.61
21 JUL 1998	74.84	5.05	---	---	69.79
05 AUG 1998	74.84	5.66	---	---	69.18
26 AUG 1998	74.84	4.35	---	---	70.49
10 SEP 1998	74.84	5.21	---	---	69.63
25 SEP 1998	74.84	5.85	---	---	68.99
01 OCT 1998	74.84	5.55	---	---	69.29
22 OCT 1998	74.84	4.36	---	---	70.48
11 NOV 1998	74.84	3.55	---	---	71.29
23 NOV 1998	74.84	3.99	---	---	70.85
03 DEC 1998	74.84	4.46	---	---	70.38
10 DEC 1998	74.84	4.56	---	---	70.38
21 DEC 1998	74.84	4.93	---	---	69.91
WP-2					
13 JUL 1998	75.25	5.14	---	---	70.11
21 JUL 1998	75.25	5.69	---	---	69.56
05 AUG 1998	75.25	6.14	---	---	69.11
26 AUG 1998	75.25	5.49	---	---	69.76
10 SEP 1998	75.25	5.91	---	---	69.34
25 SEP 1998	75.25	6.30	---	---	68.95
01 OCT 1998	75.25	6.18	---	---	69.07
22 OCT 1998	75.25	5.07	---	---	70.18
11 NOV 1998	75.25	5.45	---	---	69.80
23 NOV 1998	75.25	5.07	---	---	70.18
03 DEC 1998	75.25	5.21	---	---	70.04
10 DEC 1998	75.25	5.20	---	---	70.05
21 DEC 1998	75.25	5.41	---	---	69.84

NOTE: LNAPL = Light, non-aqueous phase liquid; MSL = Mean sea level.
Dashes (---) indicate LNAPL not detected.
Biosparging system inactive during 30 November – 31 December 1998.

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
WP-3					
13 JUL 1998	74.16	4.73	---	---	69.43
21 JUL 1998	74.16	4.29	---	---	69.87
05 AUG 1998	74.16	4.93	---	---	69.23
26 AUG 1998	74.16	4.68	---	---	69.48
10 SEP 1998	74.16	4.97	---	---	69.19
25 SEP 1998	74.16	5.38	---	---	68.78
01 OCT 1998	74.16	5.30	---	---	68.86
22 OCT 1998	74.16	3.68	---	---	70.48
11 NOV 1998	74.16	3.93	---	---	70.23
23 NOV 1998	74.16	3.99	---	---	70.17
03 DEC 1998	74.16	4.06	---	---	70.10
10 DEC 1998	74.16	4.21	---	---	69.95
21 DEC 1998	74.16	4.29	---	---	69.87
WP-4					
13 JUL 1998	76.18	5.05	---	---	71.13
21 JUL 1998	76.18	5.75	---	---	70.43
05 AUG 1998	76.18	6.53	---	---	69.65
26 AUG 1998	76.18	6.69	---	---	69.49
10 SEP 1998	76.18	4.03	---	---	72.15
25 SEP 1998	76.18	7.45	---	---	68.73
01 OCT 1998	76.18	7.36	---	---	68.82
22 OCT 1998	76.18	4.61	---	---	71.57
11 NOV 1998	76.18	5.22	---	---	70.96
23 NOV 1998	76.18	4.78	---	---	71.40
03 DEC 1998	76.18	4.91	---	---	71.27
10 DEC 1998	76.18	5.38	---	---	70.80
21 DEC 1998	76.18	5.65	---	---	70.53
WP-5					
13 JUL 1998	74.64	5.22	---	---	69.42
21 JUL 1998	74.64	5.57	---	---	69.07
05 AUG 1998	74.64	5.87	---	---	68.77
26 AUG 1998	74.64	5.61	---	---	69.03
10 SEP 1998	74.64	4.82	---	---	69.82
25 SEP 1998	74.64	6.07	---	---	68.57
01 OCT 1998	74.64	5.99	---	---	68.65
22 OCT 1998	74.64	5.04	---	---	69.60
11 NOV 1998	74.64	3.86	---	---	70.78
23 NOV 1998	74.64	5.28	---	---	69.36
03 DEC 1998	74.64	5.33	---	---	69.31
10 DEC 1998	74.64	5.50	---	---	69.14
21 DEC 1998	74.64	5.85	---	---	68.79

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
WP-6					
13 JUL 1998	73.72	4.14	---	---	69.58
21 JUL 1998	73.72	4.65	---	---	69.07
05 AUG 1998	73.72	5.05	---	---	68.67
26 AUG 1998	73.72	4.68	---	---	69.04
10 SEP 1998	73.72	2.99	---	---	70.73
25 SEP 1998	73.72	5.31	---	---	68.41
01 OCT 1998	73.72	5.19	---	---	68.53
22 OCT 1998	73.72	4.08	---	---	69.64
11 NOV 1998	73.72	5.35	---	---	68.37
23 NOV 1998	73.72	4.21	---	---	69.51
03 DEC 1998	73.72	4.23	---	---	69.49
10 DEC 1998	73.72	4.53	---	---	69.19
21 DEC 1998	73.72	4.61	---	---	69.11
WP-7					
13 JUL 1998	73.92	4.47	---	---	69.45
21 JUL 1998	73.92	5.04	---	---	68.88
05 AUG 1998	73.92	5.50	---	---	68.42
26 AUG 1998	73.92	5.09	---	---	68.83
10 SEP 1998	73.92	5.31	---	---	68.61
25 SEP 1998	73.92	5.77	---	---	68.15
01 OCT 1998	73.92	5.63	---	---	68.29
22 OCT 1998	73.92	4.27	---	---	69.65
11 NOV 1998	73.92	3.70	---	---	70.22
23 NOV 1998	73.92	4.16	---	---	69.76
03 DEC 1998	73.92	4.30	---	---	69.62
10 DEC 1998	73.92	4.39	---	---	69.53
21 DEC 1998	73.92	4.57	---	---	69.35
WP-8					
13 JUL 1998	74.99	4.83	---	---	70.16
21 JUL 1998	74.99	5.45	---	---	69.54
05 AUG 1998	74.99	5.96	---	---	69.03
26 AUG 1998	74.99	5.83	---	---	69.16
10 SEP 1998	74.99	7.88	---	---	67.11
25 SEP 1998	74.99	6.67	---	---	68.32
01 OCT 1998	74.99	6.40	---	---	68.59
22 OCT 1998	74.99	4.45	---	---	70.54
11 NOV 1998	74.99	5.47	---	---	69.52
23 NOV 1998	74.99	4.87	---	---	70.12
03 DEC 1998	74.99	4.89	---	---	70.10
10 DEC 1998	74.99	5.25	---	---	69.74
21 DEC 1998	74.99	5.42	---	---	69.57

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
WP-9					
13 JUL 1998	75.46	5.32	---	---	70.14
21 JUL 1998	75.46	5.91	---	---	69.55
05 AUG 1998	75.46	7.05	---	---	68.41
26 AUG 1998	75.46	Data not available (dry)			
10 SEP 1998	75.46	Data not available (dry)			
25 SEP 1998	75.46	Data not available (dry)			
01 OCT 1998	75.46	Data not available (dry)			
22 OCT 1998	75.46	4.88	---	---	70.58
11 NOV 1998	75.46	6.37	---	---	69.09
23 NOV 1998	75.46	6.70	---	---	68.76
03 DEC 1998	75.46	6.34	---	---	69.12
10 DEC 1998	75.46	6.78	---	---	68.68
21 DEC 1998	75.46	Data not available (dry)			
WP-10					
13 JUL 1998	74.83	4.86	---	---	69.97
21 JUL 1998	74.83	5.64	---	---	69.19
05 AUG 1998	74.83	6.27	---	---	68.56
26 AUG 1998	74.83	6.17	---	---	68.66
10 SEP 1998	74.83	5.42	---	---	69.41
25 SEP 1998	74.83	6.79	---	---	68.04
01 OCT 1998	74.83	6.64	---	---	68.19
22 OCT 1998	74.83	4.38	---	---	70.45
11 NOV 1998	74.83	5.09	---	---	69.74
23 NOV 1998	74.83	4.95	---	---	69.88
03 DEC 1998	74.83	5.11	---	---	69.72
10 DEC 1998	74.83	5.34	---	---	69.49
21 DEC 1998	74.83	5.64	---	---	69.19
WP-11					
13 JUL 1998	74.06	4.96	---	---	69.10
21 JUL 1998	74.06	5.37	---	---	68.69
05 AUG 1998	74.06	5.82	---	---	68.24
26 AUG 1998	74.06	5.52	---	---	68.54
10 SEP 1998	74.06	4.71	---	---	69.35
25 SEP 1998	74.06	6.16	---	---	67.90
01 OCT 1998	74.06	6.02	---	---	68.04
22 OCT 1998	74.06	4.70	---	---	69.36
11 NOV 1998	74.06	5.03	---	---	69.03
23 NOV 1998	74.06	4.98	---	---	69.08
03 DEC 1998	74.06	5.00	---	---	69.06
10 DEC 1998	74.06	5.20	---	---	68.86
21 DEC 1998	74.06	5.28	---	---	68.78

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
WP-12					
13 JUL 1998	75.12	6.41	---	---	68.71
21 JUL 1998	75.12	6.89	---	---	68.23
05 AUG 1998	75.12	7.70	---	---	67.42
26 AUG 1998	75.12	Data not available (dry)			
10 SEP 1998	75.12	Data not available (dry)			
25 SEP 1998	75.12	Data not available (dry)			
01 OCT 1998	75.12	Data not available (dry)			
22 OCT 1998	75.12	5.78	---	---	69.34
11 NOV 1998	75.12	7.10	---	---	68.02
23 NOV 1998	75.12	6.95	---	---	65.17
03 DEC 1998	75.12	6.62	---	---	68.50
10 DEC 1998	75.12	7.05	---	---	68.07
21 DEC 1998	75.12	7.40	---	---	67.72
WP-14					
13 JUL 1998	75.18	5.52	---	---	69.66
21 JUL 1998	75.18	6.16	---	---	69.02
05 AUG 1998	75.18	6.78	---	---	68.40
26 AUG 1998	75.18	6.67	---	---	68.51
10 SEP 1998	75.18	6.94	---	---	68.24
25 SEP 1998	75.18	7.27	---	---	67.91
01 OCT 1998	75.18	7.16	---	---	68.02
22 OCT 1998	75.18	5.08	---	---	70.10
11 NOV 1998	75.18	5.98	---	---	69.20
23 NOV 1998	75.18	5.87	---	---	69.31
03 DEC 1998	75.18	5.75	---	---	69.43
10 DEC 1998	75.18	6.17	---	---	69.01
21 DEC 1998	75.18	6.39	---	---	68.79
WP-15					
13 JUL 1998	74.54	5.40	---	---	69.14
21 JUL 1998	74.54	5.92	---	---	68.62
05 AUG 1998	74.54	6.51	---	---	68.03
26 AUG 1998	74.54	6.20	---	---	68.34
10 SEP 1998	74.54	6.21	---	---	68.33
25 SEP 1998	74.54	6.84	---	---	67.70
01 OCT 1998	74.54	6.81	---	---	67.73
22 OCT 1998	74.54	5.01	---	---	69.53
11 NOV 1998	74.54	5.66	---	---	68.88
23 NOV 1998	74.54	5.59	---	---	68.95
03 DEC 1998	74.54	5.48	---	---	69.06
10 DEC 1998	74.54	5.89	---	---	68.65
21 DEC 1998	74.54	6.08	---	---	68.46

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
WP-16R					
13 JUL 1998	73.33	6.12	---	---	67.21
21 JUL 1998	73.33	6.81	---	---	66.52
05 AUG 1998	73.33	7.78	---	---	65.55
26 AUG 1998	73.33	8.40	---	---	64.93
10 SEP 1998	73.33	8.69	---	---	64.64
25 SEP 1998	73.33	9.03	---	---	64.30
01 OCT 1998	73.33	9.05	---	---	64.28
22 OCT 1998	73.33	5.28	---	---	68.05
11 NOV 1998	73.33	7.00	---	---	66.33
23 NOV 1998	73.33	7.28	---	---	66.05
03 DEC 1998	73.33	Data not available (dry)			
10 DEC 1998	73.33	7.29	---	---	66.04
21 DEC 1998	73.33	7.65	---	---	65.68
WP-17R					
13 JUL 1998	74.74	6.78	---	---	67.96
21 JUL 1998	74.74	7.31	---	---	67.43
05 AUG 1998	74.74	8.02	---	---	66.72
26 AUG 1998	74.74	8.49	---	---	66.25
10 SEP 1998	74.74	8.69	---	---	66.05
25 SEP 1998	74.74	9.68	---	---	65.06
01 OCT 1998	74.74	8.96	---	---	65.78
22 OCT 1998	74.74	6.07	---	---	68.67
11 NOV 1998	74.74	7.46	---	---	67.28
23 NOV 1998	74.74	7.53	---	---	67.21
03 DEC 1998	74.74	7.10	---	---	67.64
10 DEC 1998	74.74	7.45	---	---	67.29
21 DEC 1998	74.74	7.82	---	---	66.92
WP-18R					
13 JUL 1998	74.81	5.59	---	---	69.22
21 JUL 1998	74.81	6.39	---	---	68.42
05 AUG 1998	74.81	7.20	---	---	67.61
26 AUG 1998	74.81	7.05	---	---	67.76
10 SEP 1998	74.81	7.57	---	---	67.24
25 SEP 1998	74.81	7.65	---	---	67.16
01 OCT 1998	74.81	7.63	---	---	67.18
22 OCT 1998	74.81	5.05	---	---	69.76
11 NOV 1998	74.81	6.08	---	---	68.73
23 NOV 1998	74.81	6.23	---	---	68.58
03 DEC 1998	74.81	6.15	---	---	68.66
10 DEC 1998	74.81	6.48	---	---	68.33
21 DEC 1998	74.81	6.64	---	---	68.17

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
WP-21					
13 JUL 1998	75.77	5.78	---	---	69.99
21 JUL 1998	75.77	6.47	---	---	69.30
05 AUG 1998	75.77	7.00	---	---	68.77
26 AUG 1998	75.77	6.93	---	---	68.84
10 SEP 1998	75.77	7.13	---	---	68.64
25 SEP 1998	75.77	7.49	---	---	68.28
01 OCT 1998	75.77	7.30	---	---	68.47
22 OCT 1998	75.77	5.48	---	---	70.29
11 NOV 1998	75.77	6.05	---	---	69.72
23 NOV 1998	75.77	6.05	---	---	69.72
03 DEC 1998	75.77	6.18	---	---	69.59
10 DEC 1998	75.77	6.30	---	---	69.47
21 DEC 1998	75.77	6.53	---	---	69.24
WP-22					
13 JUL 1998	76.10	5.85	---	---	70.25
21 JUL 1998	76.10	6.49	---	---	69.61
05 AUG 1998	76.10	7.00	---	---	69.10
26 AUG 1998	76.10	7.03	---	---	69.07
10 SEP 1998	76.10	7.23	---	---	68.87
25 SEP 1998	76.10	7.89	---	---	68.21
01 OCT 1998	76.10	7.72	---	---	68.38
22 OCT 1998	76.10	5.65	---	---	70.45
11 NOV 1998	76.10	6.35	---	---	69.75
23 NOV 1998	76.10	6.07	---	---	70.03
03 DEC 1998	76.10	7.08	---	---	69.02
10 DEC 1998	76.10	6.51	---	---	69.59
21 DEC 1998	76.10	6.51	---	---	69.59
MW-NASB-043					
13 JUL 1998	73.88	6.19	---	---	67.69
21 JUL 1998	73.88	Data not available (dry)			
05 AUG 1998	73.88	Data not available (dry)			
26 AUG 1998	73.88	Data not available (dry)			
10 SEP 1998	73.88	Data not available (dry)			
25 SEP 1998	73.88	Data not available (dry)			
01 OCT 1998	73.88	Data not available (dry)			
22 OCT 1998	73.88	6.15	---	---	67.73
11 NOV 1998	73.88	Data not available (dry)			
23 NOV 1998	73.88	6.77	---	---	67.11
03 DEC 1998	73.88	Data not available (dry)			
09 DEC 1998		Data not available (dry)			
21 DEC 1998	73.88	7.10	---	---	66.78

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
MW-NASB-044					
13 JUL 1998	73.18	2.72	---	---	70.46
21 JUL 1998	73.18	3.14	---	---	70.04
05 AUG 1998	73.18	6.75	---	---	66.43
26 AUG 1998	73.18	3.26	---	---	69.92
10 SEP 1998	73.18	3.62	---	---	69.56
25 SEP 1998	73.18	4.02	---	---	69.16
01 OCT 1998	73.18	3.94	---	---	69.24
22 OCT 1998	73.18	2.70	---	---	70.48
11 NOV 1998	73.18	2.14	---	---	71.04
23 NOV 1998	73.18	2.82	---	---	70.36
03 DEC 1998	73.18	2.86	---	---	70.32
09 DEC 1998	73.18	2.92	---	---	70.26
21 DEC 1998	73.18	3.05	---	---	70.13
MW-NASB-046					
10 SEP 1998	71.02	5.42	---	---	65.60
25 SEP 1998	71.02	6.12	---	---	64.90
01 OCT 1998	71.02	6.10	---	---	64.92
22 OCT 1998	71.02	4.13	---	---	66.89
11 NOV 1998	71.02	6.41	---	---	64.61
23 NOV 1998	71.02	4.90	---	---	66.12
03 DEC 1998	71.02	4.71	---	---	66.31
08 DEC 1998	71.02	5.00	---	---	66.02
21 DEC 1998	71.02	5.27	---	---	65.75
MW-NASB-049					
13 JUL 1998	66.97	5.62	---	---	61.35
21 JUL 1998	66.97	5.91	---	---	61.06
05 AUG 1998	66.97	6.22	---	---	60.75
26 AUG 1998	66.97	5.71	---	---	61.26
10 SEP 1998	66.97	5.93	---	---	61.04
25 SEP 1998	66.97	8.22	---	---	58.75
01 OCT 1998	66.97	6.10	---	---	60.87
22 OCT 1998	66.97	5.61	---	---	61.36
11 NOV 1998	66.97	5.78	---	---	61.19
23 NOV 1998	66.97	5.59	---	---	61.38
03 DEC 1998	66.97	5.61	---	---	61.36
08 DEC 1998	66.97	5.70	---	---	61.27
21 DEC 1998	66.97	5.67	---	---	61.30

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
MW-NASB-051					
13 JUL 1998	73.20	4.08	---	---	69.12
21 JUL 1998	73.20	4.85	---	---	68.35
05 AUG 1998	73.20	6.02	---	---	67.18
26 AUG 1998	73.20	5.56	---	---	67.64
10 SEP 1998	73.20	6.09	---	---	67.11
25 SEP 1998	73.20	6.60	---	---	66.60
01 OCT 1998	73.20	6.59	---	---	66.61
22 OCT 1998	73.20	4.16	---	---	69.04
11 NOV 1998	73.20	3.99	---	---	69.21
23 NOV 1998	73.20	4.19	---	---	69.01
03 DEC 1998	73.20	4.18	---	---	69.02
08 DEC 1998	73.20	4.37	---	---	68.83
21 DEC 1998	73.20	4.25	---	---	68.95
MW-NASB-054					
13 JUL 1998	75.49	5.75	---	---	69.74
21 JUL 1998	75.49	6.50	---	---	68.99
05 AUG 1998	75.49	7.11	---	---	68.38
26 AUG 1998	75.49	7.04	---	---	68.45
10 SEP 1998	75.49	8.34	---	---	67.15
25 SEP 1998	75.49	7.68	---	---	67.81
01 OCT 1998	75.49	8.22	---	---	67.27
22 OCT 1998	75.49	5.34	---	---	70.15
11 NOV 1998	75.49	7.64	---	---	67.85
23 NOV 1998	75.49	6.22	---	---	69.27
03 DEC 1998	75.49	6.30	---	---	69.19
09 DEC 1998	75.49	6.62	---	---	68.87
21 DEC 1998	75.49	6.68	---	---	68.81
MW-NASB-058					
13 JUL 1998	69.80	5.99	---	---	63.81
21 JUL 1998	69.80	6.10	---	---	63.70
05 AUG 1998	69.80	6.25	---	---	63.55
26 AUG 1998	69.80	6.32	---	---	63.48
10 SEP 1998	69.80	6.38	---	---	63.42
25 SEP 1998	69.80	6.52	---	---	63.28
01 OCT 1998	69.80	6.53	---	---	63.27
22 OCT 1998	69.80	5.83	---	---	63.97
11 NOV 1998	69.80	6.17	---	---	63.63
23 NOV 1998	69.80	6.10	---	---	63.70
03 DEC 1998	69.80	6.00	---	---	63.80
08 DEC 1998	69.80	6.10	---	---	63.70
21 DEC 1998	69.80	6.17	---	---	63.63

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
MW-NASB-061R					
13 JUL 1998	75.52	4.56	---	---	70.96
21 JUL 1998	75.52	6.21	---	---	69.31
05 AUG 1998	75.52	5.86	---	---	69.66
26 AUG 1998	75.52	5.14	---	---	70.38
10 SEP 1998	75.52	5.64	---	---	69.88
25 SEP 1998	75.52	8.12	---	---	67.40
01 OCT 1998	75.52	5.96	---	---	69.56
22 OCT 1998	75.52	4.57	---	---	70.95
11 NOV 1998	75.52	3.95	---	---	71.57
23 NOV 1998	75.52	4.77	---	---	70.75
03 DEC 1998	75.52	4.95	---	---	70.57
09 DEC 1998	75.52	5.04	---	---	70.48
21 DEC 1998	75.52	5.23	---	---	70.29
MW-NASB-062					
13 JUL 1998	80.78	8.38	---	---	72.40
21 JUL 1998	80.78	7.86	---	---	72.92
05 AUG 1998	80.78	9.77	---	---	71.01
26 AUG 1998	80.78	9.64	---	---	71.14
10 SEP 1998	80.78	10.20	---	---	70.58
25 SEP 1998	80.78	10.46	---	---	70.32
01 OCT 1998	80.78	10.46	---	---	70.32
22 OCT 1998	80.78	8.18	---	---	72.60
11 NOV 1998	80.78	8.52	---	---	72.26
23 NOV 1998	80.78	8.59	---	---	72.19
03 DEC 1998	80.78	8.48	---	---	72.30
09 DEC 1998	80.78	8.46	---	---	72.32
21 DEC 1998	80.78	8.61	---	---	72.17
MW-NASB-211					
13 JUL 1998	75.55	6.34	---	---	69.21
21 JUL 1998	75.55	6.83	---	---	68.72
05 AUG 1998	75.55	7.40	---	---	68.15
26 AUG 1998	75.55	7.79	---	---	67.76
10 SEP 1998	75.55	7.82	---	---	67.73
25 SEP 1998	75.55	8.22	---	---	67.33
01 OCT 1998	75.55	8.22	---	---	67.33
22 OCT 1998	75.55	5.76	---	---	69.79
11 NOV 1998	75.55	6.92	---	---	68.63
23 NOV 1998	75.55	6.77	---	---	68.78
03 DEC 1998	75.55	6.49	---	---	69.06
09 DEC 1998	75.55	6.82	---	---	68.73
21 DEC 1998	75.55	7.18	---	---	68.37

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)
MW-NASB-213					
13 JUL 1998	76.81	5.00	---	---	71.81
21 JUL 1998	76.81	5.57	---	---	71.24
05 AUG 1998	76.81	6.55	---	---	70.26
26 AUG 1998	76.81	7.03	---	---	69.78
10 SEP 1998	76.81	7.41	---	---	69.40
25 SEP 1998	76.81	7.81	---	---	69.00
01 OCT 1998	76.81	7.84	---	---	68.97
22 OCT 1998	76.81	5.31	---	---	71.50
11 NOV 1998	76.81	6.12	---	---	70.69
23 NOV 1998	76.81	5.73	---	---	71.08
03 DEC 1998	76.81	5.62	---	---	71.19
08 DEC 1998	76.81	5.84	---	---	70.97
21 DEC 1998	76.81	6.03	---	---	70.78

TABLE 3-2 SUMMARY OF WATER QUALITY INDICATOR PARAMETER MEASUREMENTS COLLECTED FROM 1 JULY THROUGH 31 DECEMBER 1998 OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
WP-1					
13 JUL 1998	7.50	19.15	2.62	203	-109
21 JUL 1998	6.61	18.04	2.43	332	6
05 AUG 1998	6.90	17.55	5.41	344	16
26 AUG 1998	5.79	20.58	2.17	380	277
10 SEP 1998	7.36	19.12	1.81	337	-101
25 SEP 1998	6.18	16.61	3.19	254	127
01 OCT 1998	6.76	16.57	5.82	326	151
22 OCT 1998	5.55	13.12	5.08	301	319
11 NOV 1998	6.84	9.33	12.57	145	285
23 NOV 1998	5.31	7.51	4.81	195	314
03 DEC 1998	6.02	7.68	9.57	286	319
21 DEC 1998	5.99	6.12	8.13	243	299
WP-2					
13 JUL 1998	6.66	17.94	2.99	178	-107
21 JUL 1998	6.39	17.64	2.48	136	-10
05 AUG 1998	6.66	17.43	3.9	130	-12.9
26 AUG 1998	6.04	20.02	2.36	164	268
10 SEP 1998	7.34	18.77	1.28	161	-160
25 SEP 1998	6.24	16.52	3.01	155	118
01 OCT 1998	6.83	16.13	3.41	187	133
22 OCT 1998	5.85	12.77	5.39	177	306
11 NOV 1998	6.75	9.34	11.98	16	285
23 NOV 1998	5.52	8.00	6.91	167	302
03 DEC 1998	6.02	7.41	7.07	149	360
21 DEC 1998	6.84	7.99	6.51	68	298
WP-3					
13 JUL 1998	6.77	17.41	3.32	56	-80
21 JUL 1998	6.53	16.85	2.87	51	12
05 AUG 1998	6.93	17.56	4.79	49	8.8
26 AUG 1998	5.81	18.47	2.41	117	272
10 SEP 1998	6.63	17.51	1.23	84	-103
25 SEP 1998	6.14	15.93	3.23	48	27
01 OCT 1998	6.65	15.41	3.70	60	30
22 OCT 1998	5.81	13.08	2.48	47	291
11 NOV 1998	6.73	10.44	11.67	61	279
23 NOV 1998	5.69	8.52	6.64	70	285
03 DEC 1998	6.03	8.55	9.15	71	294
21 DEC 1998	5.75	6.25	7.62	74	261

NOTE: Biosparging system was inactive from 30 November to 31 December 1998.
Water quality parameter indicator data collected without well purging and may not be representative of actual field conditions.

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
WP-4					
13 JUL 1998	6.63	17.75	3.43	160	-93
21 JUL 1998	6.28	16.97	3.33	183	-38
05 AUG 1998	6.53	18.06	6.07	203	22.9
26 AUG 1998	6.03	18.11	2.57	243	258
10 SEP 1998	6.47	17.82	1.19	241	-181
25 SEP 1998	Data not available (dry)				
01 OCT 1998	Data not available (dry)				
22 OCT 1998	5.89	13.23	4.45	108	279
11 NOV 1998	6.53	10.22	11.69	145	285
23 NOV 1998	5.96	8.48	8.07	104	270
03 DEC 1998	5.94	7.65	10.98	121	311
21 DEC 1998	5.89	6.53	7.35	122	255
WP-5					
13 JUL 1998	7.24	14.73	1.42	68	-114
21 JUL 1998	6.62	15.48	2.81	74	-29
05 AUG 1998	6.98	16.95	6.49	73	-10.3
26 AUG 1998	5.66	16.41	2.25	66	227
10 SEP 1998	6.11	16.64	0.45	81	-142
25 SEP 1998	6.59	15.86	1.80	73	20
11 OCT 1998	7.28	15.99	2.93	80	29
22 OCT 1998	5.57	13.61	3.63	87	343
10 NOV 1998	6.67	11.18	11.61	47	274
23 NOV 1998	5.05	10.11	6.62	52	330
03 DEC 1998	6.26	8.96	9.77	63	301
21 DEC 1998	6.84	7.99	6.29	56	308
WP-6					
13 JUL 1998	6.92	16.49	3.66	55	-106
21 JUL 1998	6.50	14.43	3.90	84	-5
05 AUG 1998	6.00	16.13	5.48	97	-79.6
26 AUG 1998	5.76	16.21	2.23	76	285
10 SEP 1998	6.35	16.76	0.47	96	-175
25 SEP 1998	6.01	15.36	1.50	91	1
01 OCT 1998	6.61	15.24	2.26	98	6
22 OCT 1998	5.77	13.23	3.09	47	302
11 NOV 1998	6.74	10.72	11.11	64	278
23 NOV 1998	5.63	9.23	6.66	50	295
03 DEC 1998	6.03	8.77	6.68	53	291
21 DEC 1998	5.81	7.91	7.28	53	284

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
WP-7					
13 JUL 1998	6.23	17.77	2.36	262	116
21 JUL 1998	6.16	17.23	1.92	248	-116
05 AUG 1998	6.64	17.79	6.15	239	-83
26 AUG 1998	5.77	18.70	2.71	318	275
10 SEP 1998	6.01	17.63	1.01	333	-187
25 SEP 1998	5.79	15.85	2.72	256	-23
01 OCT 1998	6.28	15.27	3.32	275	-11
22 OCT 1998	5.55	12.55	4.58	264	301
11 NOV 1998	6.66	8.49	12.12	116	284
23 NOV 1998	5.52	7.37	4.77	219	296
03 DEC 1998	5.84	7.11	10.35	169	306
21 DEC 1998	5.43	4.45	8.41	250	278
WP-8					
13 JUL 1998	6.36	16.81	2.60	487	-74
21 JUL 1998	6.15	17.31	3.85	549	36
05 AUG 1998	6.34	18.3	5.57	477	45
26 AUG 1998	5.73	18.21	3.24	501	270
10 SEP 1998	6.53	18.04	0.77	513	-160
25 SEP 1998	5.75	16.60	2.02	393	57
01 OCT 1998	6.16	16.16	2.84	424	71
22 OCT 1998	5.43	13.16	6.23	451	301
11 NOV 1998	6.48	11.68	11.31	388	287
23 NOV 1998	5.47	8.49	6.68	364	294
03 DEC 1998	5.64	8.11	9.86	347	323
21 DEC 1998	5.33	6.23	6.91	330	268
WP-9					
13 JUL 1998	6.70	16.58	4.11	166	-80
21 JUL 1998	8.97	18.08	4.5	176	-114
05 AUG 1998	6.58	18.6	7.37	210	17
26 AUG 1998	Data not available (dry)				
10 SEP 1998	Data not available (dry)				
25 SEP 1998	Data not available (dry)				
01 OCT 1998	Data not available (dry)				
22 OCT 1998	5.84	14.02	6.04	145	283
11 NOV 1998	6.60	11.85	11.46	159	278
23 NOV 1998	5.84	9.95	8.81	140	276
03 DEC 1998	6.00	7.94	10.99	127	315
21 DEC 1998	Data not available (dry)				

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
WP-10					
13 JUL 1998	7.71	13.85	1.37	94	-169
21 JUL 1998	6.73	13.32	2.51	89	-21
05 AUG 1998	7.0	14.1	3.3	79	32
26 AUG 1998	5.63	14.21	2.70	89	287
10 SEP 1998	5.60	14.86	1.24	84.0	-25
25 SEP 1998	6.78	14.28	2.28	87	-3
01 OCT 1998	7.38	14.26	2.87	106	23
22 OCT 1998	5.73	13.13	4.20	55	344
11 NOV 1998	7.0	11.89	11.54	76	272
23 NOV 1998	4.87	10.10	7.83	94	354
03 DEC 1998	7.43	9.49	8.65	91	294
21 DEC 1998	6.33	8.64	9.51	84	276
WP-11					
13 JUL 1998	6.37	15.84	3.32	145	114
21 JUL 1998	6.21	16.76	2.82	149	-95
05 AUG 1998	6.64	17.63	7.92	168	8.8
26 AUG 1998	5.73	17.47	2.41	161	281
10 SEP 1998	6.14	17.63	2.34	172	-189
25 SEP 1998	5.81	16.06	2.09	147	49
01 OCT 1998	6.27	15.77	3.42	164	93
22 OCT 1998	5.58	13.17	5.06	120	302
11 NOV 1998	6.45	11.54	11.62	52	282
23 NOV 1998	5.36	8.94	6.97	101	303
03 DEC 1998	5.84	7.69	10.97	121	308
21 DEC 1998	6.00	7.38	8.13	148	312
WP-12					
13 JUL 1998	6.67	16.27	1.79	166	-72
21 JUL 1998	6.26	17.44	2.34	155	-12
05 AUG 1998	6.61	18.85	6.66	130	32
26 AUG 1998			Data not available (dry)		
10 SEP 1998			Data not available (dry)		
25 SEP 1998			Data not available (dry)		
01 OCT 1998			Data not available (dry)		
22 OCT 1998	5.46	13.68	3.56	242	308
11 NOV 1998	6.59	11.70	6.30	199	269
23 NOV 1998	5.82	9.52	6.56	129	283
03 DEC 1998	6.05	8.82	8.51	83	304
21 DEC 1998			Data not available (dry)		

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
WP-14					
13 JUL 1998	6.78	15.99	2.40	139	-108
21 JUL 1998	6.28	16.54	2.48	130-253000	-25
05 AUG 1998	6.42	17.53	6.31	160	-2
26 AUG 1998	5.69	17.50	2.51	197	330
10 SEP 1998	6.26	19.11	5.51	2.00	-89.9
25 SEP 1998	7.17	16.10	3.64	170	-17
01 OCT 1998	7.76	16.04	4.35	185	94
22 OCT 1998	5.99	13.39	4.88	74	327
11 NOV 1998	8.15	11.19	7.83	80	130
23 NOV 1998	5.52	9.75	8.15	76	320
03 DEC 1998	8.22	9.44	11.09	61	236
21 DEC 1998	7.06	7.36	8.01	63	239
WP-15					
13 JUL 1998	7.00	16.86	7.70	47	-92
21 JUL 1998	6.64	16.69	8.97	52	-7
05 AUG 1998	6.77	17.02	6.93	64	-38
26 AUG 1998	5.83	17.17	2.95	98	282
10 SEP 1998	5.96	17.00	0.69	112	-109
25 SEP 1998	6.04	15.60	8.16	76	91
01 OCT 1998	6.54	15.45	1.59	87	97
22 OCT 1998	5.77	12.58	10.20	37	296
11 NOV 1998	9.02	10.39	8.35	54	92
23 NOV 1998	5.61	9.11	7.18	53	294
03 DEC 1998	6.22	7.85	11.82	53	328
21 DEC 1998	5.77	7.16	8.43	54	266
WP-16R					
13 JUL 1998	6.38	16.31	6.08	458	2
21 JUL 1998	7.95	15.83	5.30	467	-49
05 AUG 1998	7.85	18.48	3.92	541	-19
26 AUG 1998	6.42	16.56	3.39	427	137
10 SEP 1998	6.64	17.01	3.07	490	-130
25 SEP 1998	6.92	15.12	4.37	311	-45
01 OCT 1998	8.0	15.18	5.06	575	-76
22 OCT 1998	5.83	13.46	4.92	321	302
11 NOV 1998	8.25	12.01	10.33	446	105
23 NOV 1998	8.35	10.77	6.90	418	128
03 DEC 1998			Data not available (dry)		
21 DEC 1998	7.12	7.32	7.12	309	212

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
WP-17R					
13 JUL 1998	6.66	15.12	5.97	167	12
21 JUL 1998	8.33	13.91	5.22	166	-53
05 AUG 1998	8.59	17.81	3.34	182	-1
26 AUG 1998	5.91	19.03	2.67	292	139
10 SEP 1998	5.96	15.85	2.08	278	-106
25 SEP 1998	7.12	14.28	4.59	298	-42
01 OCT 1988	6.28	15.38	5.34	349	108
22 OCT 1998	5.73	13.29	5.07	284	279
11 NOV 1998	6.23	12.19	6.97	274	293
23 NOV 1998	8.79	11.12	5.47	281	107
03 DEC 1998	8.85	10.38	8.90	273	188
21 DEC 1998	8.12	8.12	6.94	210	224
WP-18R					
13 JUL 1998	7.17	21.20	8.52	190	45
21 JUL 1998	7.46	19.38	8.56	198	-108
05 AUG 1998	6.58	29.95	7.96	154	137
26 AUG 1998			Data not available (dry)		
10 SEP 1998	7.23	21.94	6.34	178	-139
25 SEP 1998			Data not available (dry)		
01 OCT 1998			Data not available (dry)		
22 OCT 1998	5.88	13.15	4.11	199	313
11 NOV 1998	7.94	11.64	10.67	113	143
23 NOV 1998	6.04	9.17	11.85	103	266
03 DEC 1998	6.14	9.07	11.44	102	340
21 DEC 1998	6.38	6.12	9.28	56	271
WP-21					
13 JUL 1998	6.78	16.31	6.89	185	44
21 JUL 1998	7.71	16.58	6.11	241	-146
05 AUG 1998	6.61	21.37	4.38	200	111
26 AUG 1998	8.74	17.28	2.52	209	73
10 SEP 1998	7.22	17.55	2.15	222	-210
25 SEP 1998	5.86	16.82	4.29	101	63
01 OCT 1998	6.28	15.88	5.36	210	71.3
22 OCT 1998	5.91	13.07	4.32	203	299
11 NOV 1998	8.27	12.60	6.43	193	143
23 NOV 1988	5.64	10.79	9.01	187	283
03 DEC 1998	5.87	10.63	9.00	193	354
21 DEC 1998	7.68	8.19	6.94	134	286

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
WP-22					
13 JUL 1998	10.86	16.10	4.92	1385	-150
21 JUL 1998	9.65	18.45	5.5	1431	-258
05 AUG 1998	7.85	20.27	3.36	683	-150
26 AUG 1998	10.25	17.72	2.33	809	-12
10 SEP 1998	10.20	18.31	2.13	469	-226
25 SEP 1998	6.46	16.23	5.35	267	3
01 OCT 1998			Data not available (dry)		
22 OCT 1998	5.56	13.52	3.99	433	311
11 NOV 1998	7.41	11.91	6.72	924	115
23 NOV 1998	6.96	9.66	520	888	195
03 DEC 1998	6.92	9.86	10.05	997	239
21 DEC 1998	6.91	6.99	8.12	801	312
MW-NASB-043					
13 JUL 1998	6.71	17.81	6.63	53	-62
21 JUL 1998			Data not available (dry)		
05 AUG 1998			Data not available (dry)		
26 AUG 1998			Data not available (dry)		
10 SEP 1998			Data not available (dry)		
25 SEP 1998			Data not available (dry)		
01 OCT 198			Data not available (dry)		
22 OCT 1998	6.05	13.16	5.08	18	281
11 NOV 1998			Data not available (dry)		
23 NOV 1998	5.65	8.20	12.23	1	291
03 DEC 1998			Data not available (dry)		
21 DEC 1998			Data not available (dry)		
MW-NASB-044					
13 JUL 1998	6.93	18.56	4.90	53	-78
21 JUL 1998	6.71	18.92	4.66	53	-17
05 AUG 1998	6.91	18.41	6.21	50	-19.4
26 AUG 1998	6.34	18.73	3.05	51	251
10 SEP 1998	7.44	18.15	3.39	53	-101
25 SEP 1998	6.48	16.67	3.89	48	103
01 OCT 1998	6.85	15.16	1.95	98	107
22 OCT 1998	5.96	13.52	3.10	81	299
11 NOV 1998	6.78	10.60	11.20	62	274
23 NOV 1998	5.74	9.14	7.46	69	290
03 DEC 1998	6.14	8.05	10.55	6.8	291
21 DEC 1998	5.89	6.66	7.19	6.3	269

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
MW-NASB-046					
25 SEP 1998	6.01	16.32	8.23	178	78
01 OCT 1998	6.35	15.55	1.90	264	62
22 OCT 1998	5.66	13.71	5.64	267	296
11 NOV 1998	6.51	12.28	5.73	245	274
23 NOV 1998	5.72	10.59	5.48	214	277
03 DEC 1998	6.14	7.86	11.58	193	324
21 DEC 1998	5.91	8.52	7.24	222	251
MW-NASB-049					
13 JUL 1998	6.58	12.94	3.08	107	8
21 JUL 1998	7.21	13.07	5.90	100	-49
05 AUG 1998	6.68	15.82	7.43	104	31
26 AUG 1998	6.05	15.22	5.18	116	218
10 SEP 1998	5.70	16.28	0.70	110	-8
25 SEP 1998	5.84	14.26	2.70	153	38
01 OCT 1998	6.26	12.84	3.03	2.51	60
22 OCT 1998	5.71	12.99	1.87	97	296
11 NOV 1998	6.57	11.72	7.14	109	271
23 NOV 1998	5.88	10.68	7.66	112	273
03 DEC 1998	6.12	9.44	10.96	105	326
21 DEC 1998	5.95	8.89	5.87	106	247
MW-NASB-051					
13 JUL 1998	6.71	14.15	3.61	46	3
21 JUL 1998	7.66	17.09	8.21	51	-41
05 AUG 1998	6.91	16.48	8.88	54	30
26 AUG 1998	6.28	13.85	3.40	68	168
10 SEP 1998	6.20	16.42	2.40	67	-53
25 SEP 1998	6.24	15.22	3.59	57	42
01 OCT 1998	6.71	14.32	3.55	72	24
22 OCT 1998	5.91	12.51	5.13	63	286
11 NOV 1998	6.63	10.59	8.17	66	266
23 NOV 1998	5.87	9.44	7.78	73	272
03 DEC 1998	6.14	8.60	11.52	64	323
21 DEC 1998	5.93	8.21	10.98	61	289

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
MW-NASB-054					
13 JUL 1998	8.22	15.18	3.20	119	-113
21 JUL 1998	7.26	14.41	2.75	119	-10
05 AUG 1998	7.54	15.63	4.13	102	115
26 AUG 1998	6.17	16.22	2.51	135	349
10 SEP 1998	5.92	16.60	3.69	113	-34
25 SEP 1998	7.89	15.35	2.46	99	263
01 OCT 1998	8.34	15.32	3.28	148	258
22 OCT 1998	6.09	13.49	1.90	95	332
11 NOV 1998	7.47	12.41	4.62	107	256
23 NOV 1998	6.55	11.75	4.44	120	292
03 DEC 1998	8.58	12.38	10.65	122	214
21 DEC 1998	7.20	10.33	1.93	189	227
MW-NASB-058					
13 JUL 1998	7.28	11.17	6.63	56	-41
21 JUL 1998	7.69	12.89	6.74	53	-64
05 AUG 1998	6.81	13.22	2.48	56	29
26 AUG 1998	6.44	15.03	4.07	58	191
10 SEP 1998	6.27	15.64	2.15	58	-48
25 SEP 1998	6.34	14.20	3.56	53	37
01 OCT 1998	6.71	13.32	3.63	64	45
22 OCT 1998	6.04	13.05	2.92	51	281
11 NOV 1998	6.99	12.01	6.97	54	249
23 NOV 1998	6.16	11.13	7.44	48	255
03 DEC 1998	6.27	10.11	10.59	51	310
21 DEC 1998	6.19	9.02	7.78	55	234
MW-NASB-061R					
13 JUL 1998	7.76	19.02	4.01	110	-137
21 JUL 1998	6.74	19.74	2.66	120	-9
05 AUG 1998	6.91	18.72	4.06	121	31.3
26 AUG 1998	5.83	20.01	4.25	129	261
10 SEP 1998	8.82	19.08	3.18	137	-139
25 SEP 1998	6.59	16.76	3.58	112	39
01 OCT 1998	7.19	16.37	3.11	126	54
22 OCT 1998	5.66	13.33	5.19	114	330
11 NOV 1998	6.85	10.50	11.01	112	285
23 NOV 1998	5.09	9.85	8.07	116	326
03 DEC 1998	6.35	8.83	9.90	107	294
21 DEC 1998	5.75	7.10	8.38	103	279

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μmhos)	Redox (mV)
MW-NASB-062					
13 JUL 1998	7.01	10.17	6.20	73	-71
21 JUL 1998	7.33	10.73	9.71	41	26
05 AUG 1998	7.38	10.99	7.55	48	19.2
26 AUG 1998	5.99	10.75	2.26	72	266
10 SEP 1998	9.24	11.92	2.16	73	-185
25 SEP 1998	6.82	12.05	5.57	56	69
01 OCT 1998	7.33	11.00	4.01	69	91
22 OCT 1998	5.85	10.85	4.70	71	321
11 NOV 1998	7.81	10.98	7.52	63	150
23 NOV 1998	5.49	10.54	7.80	73	310
03 DEC 1998	6.33	8.31	11.22	44	282
21 DEC 1998	5.78	6.89	9.12	68	212
MW-NASB-211					
13 JUL 1998	6.40	14.61	2.86	137	-96
21 JUL 1998	6.06	15.96	1.88	139	-85
05 AUG 1998	6.51	16.67	9.97	152	46
26 AUG 1998	6.11	16.64	1.37	194	184
10 SEP 1998	6.31	16.96	0.64	183	-237
25 SEP 1998	6.10	16.02	3.39	172	-11
01 OCT 1998	6.57	15.75	2.18	185	-30
22 OCT 1998	5.89	13.93	2.04	127	285
11 NOV 1998	6.52	11.62	11.63	100	275
23 NOV 1998	5.78	11.17	1.44	156	281
03 DEC 1998	6.06	9.04	8.37	103	297
21 DEC 1998	5.81	8.17	7.45	102	252
MW-NASB-213					
13 JUL 1998	7.04	17.44	6.72	43	-91
21 JUL 1998	6.81	17.52	7.30	44	-32
05 AUG 1998	6.86	17.24	8.05	45	-14
26 AUG 1998	6.47	16.35	5.57	57	211
10 SEP 1998	6.56	16.88	4.23	54	-98
25 SEP 1998	6.41	15.49	5.40	51	64
01 OCT 1998	6.89	14.15	4.95	74	85
22 OCT 1998	6.11	13.63	5.34	46	27.5
11 NOV 1998	6.43	11.87	11.34	2	277
23 NOV 1998	6.14	10.30	8.45	57	265
03 DEC 1998	6.19	9.18	10.94	49	303
21 DEC 1998	6.64	8.37	7.70	46	241

TABLE 3-3 SUMMARY OF FIELD MEASUREMENTS OF TOTAL VOLATILE HYDROCARBONS AT WELL POINT RISERS FROM 1 JULY THROUGH 31 DECEMBER 1998, OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Location	21 JUL 1998		5 AUG 1998		25 SEP 1998		22 OCT 1998		23 NOV 1998		3 DEC 1998	
	FID TVH	PID TVH	FID TVH	PID TVH	FID TVH	PID TVH	FID TVH	PID TVH	FID TVH	PID TVH	FID TVH	PID TVH
WP-1	140	NA	71	1,390	90	2	6	98	202	0	15	0
WP-2	1,600	NA	1,618	870	1,800	300	549	176	328	80	419	69
WP-3	9	NA	98	196	101	2	128	16	75	1	1	23
WP-4	148	NA	230	103	17	9	61	54	144	36	124	32
WP-5	258	NA	16	1,950	0	1	534	101	805	13	485	20
WP-6	144	NA	62	440	126	2	39	38	14	1	13	3
WP-7	9,740	NA	4,700	170	1,100	120	161	23	237	39	70	13
WP-8	149	NA	2%	41	67	4	84	13	445	0	170	4
WP-9	49	NA	0	2	0	1	3	21	4	2	0	0
WP-10	0	NA	0	600	22	5	0	46	0	0	26	0
WP-11	107	NA	44	20	2.6	2	0	26	1	1	4	0
WP-12	0	NA	1	34	0	2	6	11	0	0	0	0
WP-14	53	NA	0	14	0	0	0	21	0	0	157	0
WP-15	0	NA	2	22	0	1	0	20	1	0	4	0
WP-16R	0	NA	0	14	0	1	0	0	0	0	0	0
WP-17R	0	NA	0	28	10	6	0	0	0	0	1	0
WP-18R	0	NA	0	3	0	2	0	33	0	0	0	0
WP-21	0	NA	15	5	0	0	0	1	29	0	0	0
WP-22	256	NA	3	2	0	0	0	1	0	0	0	0

NOTE: FID = Flame ionization detector response expressed as ppm_v except where % is noted.
TVH = Total volatile hydrocarbons.
PID = Photoionization detector.
NA = Instrument response error.
Biosparging system inactive during 30 November - 31 December 1998.

TABLE 3-4 SUMMARY OF FIELD MEASUREMENTS OF METHANE, CARBON DIOXIDE, AND OXYGEN IN WELL POINT RISER HEADSPACE FROM 1 JULY THROUGH 31 DECEMBER 1998 OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Location	21 JUL 1998			5 AUG 1998			25 SEP 1998			22 OCT 1998			23 NOV 1998			3 DEC 1998		
	CH_4	CO_2	O_2	CH_4	CO_2	O_2	CH_4	CO_2	O_2	CH_4	CO_2	O_2	CH_4	CO_2	O_2	CH_4	CO_2	O_2
WP-1	0.1	0.0	21.4	0.0	0.0	21.4	0.0	4.9	16.8	0.2	0.3	20.7	0.0	0.0	21.0	0.0	0.0	20.9
WP-2	0.2	0.6	21.0	1.0	3.0	18.6	1.4	4.6	16.2	0.2	0.6	20.5	1.0	0.5	20.2	0.0	0.8	20.7
WP-3	0.1	0.1	21.4	0.2	0.1	21.2	0.1	0.3	21.3	0.2	3.2	19.4	0.5	0.1	20.9	0.0	4.0	15.5
WP-4	0.1	4.8	15.5	0.2	1.4	19.7	0.1	4.4	16.5	0.1	0.0	20.7	0.5	0.0	20.7	0.0	0.0	19.7
WP-5	0.1	1.9	19.7	0.1	3.0	19.1	0.0	1.6	19.8	0.5	3.0	9.7	0.9	0.8	20.2	0.0	0.9	20.9
WP-6	0.1	0.0	21.5	0.1	0.0	21.5	0.1	4.2	17.8	0.2	1.3	19.7	0.1	0.0	20.9	0.0	0.0	21.0
WP-7	1.8	0.6	21.1	1.1	1.4	20.3	1.6	1.7	19.9	0.2	0.1	20.7	6.3	2.2	18.9	0.0	0.0	20.7
WP-8	0.0	0.0	21.5	2.0	3.4	17.9	0.2	7.6	13.0	0.2	0.2	20.7	1.2	0.0	20.9	0.0	0.0	20.4
WP-9	0.0	0.1	20.7	0.1	0.2	21.2	0.1	1.4	19.8	0.1	0.0	20.7	0.4	0.0	21.1	0.0	0.0	20.4
WP-10	0.0	0.2	21.4	0.1	1.8	20.0	0.1	12.4	11.5	0.1	0.0	20.7	0.0	0.0	21.0	0.0	1.7	20.7
WP-11	0.0	0.2	21.3	0.1	3.0	18.8	0.0	1.6	20.1	0.1	0.1	20.7	0.2	0.1	20.9	0.0	0.0	21.0
WP-12	0.0	6.5	14.7	0.1	11.0	12.1	0.1	2.4	19.8	0.1	1.3	17.0	0.0	0.0	20.8	0.0	14.0	12.0
WP-14	0.0	0.3	20.7	0.2	1.8	20.0	0.0	2.3	19.2	0.2	0.1	17.9	0.0	0.1	20.8	0.1	0.0	10.0
WP-15	0.0	0.1	21.2	0.1	3.0	17.4	0.0	2.2	20.4	0.1	1.0	20.0	0.0	8.1	12.9	0.0	0.0	20.4
WP-16R	0.0	1.9	19.9	0.1	3.0	19.1	0.0	0.0	21.8	0.0	0.0	20.8	0.0	0.0	20.9	0.0	0.0	20.9
WP-17R	0.0	2.6	18.9	0.1	1.5	20.3	0.1	0.0	21.6	0.0	0.0	20.8	0.0	0.0	21.0	0.0	0.0	20.9
WP-18R	0.0	0.0	21.4	0.1	0.0	21.3	0.1	0.0	21.6	0.2	0.0	20.5	0.1	0.1	20.9	0.0	3.1	17.3
WP-21	5.4	0.7	19.9	0.1	0.0	21.4	0.1	0.0	21.4	0.0	0.0	20.8	0.3	0.6	20.4	0.0	0.0	20.9
WP-22	1.5	0.0	21.2	0.1	0.0	21.7	0.1	0.0	21.6	0.1	0.0	20.8	0.1	0.0	21.0	0.0	0.0	20.8

NOTE: Measurements collected with a Landtec GA-90 multi-gas analyzer.
All values expressed as % air.
Biosparging system inactive from 30 November to 31 December 1998.

TABLE 3-5 SUMMARY OF ANALYTICAL RESULTS FOR GROUND-WATER SAMPLES COLLECTED 8-9 DECEMBER 1998, OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Compound	Sample Location										MEDEP Cleanup Goal[a]	MEDEP Drinking Water Guidelines[a]
	WP-1	WP-2	WP-2-DUP	WP-3	WP-4	WP-5	WP-6	WP-7	WP-7-DUP	WP-8		
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 602 (μg/L)												
Benzene	(<1U)	3	5	(<1U)	3	32	(<1U)	(<1U)	3	3	5	5
Toluene	2	2	8	2	3	370D	2	3	27	2	---	1,400
Ethylbenzene	(<1U)	3	2	(<1U)	2	190	2	2	3	2	---	700
Total xylenes	2	5	7	3	4	3,900D	3	8	7	4	---	600
Total BTEX	ND[b]	11[b]	20[b]	3[b]	10[b]	4,492	3[b]	11[b]	40[b]	7[b]	---	---
MTBE	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	35[c]	50
TPH BY DHS-HETL METHOD 4.2.17 (μg/L)												
TPH-GRO	19	8,500D	13,000D	63	610	14,000D	17	750	1,100D	140	50	50
TPH BY DHS-HETL METHOD 4.1.25 (μg/L)												
TPH-DRO	690	5,300D	7,400D	150	5,000D	2,500D	250	650	800	370	50	50

(a) Stringent cleanup goals taken from *Procedural Guidelines for Establishing Standards for the Remediation of Oil Contaminated Soil and Ground Water in Maine*, Maine Department of Environmental Protection (1995). Dashes indicate no goal established for this compound.

(b) Toluene, ethylbenzene, m&p-xylene, and o-xylene each reported at 2 μg/L in the trip blank. Toluene and m&p-xylene reported at 2 μg/L in the rinsate blank. Reported concentrations for toluene, ethylbenzene, and total xylenes ≤2 μg/L not included in total BTEX calculation.

(c) Maine State Legislature Office of Policy and Legal Analysis. Memo dated 3 June 1998 addressed to members of the Natural Resources Committee and Health and Human Services Committee.

NOTE:
- MEDEP = Maine Department of Environmental Protection.
- EPA = U.S. Environmental Protection Agency.
- U = Not detected. Sample quantitation limits are shown as (<___U).
- D = Indicates compound identified at secondary dilution factor.
- BTEX = Benzene, toluene, ethylbenzene, and total xylenes.
- ND = No detected BTEX compounds.
- MTBE = Methyl tertiary-butyl ether.
- TPH = Total petroleum hydrocarbons.
- DHS-HETL = State of Maine Department of Human Services–Health and Environmental Testing Laboratory.
- GRO = Gasoline range organics.
- DRO = Diesel range organics.

Well points WP-13, WP-19, and WP-20 were destroyed; thus, no samples were collected.
Well point 18R and monitoring well MW-NASB-043 were dry and could not be sampled. Monitoring well MW-56R was obstructed and could not be sampled.
Biosparging system was inactive from 30 November to 31 December 1998.

Compound	Sample Location												MEDEP Cleanup Goal[a]	MEDEP Drinking Water Guidelines
	WP-9	WP-10	WP-11	WP-12	WP-14	WP-15	WP-16R	WP-17R	WP-21	WP-22	Trip Blank	Rinsate Blank		
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 602 (μg/L)														
Benzene	(<1U)	(<1U)	11	3	(<1U)	(<1U)	3	17	11	91	(<1U)	(<1U)	5	5
Toluene	2	2	46	4	2	2	3	36	75	450D	2	2	---	1,400
Ethylbenzene	(<1U)	(<1U)	2	2	(<1U)	(<1U)	2	9	150D	71	2	(<1U)	---	700
Total xylenes	3	3	4	1	3	3	4	56	820D	532D	4	2	---	600
Total BTEX	3[b]	3[b]	61[b]	7[b]	3[b]	3[b]	10[b]	118	1,056	1,144	8	4	---	---
MTBE	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	11	9	(<1U)	(<1U)	35[c]	50
TPH BY DHS-HETL METHOD 4.2.17 (μg/L)														
TPH-GRO	23	330	56	28D	(U<10)	51	30D	2,400	2,900D	8,900D	NA	35	50	50
TPH BY DHS-HETL METHOD 4.1.25 (μg/L)														
TPH-DRO	NA	330	300	320	140	510	NA	18,000D	2,700D	16,000D	NA	(<50U)	50	50

Compound	Sample Location													MEDEP Cleanup Goal[a]	MEDEP Drinking Water Guidelines
	MW-NASB-044	MW-NASB-046	MW-NASB-049	MW-NASB-051	MW-NASB-054	MW-NASB-058	MW-NASB-061R	MW-NASB-062	MW-NASB-211	MW-NASB-211-DUP	MW-NASB-213	Trip Blank	Rinsate Blank		
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 602 (μg/L)															
Benzene	(<1U)	(<1U)	(<1U)	(<1U)	3	(<1U)	3	(<1U)	7	7	(<1U)	(<1U)	(<1U)	5	5
Toluene	2	3	3	3	3	3	2	2	11,000D	10,000D	3	(<1U)	(<1U)	---	1,400
Ethylbenzene	2	(<1U)	(<1U)	(<1U)	2	(<1U)	2	(<1U)	450D	480D	(<1U)	(<1U)	(<1U)	---	700
Total xylenes	2	4	4	2	4	5	3	2	1,290D	1,300D	3	(<1U)	(<1U)	---	600
Total BTEX	6	7	7	5	12	8	10	4	12,747D	11,787D	6	ND	ND	---	---
MTBE	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	(<1U)	4	(<1U)	36	(<130U)	(<1U)	(<1U)	(<1U)	35[c]	50
TPH BY DHS-HETL METHOD 4.2.17 (μg/L)															
TPH-GRO	14	19	16	14	18	20	36	13	15,000D	2,190	13	NA	53	50	50
TPH BY DHS-HETL METHOD 4.1.25 (μg/L)															
TPH-DRO	87	99	150	80	160	75	180	56	960	1,000	(<50U)	NA	(<50U)	50	50

NOTE: NA = Not collected due to insufficient sample volume or program requirement.
Based on historical data, the total BTEX calculations for monitoring well samples are likely over-represented (see supporting report text).

TABLE 3-6 SUMMARY OF ANALYTICAL RESULTS FOR GROUND-WATER SAMPLES COLLECTED FROM 10 JUNE 1996 TO 9 DECEMBER 1998, OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Date	Parameters							
	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	TPH-GRO	TPH-DRO
WP-1								
07-08 AUG 1996	(<1U)	2	(<1U)	12	14	16	77	1,000
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	2	2	(<1U)	3,300	750
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	260	1,800
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	1	1	(<1U)	140	640
16-18 JUN 1998	(<1U)	1	(<1U)	5	6	(<1U)	45	320
08-09 DEC 1998	(<1U)	2	(<1U)	2	4	(<1U)	19	690
WP-2								
07-08 AUG 1996	6	34	94	490	624	34	4,200	16,000
24-25 JUN 1997	3	13	81	450	547	(<1U)	4,200	23,000D[a]
10-11 DEC 1997	(<1U)	(<1U)	2	12	14	(<1U)	18,000D	5,900D
16-18 JUN 1998	(<1U)	(<1U)	2	14	16	(<1U)	2,400E[b]	4,700D
08-09 DEC 1998	3	2	3	5	13	(<1U)	8,500D	5,300D
WP-3								
07-08 AUG 1996	17	72	1	3	93	1	140	410
04-05 DEC 1996	(<1U)	3	(<1U)	5	8	(<1U)	4,100	670
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	1	130	440
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	200	170
16-18 JUN 1998	(<1U)	2	(<1U)	3	5	(<1U)	40	150
08-09 DEC 1998	(<1U)	2	(<1U)	3	5	(<1U)	63	150
WP-4								
07-08 AUG 1996	2	4	8	16	30	31	890	1,300
24-25 JUN 1997	3	10	94	530	637	1	16,000	12,000,000D
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	6,800D	49,000D
16-18 JUN 1998	(<1U)	3	(<1U)	1	4	(<1U)	180	2,000
08-09 DEC 1998	3	3	2	4	12	(<1U)	610	5,000D

(a) Chromatographic patterns indicated the presence of a heavy petroleum product, much of which eluted beyond the DRO retention time range.
(b) Results of TPH-GRO analysis above upper instrument calibration limit. Laboratory flagged as "E." The original calibration curve width affected low concentration results. Upon reanalysis, the high standard results were estimated.
(c) Reanalysis due to low surrogate recovery.

NOTE: BTEX = Benzene, toluene, ethylbenzene, and total xylenes.
MTBE = Methyl tertiary-butyl ether.
TPH = Total petroleum hydrocarbons; GRO = Gasoline range organics; DRO = Diesel range organics.
(<__U) = Compound not detected above method detection limit shown. Results reported in μg/L.
ND = Not detected.
D = Indicates compound identified at secondary dilution factor.
Values for August and December 1996 rounded to nearest integer.
Total BTEX calculations for 8-9 December 1998 analytical results are likely over-represented due to detection of toluene, ethylbenzene, and total xylenes in the trip and rinsate blanks. Biosparging system was inactive during 8-9 December 1998 sampling event.
Results reported in μg/L.

Date	Parameters							
	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	TPH-GRO	TPH-DRO
WP-5								
07-08 AUG 1996	12	740[c]	700[c]	4,300[c]	5,752	14	9,000	1,000
04-05 DEC 1996	17	240	350	2,420	3,027	9	4,800	(<50U)
24-25 JUN 1997	55	1,700D	1,100D	8,500D	11,355	(<1U)	15,000	2,700D
10-11 DEC 1997	1	10	6	178	195	4	890D	760
16-18 JUN 1998	52	710D	890D	6,700D	8,352D	(<1U)	15,000E[b]	1,600
08-09 DEC 1998	32	370D	190	3,900D	4,492	(<1U)	14,000D	2,500D
WP-6								
07-08 AUG 1996	(<1U)	4	(<1U)	4	8	32	31	150
04-05 DEC 1996	(<1U)	3	(<1U)	1	4	(<1U)	20	(<50U)
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	210	450
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	1	1	(<1U)	200	220
16-18 JUN 1998	(<1U)	1	(<1U)	2	3	(<1U)	150	360
08-09 DEC 1998	(<1U)	2	2	3	7	(<1U)	17	250
WP-7								
07-08 AUG 1996	(<1U)	12	6	49	67	10	2,500	680
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	4,000	1,200
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	11,000D	1,300
16-18 JUN 1998	(<1U)	(<1U)	14	37	51	(<1U)	1,800	660
08-09 DEC 1998	(<1U)	3	2	8	13	(<1U)	750	650
WP-8								
07-08 AUG 1996	15	6	2	6	29	29	220	480
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	1	1	(<1U)	270	150
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	1,600	2,400D
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	560	730
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	1	1	(<1U)	70	66
08-09 DEC 1998	3	2	2	4	11	(<1U)	140	370
WP-9								
07-08 AUG 1996	1	5	1	9	16	130	93	89
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	1	1	(<1U)	730	(<50U)
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	110	NA
16-18 JUN 1998	(<1U)	1	(<1U)	1	2	(<1U)	49	150
08-09 DEC 1998	(<1U)	2	(<1U)	3	5	(<1U)	23	NA
WP-10								
07-08 AUG 1996	31	46	17	72	166	49	550	420
04-05 DEC 1996	(<1U)	4	2	14	20	(<1U)	130	(<50U)
24-25 JUN 1997	34	26	9	41	110	(<1U)	310	470
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	25	240
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	78	310
08-09 DEC 1998	(<1U)	2	(<1U)	3	5	(<1U)	330	330

NOTE: NA = Not analyzed; insufficient water.

Date	Parameters							
	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	TPH-GRO	TPH-DRO
WP-11								
07-08 AUG 1996	78	3,000[b]	170	750	3,998	51	5,500	3,600
04-05 DEC 1996	10	220	2	38	270	(<1U)	3,400	220
24-25 JUN 1997	320	6,700D	72	335	7,427	2	9,100	12,000D
10-11 DEC 1997	(<1U)	5	(<1U)	2	7	(<1U)	490	1,200
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	1	1	(<1U)	180	420
08-09 DEC 1998	11	46	2	4	63	(<1U)	56	300
WP-12								
04-05 DEC 1996	(<1U)	190	9	392	591	(<1U)	870	390
16-18 JUN 1998	(<1U)	2	(<1U)	2	4	(<1U)	(<10U)	550
08-09 DEC 1998	3	4	2	1	10	(<1U)	28D	320
WP-13								
07-08 AUG 1996	15	380	56	315	766	89	2,200	580
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	57	57	(<1U)	950	3,100
24-25 JUN 1997	12	270	3	15	300	(<1U)	430	290
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	470	NA
16-18 JUN 1998	Data not available (well blocked)							
08-09 DEC 1998	Data not available (well blocked)							
WP-14								
07-08 AUG 1996	(<1U)	10	(<1U)	5	15	2	34	140
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	15	62
24-25 JUN 1997	(<1U)	1	(<1U)	(<1U)	1	(<1U)	(<25U)	280
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	38	280
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	280
08-09 DEC 1998	(<1U)	2	(<1U)	3	5	(<1U)	(<10U)	140
WP-15								
07-08 AUG 1996	6	19	2	8	35	2	47	500
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	66
24-25 JUN 1997	(<1U)	1	(<1U)	(<1U)	1	(<1U)	160	570
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	160	570
16-18 JUN 1998	(<1U)	2	(<1U)	3	5	(<1U)	43	340
08-09 DEC 1998	(<1U)	2	(<1U)	3	5	(<1U)	51	510
WP-16								
04-05 DEC 1996	(<1U)	1	(<1U)	1	2	(<1U)	11	(<50U)
WP-16R								
16-18 JUN 1998	(<1U)	2	(<1U)	2	4	(<1U)	85	630
08-09 DEC 1998	3	3	2	4	12	(<1U)	30D	NA
WP-17R								
16-18 JUN 1998	42	100	7	40	189	(<1U)	1,900E[b]	2,500D
08-09 DEC 1998	17	36	9	56	118	(<1U)	2,400	18,000D

Date	Parameters							
	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	TPH-GRO	TPH-DRO
WP-18								
07-08 AUG 1996	(<1U)	8	(<1U)	4	12	(<1U)	22	75
04-05 DEC 1996	(<1U)	2	(<1U)	2	4	(<1U)	35	(<50U)
WP-18R								
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	330
16-18 JUN 1998	(<1U)	2	(<1U)	1	3	(<1U)	24	100
WP-19								
07-08 AUG 1996	(<1U)	3	(<1U)	1	4	4	260	100
04-05 DEC 1996	(<1U)	1	(<1U)	3	4	(<1U)	1,100	210
24-25 JUN 1997	(<1U)	4	(<1U)	(<1U)	4	(<1U)	1,000	400
16-18 JUN 1998	Well point destroyed							
WP-20								
07-08 AUG 1996	1	7	1	6	15	4	310	73
04-05 DEC 1996	(<1U)	1	(<1U)	4	5	(<1U)	14	(<50U)
24-25 JUN 1997	(<1U)	2	(<1U)	(<1U)	2	(<1U)	(<25U)	370
10-11 DEC 1997	(<1U)	2	(<1U)	(<1U)	2	(<1U)	(<10U)	200
16-18 JUN 1998	Data not available (well blocked)							
WP-21								
10-11 DEC 1997	68	90	120	540	818	16	8,500D	3,700D
16-18 JUN 1998	41	30	96	380	547	(<1U)	3,800E[b]	1,200
08-09 DEC 1998	11	75	150D	820D	1,056	11	2,900D	2,700D
WP-22								
10-11 DEC 1997	52	180	12	138	382	(<1U)	3,400D	5,200D
16-18 JUN 1998	150	570D	110	450	1,280D	(<1U)	3,900E[b]	10,000D
08-09 DEC 1998	91	450D	71	532D	1,144	9	8,900D	16,000D
MW-NASB-044								
10 JUN 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<50U)	(<100U)
07-08 AUG 1996	(<1U)	3	(<1U)	1	4	(<1U)	16	(<50U)
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	110	290
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<25U)	56
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	84
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	38	110
08-09 DEC 1998	(<1U)	2	2	2	6	(<1U)	14	87
MW-NASB-049								
10 JUN 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<50U)	(<50U)
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	110[d]
24-25 JUN 1997	(<1U)	2	(<1U)	(<1U)	2	(<1U)	(<25U)	140
10-11 DEC 1997	(<1U)	2	(<1U)	(<1U)	2	(<1U)	(<10U)	190
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	130
08-09 DEC 1998	(<1U)	3	(<1U)	4	7	(<1U)	16	150

(d) Chromatographic pattern indicated the presence of more than one petroleum product. This sample had responses which eluted before and after the DRO retention time range.

Date	Parameters							
	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	TPH-GRO	TPH-DRO
MW-NASB-051								
10 JUN 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	2	(<50U)	(<100U)
07-08 AUG 1996	(<1U)	1	(<1U)	(<1U)	1	5	14	(<50U)
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	(<50U)[d]
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<25U)	52
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	93
16-18 JUN 1998	(<1U)	1	(<1U)	1	2	(<1U)	21	64
08-09 DEC 1998	(<1U)	3	(<1U)	2	5	(<1U)	14	80
MW-NASB-054								
10 JUN 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<50U)	(<100U)
04-05 DEC 1996	(<1U)	(<1U)	1	(<1U)	1	(<1U)	15	260[d]
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<25U)	230
10-11 DEC 1997	1	(<1U)	(<1U)	(<1U)	1	(<1U)	150	310
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	2	2	(<1U)	32	160
08-09 DEC 1998	3	3	2	4	12	(<1U)	18	160
MW-NASB-056								
10 JUN 1996	(<1U)	2	(<1U)	1	3	(<1U)	44	56
16-18 JUN 1998	Well not sampled							
MW-NASB-058								
10 JUN 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<50U)	(<100U)
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	230[d]
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<25U)	100
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	98
16-18 JUN 1998	(<1U)	(<1U)	1	1	2	4	(<10U)	(<50U)
08-09 DEC 1998	(<1U)	3	(<1U)	5	8	(<1U)	20	75
MW-NASB-061R								
24-25 JUN 1997	(<1U)	1	(<1U)	(<1U)	1	(<1U)	32	320[a]
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	75	210
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	(<1U)	ND	5	(<10U)	86
08-09 DEC 1998	3	2	2	3	10	4	36	180
MW-NASB-062								
10 JUN 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<50U)	(<100U)
04-05 DEC 1996	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	11	52
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<25U)	58
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<10U)	64
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<1U)	76
08-09 DEC 1998	(<1U)	2	(<1U)	2	4	(<1U)	13	56

Date	Parameters							
	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	MTBE	TPH-GRO	TPH-DRO
MW-NASB-211								
04-05 DEC 1996	1,300[b]	12,000[b]	250	2,770	16,320	120	30,000	6,700[d]
24-25 JUN 1997	510D	20,000D	200	950	21,660	(<1U)	24,000	3,000D
10-11 DEC 1997	110	5,800D	56	335	6,301	(<1U)	19,000D	1,700
16-18 JUN 1998	(<1U)	2,500D	58	190	2,748	(<1U)	4,400	900
08-09 DEC 1998	7	11,000D	450D	1,290D	12,747	36	15,000D	960
MW-NASB-213								
04-05 DEC 1996	(<1U)	(<1U)	2	(<1U)	2	(<1U)	100	66D
24-25 JUN 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	(<25U)	180
10-11 DEC 1997	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	52	79
16-18 JUN 1998	(<1U)	(<1U)	(<1U)	(<1U)	ND	(<1U)	22	(<50U)
08-09 DEC 1998	(<1U)	3	(<1U)	3	6	(<1U)	13	(<50U)

TABLE 3-7 SUMMARY OF ANALYTICAL RESULTS FOR FERROUS IRON AND MANGANESE CONCENTRATIONS IN GROUND-WATER SAMPLES COLLECTED 10 DECEMBER 1998, OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Location	Ferrous Iron (mg/L)	Manganese (mg/L)
WP-1	0.87	0.1
WP-2	2.62	0.4
WP-2 DUP	2.68	0.3
WP-3	1.11	0.3
WP-4	2.71	1.2
WP-5	2.95	0.3
WP-6	1.00	0.0
WP-7	2.47	0.1
WP-7DUP	1.95	0.5
WP-8	0.15	0.3
WP-9	1.73	3.5
WP-10	0.53	0.2
WP-11	1.21	1.2
WP-12	0.33	0.2
WP-14	1.06	0.6
WP-15	1.43	0.3
WP-16R	2.12	0.7
WP-17R	3.13	0.7
WP-18R	Insufficient sample volume	
WP-21	2.76	0.3
WP-22	0.24	0.0

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Appendix A

Response to Comments from Maine Department of Environmental Protection on the January-June 1998 Summary

RESPONSE TO COMMENTS FROM
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
ON SUMMARY REPORT, BIOSPARGING SYSTEM OPERATIONS
AT OLD NAVY FUEL FARM, JANUARY-JUNE 1998
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Claudia Sait **DATE: 11 December 1998**

GENERAL COMMENTS

1. Departmental records indicate a review for a summary report dated April 1997. It covered the monitoring period from August 1996 through December 1996. Comments were forwarded to the Navy in a letter dated 28 July 1997. The current report includes data from January 1998 through June 1998. The reference section of the current report includes two summary reports for 1997. The Department has not received either of the two summary reports for 1997.

   Response—Comment noted. As requested, the Navy will forward copies of the two 1997 summary reports to the State of Maine Department of Environmental Protection (MEDEP).

2. In the future, the Navy must submit the summary reports in a more timely fashion. This report arrived nearly five months after the Navy collected the June round of ground-water samples. In order for the Department to provide meaningful input, a shorter turnaround is necessary. Otherwise, the report's recommendations have already been implemented without agreement from MEDEP.

   Response—Comment noted. Although a substantial period of time is required for sample analysis/data evaluation, report production, and internal quality review, the Navy will make every effort to minimize the overall turnaround time for Biosparging System Operations summary reports. The last report production period was extended by the Navy to allow time for supplemental data entry and evaluation. Electronic files were developed which incorporate all existing historical ground-water data. Going forward, this approach will facilitate ground-water quality trend analyses.

3. Future reports should include a section detailing the Navy's responses to the Department's comments regarding the previous summary report.

   Response—Comment noted. It has been the Navy's policy to provide written responses to MEDEP comments, although typically this has been done under separate cover. It is the Navy's preference to continue with this approach in order to address MEDEP concerns in advance of the development of the next Bi-Annual Biosparging System Operations Summary Report. As requested, the Navy will append responses to MEDEP comments to future reports.

4. In the letter from the Department dated 29 July 1997 (copy attached), the Navy was asked to consider methods to determine respiration rates within the saturated zone. The Department still contends that this may be useful and have some suggestions for how oxygen consumption rates might be determined at this site.

   Response—The Navy agrees in principal with the Department's contention that a quantitative assessment of respiration rates may be more effectively achieved. However, the Navy questions the usefulness of such an assessment. It is the Navy's focused objective to operate the enhanced biosparging system at the Old Navy Fuel Farm while evaluating progress toward MEDEP ground-water cleanup criteria. The remedial system was designed to aerate the ground water and limited vadose zone within the targeted remedial area to provide sufficient oxygen for the aerobic microbial population to metabolize petroleum-related hydrocarbons. The periodic measurement of petroleum hydrocarbon concentrations serves to demonstrate remedial system effectiveness (petroleum hydrocarbon reduction over time). *In situ* field measurements provide data sufficient to perform systematic modulation of the biosparging system for maximum distribution of sparge air to areas of reduced oxygen concentration and/or persistent petroleum hydrocarbons. To that end, the Navy routinely monitors selected indicator parameters and performs system and operational modifications in response to field and laboratory analytical results.

5. Based on review of the summary report, it would be useful to meet with the Navy and its consultant to discuss the ongoing remedial efforts at this site.

   Response—Comment noted. The Navy agrees that a meeting to discuss ongoing remedial efforts at the Old Navy Fuel Farm would be useful. It is proposed that a meeting be scheduled following submission of the Biosparging System Operations Summary Report for the period of July–December 1998.

SPECIFIC COMMENTS

6. ***Introduction, Section 1.1, Page 1-1***—It would be helpful if Figure 1-1 depicted the location of the Old Navy Fuel Farm.

   Response—Comment noted. The location of the Old Navy Fuel Farm has been identified on Figure 1-1 for the current reporting period.

7. ***Water Quality Indicator Parameter Measurement Methodology, Section 2.1.2, Page 2-1***—Every couple of weeks, EA Engineering, Science, and Technology obtains field measurements from many of the well points and monitor wells at this site. The *in situ* measurements include pH, specific conductance, redox potential, dissolved oxygen, and temperature. EA obtains the data by lowering the field instrument below the water table in each well point/monitor well. Because the well points and monitor wells are not purged, most of the data are of limited value.

   To evaluate the data, Department staff compared *in situ* data collected from 9 monitor wells on 16 June 1998 with low flow data collected from the same wells a day later after purging the wells. The attached table contains data for dissolved oxygen and redox potential. In all wells, the dissolved oxygen concentration data obtained after purging was lower than the *in situ* data. Dissolved oxygen concentration data from MW-NASB-061R and MW-NASB-211 are of particular significance. In MW-NASB-061R and MW-NASB-211, the concentration of dissolved oxygen in the purged samples was essentially zero while the no purge data revealed 6.74 mg/L in MW-NASB-061R and 2.47 mg/L in MW-NASB-211. Redox potential was often much lower in the purged samples.

   The explanation is pretty simple. The water within the screened interval is stagnant and not representative of ground water. The higher dissolved oxygen and redox potential are a direct result of the stagnant water's direct contact with the atmosphere. Only after purging the stagnant water can one obtain meaningful data about the *in situ* concentrations at this site. Therefore, it is not worthwhile to continue this sampling unless the wells are purged.

   Response—The Navy agrees that the purging process typically yields more representative results.

   The well points were installed (as drive points) throughout the Old Navy Fuel Farm remediation zone to better define the dissolved-phase hydrocarbon plume during early operational phases of the biosparging system. Subsequently, the well points were retained as observation points during operations and maintenance visits for visual evidence of active sparging and for *in situ* measurements. It is recognized that the monitoring points have exhibited increasingly slow recharge rates, making the purge/recharge cycle impractical during single operations and maintenance visits. In that regard, the Navy agrees that modifications to the operations and maintenance data collection process are warranted. To that end, the Navy has funded the installation of new monitoring wells to be installed in the remedial zone during the next operational period. The Navy proposes to install 6 new monitoring wells to replace the well points, which will be decommissioned.

Subsequent *in situ* and laboratory analytical data from the new monitoring wells will be directly comparable to the data from the existing monitoring well network, and standardization of field sampling procedures will be more readily achieved. Future collection of water quality indicator parameters will be conducted following low flow purging.

8. ***Sampling Methodology, Section 2.3.2, Page 2-2***—It appears [that] there are some sampling problems relating to the inability to reduce flow rates below 1,000 ml/minute using the Grundfos Rediflow submersible pump. As recommended for the NEX Service Station monitoring program, it is acceptable to use peristaltic pumps for low flow ground-water sampling.

   Response—Comment noted. Currently, an ISCO Model 2700 peristaltic pump is used for ground-water sampling due to the limited diameter and yield of the well points. This pump is available for use at the monitoring wells if flow rates below 1,000 ml/minute or stabilization of ground-water elevation cannot be achieved using the submersible pumping system.

9. ***Water Quality Indicator Parameter Data, Section 3.1.3, Page 3-2***—This section includes statements regarding seasonal trends in the average oxygen concentration in ground water. Unfortunately, for the reasons stated above, trend analyses based on the non-purge data are not representative of the *in situ* oxygen concentration at this site.

   Response—Comment noted. Future dissolved oxygen trend analyses will be made exclusively with data collected following monitoring well purging.

10. ***Well Point Headspace Vapor Measurements, Section 3.1.4, Page 3-2***—The Department questions the usefulness of the headspace data measurements made on selected well points. The character of the headspace vapor is interesting, but is not clear how the Navy uses the information to modify system operation.

    Response—The collection of well riser headspace data (including total volatile hydrocarbon, methane, oxygen, and carbon dioxide concentrations) is used both to monitor for potential hydrocarbon release to the atmosphere and to augment ground-water monitoring and sampling data. The measurement of total volatile hydrocarbon concentration is used to modulate the biosparging system to minimize volatilization effects, in favor of *in situ* biodegradation and to increase air flow to areas exhibiting evidence of elevated petroleum hydrocarbon concentrations. The measurement of methane, oxygen, and carbon dioxide concentrations in the well risers provides confirmatory data to validate water quality indicator parameter measurements (reference MEDEP Comment No. 11) and to assess *in situ* biodegradation conditions.

11. ***In Situ Biodegradation Conditions, Section 3.3.1, Page 3-6***—The assessment of the biosparging system's ability to enhance oxygen concentrations is too optimistic. The analysis of oxygen distribution at this site should rely exclusively on data obtained using low flow sampling techniques. In fact, the distribution of methane as measured in the well points clearly indicate anaerobic conditions occur throughout the system.

Response—Reference response to MEDEP Comment Nos. 7 and 9. The effectiveness of the biosparging system has been demonstrated by the significant reduction in dissolved-phase petroleum hydrocarbons since system activation in August 1996. Additionally, both the frequency of detection and concentration of methane have significantly decreased since activation of the biosparging system. Methane was reported at only 4 of 14 well points (WP-2, WP-5, WP-7, and WP-12) measured on 16 June 1998. Three of these well points (WP-2, WP-5, and WP-7) are co-located in an area outside of the zone of effectiveness of the biosparging system. The fourth well point (WP-12) is located in an area of elevated petroleum hydrocarbon concentration, which likely experiences significant biological oxygen demand. The Navy has performed extensive system modifications to enhance air delivery to these areas.

Although reduced dissolved oxygen concentrations were reported following well purging on 17 June 1998, anaerobic conditions (i.e., dissolved oxygen, <2.0 mg/L) were only reported at one location within the biosparging system zone of influence (MW-NASB-211). As previously stated, this monitoring well is located in an area of elevated petroleum hydrocarbon concentration, which likely experiences significant biological oxygen demand. The remaining monitoring wells in which anaerobic conditions were reported are located outside the biosparging zone of influence, or outside the Old Navy Fuel Farm perimeter fence altogether.

It is agreed that the presence of methane suggests the persistence of anaerobic conditions at the aforementioned (selected) locations. It does not follow that anaerobic conditions occur throughout the remedial area. The progressive reductions in both dissolved-phase petroleum hydrocarbons and methane since activation biosparging system, as well as field observations of active sparging conditions at well points and monitoring wells, suggest that aerobic conditions are predominant in the remedial area.

12. ***Assessment of Dissolved-Phase Hydrocarbon Removal, Section 3.3.2, Page 3-8***—Since the initiation of the sparging system in August 1996, there has been a decrease in both GRO and DRO concentrations within the source area. In addition to monitoring the dissolved-phase petroleum concentration within the source area, it is also important to determine the behavior of the dissolved-phase plume downgradient of the Old Navy Fuel Farm. We must not lose site of the primary goal of biosparging: to reduce the extent and magnitude of ground-water contamination.

Response—The Navy has sampled downgradient monitoring wells since 8 August 1996, prior to startup of the biosparging system. Through this baseline sampling, it was demonstrated that for the compounds analyzed (BTEX, MTBE, TPH-DRO, and TPH-GRO), only TPH-DRO appeared to have migrated downgradient (i.e., south) of the Old Navy Fuel Farm. Since 8 August 1996, the downgradient concentration of TPH-DRO has decreased indicating that these compounds are not migrating from the principal source area(s) within the remedial zone. Results from the most recent ground-water sampling event (16-18 June 1998) indicate no exceedances of the MEDEP guidance values for BTEX, MTBE, or TPH-GRO in any downgradient monitoring well (including monitoring wells MW-NASB-049, MW-NASB-051, and MW-NASB-058). The historical data suggest that the extent and magnitude of ground-water contamination have been favorably influenced by operation of the biosparging system.

13. ***Conclusions and Recommendations, Section 3.4, Page 3-10***

a. The report states reduction in MTBE concentrations results primarily from volatilization. Because MTBE is extremely water soluble, it is likely ground-water movement through the contaminant zone also contributed to reductions in MTBE contamination through advection.

Response—The Navy does not believe that advection has significantly contributed to reductions in MTBE concentrations, while recognizing that it may be a contributing factor.

The historical MTBE data are summarized as follows. During baseline ground-water sampling conducted prior to activation of the biosparging system (7-8 August 1996), MTBE was detected in 19 of 20 ground-water samples at an average concentration of 26.7 μg/L. Following 6 months of biosparging system operations (4-5 December 1996), MTBE was reported in only 2 of 24 ground-water samples at an average concentration of 5.4 μg/L. MTBE was not reported at any downgradient monitoring well location during this period.

During the most recent ground-water sampling event (16-18 June 1998), MTBE was detected in only 2 of 28 ground-water samples at concentrations of 4 and 5 μg/L. Both of these concentrations are significantly below the MEDEP guidance value of 35 μg/L.

The absence of MTBE in downgradient wells, coupled with the observed baseline concentrations of MTBE in the source areas, suggests that advection was not likely a principal factor in the reduction in dissolved-phase MTBE during the first 6 months of biosparging system operation.

b. According to the report, system modifications outlined in this section were to be performed during the July-December 1998 operational period. Because the Department did not receive this report until late November, it is impossible to provide meaningful input. The Navy's response to the comments should detail the implemented changes.

Response—Comment noted. Reference response to MEDEP Comment No. 2. The system modifications are outlined in the Old Navy Fuel Farm Biosparging System Operations Summary Report for the period of July–December 1998.

c. The report indicates several well points and at least one monitor well are no longer operational. What are the Navy's plans to replace these points?

Response—Comment noted. Reference response to MEDEP Comment No. 7.

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ANGUS S. KING, JR.
GOVERNOR

EDWARD O. SULLIVAN
COMMISSIONER

RECEIVED
DEC 16 1998
EA Engineering, Science, & Technology, Inc.
Newburgh, NY 12550

December 11, 1998

Mr. Emil Klawitter
Code 1823 EK
Department of the Navy, Northern Division
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop 82
Lester, PA 19113-2090

Re: Summary Report Biosparging System Operations
at Old Navy Fuel Farm, January–June 1998
Naval Air Station, Brunswick, Maine
November 1998, Final

Dear Mr. Klawitter;

The Department of Environmental Protection (DEP or Department) has reviewed the report entitled "Summary Report Biosparging System Operations at Old Navy Fuel Farm, January-June 1998", dated November 1998, prepared by EA Engineering, Science and Technology. Based on that review the Department has the following comments and issues.

General Comments

1. Departmental records indicate a review for a summary report dated April 1997. It covered the monitoring period from August 1996 through December 1996. Comments were forwarded to the Navy in a letter dated July 28, 1997. The current report includes data from January 1998 through June 1998. The reference section of the current report includes two summary reports for 1997. The Department has not received either of the two summary reports for 1997.

2. In the future, the Navy must submit the summary reports in a more timely fashion. This report arrived nearly five months after the Navy collected the June round of groundwater samples. In order for the Department to provide meaningful input a shorter turn around is necessary. Otherwise the report's recommendations have already been implemented without agreement from the DEP.

3. Future summary reports should include a section detailing the Navy's responses to the Department's comments regarding the previous summary report.

4. In the letter from the Department dated July 29, 1997 (copy attached) the Navy was asked to consider methods to determine respiration rates within the saturated zone. The Department still contents that this may be useful and have some suggestions for how oxygen consumption rates might be determined at this site.

5. Based on review of the summary report, it would be useful to meet with the Navy and its consultant to discuss the ongoing remedial efforts at this site.

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Specific Comments:

6. Introduction, Section 1.1, page 1-1

It would be helpful if Figure 1-1 depicted the location of the Old Navy Fuel Farm.

7. Water Quality Indicator Parameter Measurement Methodology, Section 2.1.2, Pg 2-1

Every couple of weeks EA Engineering, Science, and Technology (EA) obtains field measurements from many of the well points and monitor wells at this site. The in-situ measurements include pH, specific conductance, redox potential, dissolved oxygen, and temperature. EA obtains the data by lowering the field instrument below the water table in each well point/monitor well. Because the well points and monitor wells are not purged, most of the data is of limited value.

To evaluate the data, Department staff compared in-situ data collected from 9 monitor wells on June 16, 1998, with low flow data collected from the same wells a day later after purging the wells. The attached table contains data for dissolved oxygen and redox potential. In all wells, the dissolved oxygen concentration data obtained after purging was lower than the in-situ data (see attached figure). Dissolved oxygen concentration data from MW-61R and MW-211 are of particular significance. In MW-61R and MW-211, the concentration of dissolved oxygen in the purged samples was essentially zero while the no purge data revealed 6.74 mg/L in MW-61R and 2.47 mg/L in MW-211. Redox potential was often much lower in the purged samples.

The explanation is pretty simple. The water within the screened interval is stagnant and not representative of groundwater. The higher dissolved oxygen and redox potential are a direct result of the stagnant water's direct contact with the atmosphere. Only after the purging the stagnant water can one obtain meaningful data about the in-situ concentrations at this site. Therefore, it is not worthwhile to continue this sampling unless the wells are purged.

8. Sampling Methodology, Section 2.3.2, Pg 2-2:

It appears there are some sampling problems relating to the inability to reduce flow rates below 1000 ml/min using the Grundfos Rediflo submersible pump. As recommended for the NEX Service Station monitoring program, it is acceptable to use peristaltic pumps for low flow groundwater sampling.

9. Water Quality Indicator Parameter Data, Section 3.1.3, Pg 3-2:

This section includes statements regarding seasonal trends in the average oxygen concentration in groundwater. Unfortunately, for the reasons stated above, trend analyses based on the non-purge data are not representative of the in-situ oxygen concentrations at this site.

10. Well Point Headspace Vapor Measurements, Section 3.1.4, Pg 3-2:

The Department questions the usefulness of the headspace data measurements made on selected well points. The character of the headspace vapor is interesting, but it is not clear how the Navy uses the information to modify system operation.

11. In Situ Biodegradation Conditions, Section 3.3.1, Pg 3-6:

The assessment of the biosparging system's ability to enhance oxygen concentrations is too optimistic. The analysis of oxygen distribution at this site should rely exclusively on data obtained using low flow sampling techniques. In fact, the distribution of methane as measured in the well points clearly indicate anaerobic conditions occur throughout the system.

12. Assessment of Dissolved-Phase Hydrocarbon Removal, Section 3.3.2, Pg 3-8:

Since initiation of the sparging system in August 1996 there has been a decrease in both GRO and DRO concentration within the source area. In addition to monitoring the dissolved phase petroleum concentration within the source area it is also important to determine the behavior of the dissolved phase plume downgradient of the Old Tank Farm. We must not lose sight of the primary goal of biosparging: to reduce the extent and magnitude of groundwater contamination.

To further assess the biosparging effort, the Navy needs to provide the chromatograms for all DRO and GRO groundwater samples.

13. Conclusions and Recommendations, Section 3.4, Pg 3-10

The report states reduction in MTBE concentration results primarily from volatilization. Because MTBE is extremely water soluble, it is likely groundwater movement through the contaminant zone also contributed to reductions in MTBE contamination through advection.

According to the report, the system modifications outlined in this section were to be performed during the July – December 1998 operational period. Because the Department didn't receive this report until late November it's impossible to provide meaningful input. The Navy's response to these comments should detail the implemented changes.

The report indicates several well points and at least one monitor well are no longer operational. What are the Navy's plans to replace these points?

Thank you for the opportunity to comment on this report. If you have any questions or comments please call me at (207) 287-7713.

Respectfully,

Claudia Sait

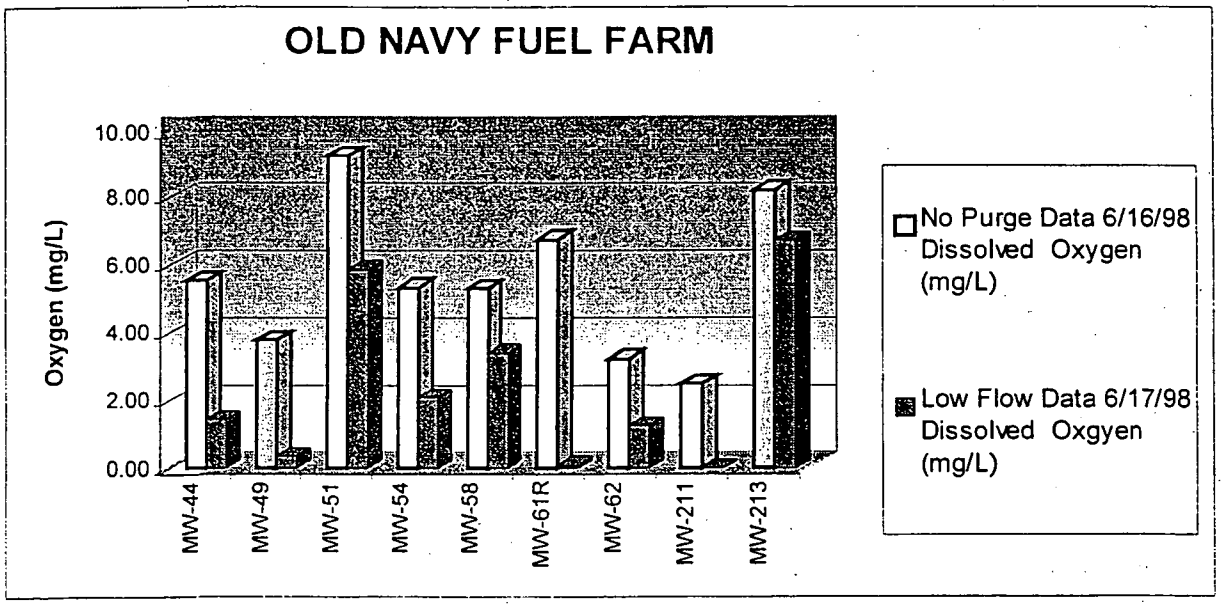
Claudia Sait
Project Manager-Federal Facilities
Bureau of Remediation & Waste Management

attachments

Cf: File
Larry Dearborn-DEP
Richard Behr-DEP
Anthony Williams-BNAS
Peter Nimmer-EA

Brunswick Naval Air Station
Old Navy Fuel Farm
Biosparging System

Well ID	No Purge Data 6/16/98 Dissolved Oxygen (mg/L)	Low Flow Data 6/17/98 Dissolved Oxgyen (mg/L)	No Purge Data 6/16/98 Redox Potential (mV)	Low Flow Data 6/17/98 Redox Potential (mV)
MW-44	5.54	1.40	165	23
MW-49	3.77	0.36	156	43
MW-51	9.26	5.86	134	138
MW-54	5.33	2.06	261	271
MW-58	5.28	3.38	159	103
MW-61R	6.74	0.07	252	-41
MW-62	3.20	1.24	189	51
MW-211	2.47	-0.03	135	-85
MW-213	8.21	6.69	119	120



Appendix B

Field Record of Water Quality Analysis Forms

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: BA, SC	Date: 7/13/98	Time:
Weather: Sunny 80°	Equipment: YSI-610D	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Riser	Bottom
WP-1	4.23	—	7.50	19.15	2.62	203	-109		
WP-2	5.14	—	6.66	17.94	2.99	178	-107		
WP-3	4.73	—	6.77	17.41	3.32	56	-80		
WP-4	5.05	—	6.63	17.75	3.43	160	-93		
WP-5	5.22	—	7.24	14.73	1.42	68	-114		
WP-6	4.14	—	6.92	16.49	3.66	55	-106		
WP-7	4.47	—	6.23	17.77	2.36	262	116		
WP-8	4.83	—	6.36	16.81	2.60	487	-74		
WP-9	5.32	—	6.70	16.58	4.11	166	-80		
WP-10	4.86	—	7.71	13.85	1.37	94	-169		
WP-11	4.96	—	6.37	15.84	3.32	145	114		
WP-12	6.41	—	6.67	16.27	1.79	166	-72		
WP-13	—								
WP-14	5.57	—	6.78	15.99	2.40	139	-108		
WP-15	5.40	—	7.00	16.86	7.70	47	-92		
WP-16R	6.12	—	6.38	16.31	6.08	458	-2		
WP-17R	6.78	—	6.66	15.12	5.97	167	-12		
WP-18R	5.59	—	7.17	21.20	8.52	190	-45		
WP-20	—								
WP-21	5.78	—	6.78	16.31	6.89	185	-44		
WP-22	5.85	—	10.86	16.10	4.92	1385	-150		

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: BA, SC	Date: 7/13/98	Time:
Weather: Sunny	Equipment: YSI-60D	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Riser	Bottom
43'	6.19	—	6.71	17.81	6.63	53	-62		
211'	6.34	—	6.40	14.61	2.86	137	-96		
213'	5.00	—	7.04	17.44	6.72	43	-91		
54'	5.75	—	8.22	15.18	3.20	119	-113		
44'	2.72	—	6.93	18.56	4.90	53	-78		
61R'	4.56	—	7.76	19.02	4.01	110	-137		
62'	8.38	—	7.01	10.17	6.20	73	-71		
51'	4.08	—	6.71	14.15	3.61	46	-3		
58'	5.99	—	7.28	11.17	6.63	56	-41		
49'	5.62	—	6.58	12.94	3.08	107	-8		

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: BA, SC	Date: 7/21/98	Time:
Weather: Sunny 85°	Equipment: YSI 610D / Interface	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-1	5.05	—	6.61	18.04	2.43	332	6
WP-2	5.69	—	6.39	17.64	2.48	136	-10
WP-3	4.29	—	6.53	16.85	2.87	51	12
WP-4	5.75	—	6.28	16.97	3.33	183	-58
WP-5	5.57	—	6.62	15.48	2.81	74	-29
WP-6	4.65	—	6.50	14.43	3.90	84	-5
WP-7	5.04	—	6.16	17.23	1.92	248	-116
WP-8	5.45	—	6.15	17.31	3.85	54	36
WP-9	5.91	—	8.97	18.08	4.15	176	-114
WP-10	5.64	—	6.73	13.32	2.51	89	-21
WP-11	5.37	—	6.21	16.76	2.82	149	-99
WP-12	6.89	—	6.26	17.44	2.34	155	12
WP-13	destroyed						
WP-14	6.16	—	6.28	16.54	2.48	130	-25
WP-15	5.92	—	6.64	16.69	8.97	52	-7
WP-16R	~~7.31~~ 6.81	—	7.95	15.83	5.30	467	-49
WP-17R	7.31	—	8.33	13.91	5.22	166	-53
WP-18R	6.39	—	7.46	19.38	8.56	198	-108
WP-20	destroyed						
WP-21	6.47	—	7.71	16.58	6.11	241	-146
WP-22	6.49	Sheen	9.65	18.45	5.50	1431	-258

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: BA, SC	Date: 7/21/98	Time:
Weather: sunny, 85°	Equipment: YSI 610D / Interface	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
43'	DRY	—					
211'	6.83	—	6.06	15.96	1.88	139	-85
213'	5.57	—	6.81	17.52	7.30	44	-32
54'	6.50	—	7.26	14.41	2.75	119	-10
44'	3.14	—	6.71	18.92	4.66	53	-17
61R'	6.21	—	6.74	19.74	2.66	120	-9
62'	7.86	—	7.33	10.73	9.71	41	26
51'	4.85	—	7.66	17.09	8.21	57	-71
58'	6.10	—	7.69	12.89	6.74	53	-64
49'	5.91	—	7.21	13.70	5.90	100	-49

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SD, BA	Date: 8/5/98	Time: 1005
Weather: Sunny, Warm	Equipment: YSI 610D / TVA 1000	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)
WP-1	5.66	—	6.9	17.55	5.41	344	16.3
WP-2	6.14	—	6.66	17.43	3.9	130	-12.9
WP-3	4.93	—	6.93	17.56	4.79	49	8.8
WP-4	6.53	—	6.53	18.06	6.70	203	22.9
WP-5	5.87	—	6.98	16.95	6.49	73	-10.3
WP-6	5.05	—	6.06	16.13	5.48	97	-79.6
WP-7	5.50	—	6.64	17.79	6.15	239	-83.1
WP-8	5.96	—	6.34	18.3	5.57	477	44.5
WP-9	7.05	—	6.58	18.6	7.37	210	17.2
WP-10	6.27	—	7.0	14.1	3.3	79	32.9
WP-11	5.82	—	6.64	17.63	7.92	168	8.8
WP-12	7.70	—	6.61	18.85	6.66	130	32.1
~~WP-13~~		Destroyed					
WP-14	6.78	—	6.42	17.53	6.31	160	-.2
WP-15	6.51	—	6.77	17.02	6.93	64	-37.6
WP-16R	7.78		7.85	18.48	~~5.39~~ 3.92	541	-18.7
WP-17R	8.07		8.59	17.81	3.34	182	-1.3
WP-18R	7.2		6.58	29.95	7.96	154	137.4
~~WP-20~~		Destroyed					
WP-21	7.0		6.61	21.37	4.38	200	110.6
WP-22	7.0		7.85	26.27	3.36	683	-149.6

strong odor/film

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SD, BA	Date: 8/5/98	Time: 1015
Weather: Sunny, Hot	Equipment: YSI 610D / TVA 1000	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
43'	~~7.11~~	—	DRY				
211'	7.40	—	6.51	16.67	9.97	152	46.0
213'	6.55	—	6.86	17.24	8.05	45	-13.9
54'	7.11	—	7.54	15.63	4.13	102	115
44'	6.75	—	6.91	18.41	6.21	50	-19.4
61R'	5.86	—	6.91	18.72	4.06	121	31.3
62	9.77	—	7.38	10.99	7.55	48	19.2
51'	6.02	—	6.91	16.48	8.88	54	29.6
58'	6.25	—	6.81	13.22	2.48	56	28.8
49'	6.22	—	6.68	15.82	7.43	104	30.6

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SYC		Date: 8/26/98	Time:
Weather: Sunny, breezy, 65°		Equipment: YSI 600 XL interface meter	

Location	Depth to Water (ft)	'Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-1	4.35	—	5.79	20.58	2.17	380	277
WP-2	5.49	—	6.04	20.02	2.36	164	268
WP-3	4.68	—	5.81	18.47	2.41	117	272
WP-4	6.69	—	6.03	18.11	2.57	243	258
WP-5	5.61	—	5.66	16.41	2.25	66	277
WP-6	4.68	—	5.76	16.21	2.23	76	285
WP-7	5.09	—	5.77	18.70	2.71	318	275
WP-8	5.83	—	5.73	18.21	3.24	501	270
WP-9	dry	—	—				
WP-10	6.77	—	5.63	14.21	2.70	89	287
WP-11	5.52	—	5.73	17.47	2.41	161	281
WP-12	dry	—	—				
WP-13	destroyed	—					
WP-14	6.67	—	5.69	17.50	2.51	197	330
WP-15	6.20	—	5.83	17.17	2.95	98	282
WP-16R	8.40	—	6.42	16.56	3.39	427	137
WP-17R	8.49	—	5.91	19.03	2.67	292	139
WP-18R	7.05	—	insufficient water				
WP-20	destroyed	—	—				
WP-21	6.93	—	8.74	17.28	2.52	209	73
WP-22	7.03	—	10.25	17.72	2.33	409	-12

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SYC	Date: 8/26/98	Time:
Weather: Sunny, 65°, breezy	Equipment: YSI 600XL	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
43	dry	—					
211	7.79	—	6.11	16.64	1.37	194	184
213	7.03	—	6.47	16.35	5.57	57	211
54	7.04	—	6.17	14.22	2.51	135	349
44	3.26	—	6.34	18.73	3.05	51	251
61R	5.14	—	5.83	20.01	4.25	129	261
62	9.64	—	5.99	10.75	2.26	72	266
51	5.56	—	6.28	13.85	3.40	68	168
58	6.32	—	6.44	15.03	4.07	58	191
49	5.71	—	6.05	15.22	5.18	116	218

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: Jeff Hutchins	Date: 9/10/98	Time: 10:30
Weather: Partly Cldy, 60°, Windy	Equipment: 451, interface probe, ISCO.	

Location	Depth to Water (ft)	'Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-1	5.21'	—	7.36	19.12	1.81	337	-100.9
WP-2	5.91'	—	7.34	18.77	1.28	161	-160.2
WP-3	4.97'	—	6.63	17.51	1.23	84	-102.9
WP-4	4.03'	—	6.40	17.82	1.19	241	-180.7
WP-5	4.82'	—	6.11	16.64	0.45	81	-142.3
WP-6	2.99'	—	6.35	16.76	0.47	96	-175.3
WP-7	5.31'		6.01	17.63	1.01	333	-187.0
WP-8	7.88'	—	6.53	18.04	~~1.48~~ 0.77	513	-160.0
WP-9	DRY Hole						
WP-10	3.42'	—	5.60	14.86	1.24	84.0	-25.3
WP-11	4.71'	—	6.14	17.63	2.34	172.00	-189.4
WP-12	DRY Hole						
WP-13	destroyed						
WP-14	6.94	—	6.26	19.11	5.51	2.00	-88.9
WP-15	6.21'	—	5.96	17.00	0.69	112.00	-109.4
WP-16R	8.69'	—	6.64	17.01	3.07	490.00	-129.8
WP-17R	8.89'		5.96	15.85	2.08	278.00	-105.5
WP-18R	7.57		7.23	21.94	6.34	178	-139.3
WP-20	destroyed						
WP-21	7.13		7.22	17.55	2.15	222.0	-210.3
WP-22	7.23		10.20	18.31	2.13	469.00	-225.7

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: Jeff Hutchins	Date: 9/10/98	Time: 10:30
Weather: PtCldy, 60°, windy	Equipment: YSI, Interface probe, ISCO	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
211	7.82'		6.31	16.96	0.64	183.00	-236.6
MW 213	7.41'	—	6.56	16.88	4.23	54.00	-98.2
51	6.09'	—	6.20	16.42	2.46	67.00	-53.1
49	5.93'	—	5.76	16.28	0.70	110.00	-7.6
58	6.38'	—	6.27	15.64	2.15	58.00	-47.7
43			DRY				
61R	5.64'	—	8.82	19.08	3.18	137.00	-139.4
44	3.62'	—	7.44	18.15	3.39	53.00	-101.0
62	10.20'	—	9.24	11.92	2.16	73.00	-184.9
54	8.34'	—	5.92	16.60	3.69	113.00	-33.7
46	5.42'	—	6.25	17.56	6.17	193.00	-39.4

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel:	SYC, BB	Date:	9/25/98	Time:	
Weather:	overcast	Equipment:			

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-1	5.85	—	6.18	16.61	3.19	254	127
WP-2	6.30	—	6.24	16.52	3.01	155	118
WP-3	5.38	—	6.14	15.93	3.23	48	27
WP-4	7.45	—	insufficient water				
WP-5	6.07	—	6.59	15.86	1.80	73	20
WP-6	5.31	—	6.01	15.36	1.50	91	1
WP-7	5.77	—	5.79	15.85	2.72	256	-23
WP-8	6.67	—	5.75	16.60	2.02	393	57
WP-9	dry	—	—	—			
WP-10	6.79	—	6.78	14.28	2.28	87	-3
WP-11	6.16	—	5.81	16.06	2.09	147	49
WP-12	dry	—	—	—			
WP-13	destroyed	—	—	—			
WP-14	7.27	—	7.17	16.10	3.64	170	-17
WP-15	6.84	—	6.04	15.60	8.16	76	91
WP-16R	9.03	—	6.92	15.12	4.37	311	-45
WP-17R	9.68	—	7.12	17.28	4.59	298	-42
WP-18R	7.65	—	insufficient water				
WP-20	destroyed	—	—	—			
WP-21	7.49	—	5.86	16.82	4.29	161	63
WP-22	7.89	—	6.46	16.23	5.35	267	3

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SVC, BB	Date: 9/25/98	Time:
Weather: Overcast	Equipment:	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
MW-211	8.22	—	6.10	16.02	3.39	172	-11
213	7.81	—	6.41	15.49	5.40	51	64
51	6.60	—	6.24	15.22	3.59	57	42
49	8.22	—	5.84	19.26	2.70	153	38
58	6.52	—	6.34	14.20	3.56	53	37
43	Dry	—					
61R	8.12	—	6.59	16.76	3.58	112	39
44	4.02	—	6.48	16.67	3.89	48	103
62	10.46	—	6.82	12.05	5.57	56	69
54	7.68	—	7.89	15.35	2.46	99	263
46	6.12	—	6.01	16.32	8.23	178	78

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SC, SD	Date: 10/1/98	Time:
Weather: Overcast,	Equipment:	

Location	Depth to Water (ft)	'Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	
WP-1	5.55	—	6.76	16.57	5.82	326	151	
WP-2	6.18	—	6.83	16.13	3.41	187	133	
WP-3	5.30	—	6.65	15.41	3.70	60	30	
WP-4	7.36	—	Insufficient					
WP-5	5.99	—	7.28	15.99	2.93	80	29	
WP-6	5.19	—	6.61	15.24	2.26	98	6	
WP-7	5.63	—	6.28	15.27	3.32	275	-11	
WP-8	6.40	—	6.16	16.16	2.84	424	71	
WP-9	dry	—	—	—	—	—	—	
WP-10	6.64	—	7.38	14.26	2.87	106	23	
WP-11	6.02	—	6.27	15.77	3.42	164	93	
WP-12	dry	—	—	—	—	—	—	
WP-13	destroyed	—	—	—	—	—	—	
WP-14	7.16	—	7.76	16.04	4.35	185	94	
WP-15	6.81	—	6.54	15.45	1.59	87	97	
WP-16R	9.05	—	8.0	15.18	5.06	575	-75.5	slight sheen
WP-17R	8.96	—	6.28	15.38	5.34	349	108	Slight sheen
WP-18R	7.63	—	Insuf. Water					
WP-20	—	—	—	—	—	—	—	
WP-21	7.30	—	6.28	15.88	5.36	210	71.3	
WP-22	7.72	—	Ins. Water - slight sheen					

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SYC, SD	Date: 10/1/98	Time:
Weather: overcast	Equipment:	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
211	8.22	—	6.57	15.75	2.18	185	-30
213	7.84	—	6.89	14.15	4.95	74	85
51	6.59	—	6.71	14.32	3.55	72	24
49	6.10	—	6.26	12.84	3.03	251	60
58	6.53	—	6.71	13.32	3.63	64	45
43	dry	—					
61R	5.96	—	7.19	16.37	3.11	126	54
44	3.94	—	6.85	15.16	1.95	98	107
62	10.46	—	7.33	11.00	4.01	69	91
54	8.22	—	8.34	15.32	3.28	148	258
46	6.10	—	6.35	15.55	1.90	264	62

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SC, SD	Date: 10/22/98	Time:
Weather:	Equipment:	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)
WP-1	4.36	—	5.55	13.12	5.08	301	319
WP-2	5.07	—	5.85	12.77	5.39	177	366
WP-3	3.68	—	5.81	13.08	2.48	47	291
WP-4	4.61	—	5.89	13.23	4.45	108	279
WP-5	5.04	—	5.57	13.61	3.63	87	343
WP-6	4.08	—	5.77	13.23	3.09	47	302
WP-7	4.27	—	5.55	12.55	4.58	264	301
WP-8	4.45	—	5.43	13.16	6.23	451	301
WP-9	4.88	—	5.84	14.02	6.04	145	283
WP-10	4.38	—	5.73	13.13	4.26	55	344
WP-11	4.70	—	5.58	13.17	5.06	120	302
WP-12	5.78	—	5.46	13.68	3.56	247	308
WP-13	destroyed						
WP-14	5.08	—	5.99	13.39	4.88	74	377
WP-15	5.01	—	5.77	12.58	10.20	37	296
WP-16R	5.28	—	5.83	13.46	4.92	321	302
WP-17R	6.07	—	5.73	13.29	5.07	284	279
WP-18R	5.05	—	5.88	13.15	4.11	199	313
WP-20	destroyed						
WP-21	5.48	—	5.91	13.07 ~~5.49~~	4.32	203	299
WP-22	5.65		5.56	13.52	3.99	433	311

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SC, SD	Date: 10/22	Time:
Weather:	Equipment:	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
211	5.76		5.89	13.93	2.04	127	285
213	5.31	—	6.11	13.63	5.34	46	275
51	4.16	—	5.91	12.51	5.13	63	286
49	5.61	—	5.71	12.99	1.87	97	296
58	5.83	—	6.04	13.05	2.92	51	281
43	6.15	—	6.05	13.16	5.80	18	281
61R	4.57	—	5.66	13.33	5.19	114	330
44	2.70	—	5.96	13.52	3.10	81	299
62	8.18	—	5.85	10.85	4.70	71	321
54	5.34	—	6.09	13.49	1.96	95	332
46	4.13	—	5.66	13.71	5.64	267	296

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SD, BA	Date: 10/11/98	Time: 825
Weather: Rain, Windy, 50° 60-70 Knots	Equipment: VSI	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	
WP-1	3.55	—	6.84	9.33	12.57	145	285	
WP-2	5.45	—	6.75	9.34	11.98	16	285	
WP-3	3.93	—	6.73	10.44	11.67	61	279	
WP-5	3.86	—	6.67	11.18	11.61	47	274	
WP-6	5.35	—	6.79	10.72	11.11	64	278	
WP-4	5.22	—	6.53	10.22	11.69	145	285	
WP-7	3.70	—	6.66	8.49	12.62	116	284	
WP-8	5.47	—	6.48	11.68	11.31	388	287	
WP-9	6.37	—	6.60	11.85	11.46	159	278	
WP-10	5.09	—	7.0	11.89	11.54	76	272	
WP-11	5.03	—	6.54	11.54	11.67	57	282	
WP-12	7.10	—	6.59	11.70	6.30	199	269	
WP-13	Bent							
WP-14	5.98	—	8.15	11.19	7.83	80	130	
WP-15	5.66	—	9.02	10.39	8.35	54	92	
WP-16R	7.00	—	8.23	12.01	10.33	446	105	
WP-17R	7.40	—	6.23	12.19	6.97	274	293	odor
WP-18R (21)	6.05	—	8.27	12.60	6.43	193	143	
WP-20	Broken off							
WP-21 (18R)	6.08	—	7.94	11.64	10.67	113	143	
WP-22	6.35	—	7.41	11.91	6.72	924	115	odor

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SD, BA	Date: 11/11/98	Time:
Weather: Rain, heavy wind, 50°	Equipment: YSI	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
211 ✓	6.92	—	6.52	11.62	11.63	100	275
213 ✓	6.12	—	6.43	11.87	11.34	2.[illegible]	277
51 ✓	3.99	—	6.63	10.59	8.17	66	266
49 ✓	5.78	—	6.57	11.72	7.14	109	271
58 ✓	6.17	—	6.99	12.01	6.97	54	249
43 ✓	← DRY	→					
61R ✓	3.95	—	6.85	10.50	11.01	112	285
44 ✓	2.14	—	6.78	10.60	11.20	62	274
62 ✓	8.52	—	7.81	10.98	7.52	63	150
54 ✓	7.64	—	7.47	12.41	4.62	107	256
46 ✓	6.41	—	6.51	12.28	5.73	245	274

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SYC	Date: 11/23/98	Time:
Weather: Overcast,	Equipment: YSI-600	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)
WP-1	3.99	—	5.31	7.51	4.81	195	314
WP-2	5.07	—	5.52	8.00	6.91	167	302
WP-3	3.99	—	5.69	8.52	6.64	70	285
WP-4	4.78	—	5.96	8.48	8.67	104	270
WP-5	5.28	—	5.05	10.11	6.62	52	330
WP-6	4.21	—	5.63	9.23	6.66	50	295
WP-7	4.16	—	5.52	7.37	4.77	219	296
WP-8	4.87	—	5.47	8.49	6.68	364	294
WP-9	6.70	—	5.84	9.95	8.81	140	276
WP-10	4.95	—	4.87	10.10	7.83	94	354
WP-11	4.98	—	5.36	8.94	6.97	101	303
WP-12	6.95	—	5.82	9.52	6.56	129	283
WP-13	bent	—					
WP-14	5.87	—	5.52	9.75	8.15	76	320
WP-15	5.59	—	5.61	9.11	7.18	53	294
WP-16R	7.28	—	8.35	10.77	6.90	418	128
WP-17R	7.53	—	8.74	11.12	5.47	271	107
WP-18R	6.23	—	6.04	9.17	11.85	103	266
WP-20	—						
WP-21	6.05	—	5.64	10.79	9.01	187	283
WP-22	6.67	—	6.96	9.66	5.20	888	195

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SYC	Date: 11/23/98	Time:
Weather: overcast, 40°	Equipment: YSI-600	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
211	6.77	—	5.78	11.17	1.44	156	281
213	5.73	—	6.14	10.30	8.45	57	265
51	4.19	—	5.87	9.44	7.78	73	272
49	5.59	—	5.88	10.68	7.66	112	273
58	6.10	—	6.16	11.13	7.44	48	255
43	6.77	—	5.65	8.20	12.23	1	291
61R	4.77	—	5.09	9.85	8.07	116	326
44	2.82	—	5.74	9.14	7.46	69	290
62	8.59	—	5.49	10.54	8.80	73	310
54	6.22	—	6.55	11.75	4.44	120	292
46	4.90	—	5.72	10.59	5.48	214	277

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SD / BA	Date: 12-3-98	Time: 920
Weather: Overcast 50°	Equipment: YSI-610, Interface probe, Slope indicator	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	
WP-1	4.46	—	6.02	7.68	9.57	286	319	
WP-2	5.21	—	6.02	7.41	7.07	149	360	
WP-3	4.06	—	6.03	8.55	9.15	71	294	
WP-4	4.91	—	5.94	7.65	10.98	121	311	
WP-5	5.33	—	6.26	8.96	9.77	63	301	
WP-6	4.23	—	6.03	8.77	6.68	53	291	
WP-7	4.30	—	5.84	7.11	10.35	169	306	
WP-8	4.89	—	5.64	8.11	9.86	347	323	
WP-9	6.34	—	6.00	7.94	10.99	127	315	
WP-10	5.11	—	7.43	9.49	8.65	91	294	
WP-11	5.00	—	5.81	7.69	10.97	121	308	
WP-12	6.62	—	6.05	8.82	8.51	83	304	
WP-13	Bent							
WP-14	5.75	—	8.22	9.44	11.09	61	236	
WP-15	5.48	—	6.22	7.85	11.82	53	328	
WP-16R	DRY							
WP-17R	7.10	—	8.85	10.38	8.90	273	188	odor
WP-18R	6.15	—	6.14	9.07	11.44	102	340	
WP-20	destroyed							
WP-21	6.18	—	5.87	10.63	9.00	193	354	odor
WP-22	9.08	—	6.92	9.86	10.05	977	239	strong odor

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SD/BA	Date: 12-3-98	Time: 920
Weather: overcast 30°	Equipment: YSI / Interface probe	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
54	6.30	—	8.58	12.38	10.65	122	214
61R	4.95	—	6.35	8.83	9.90	107	294
62	8.48	—	6.33	8.31	11.22	44	282
44	2.86	—	6.14	8.05	10.55	08	291
211	6.49	—	6.06	9.04	8.37	103	297
213	5.62	—	6.15	9.18	10.94	49	303
46	4.71	—	6.14	7.86	11.58	193	324
58	6.00	—	6.27	10.11	10.59	51	310
49	5.61	—	6.12	9.44	10.96	105	326
51	4.18	—	6.14	8.60	11.52	64	323
43	DRY						

Comments:

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SVC	Date: 12/21/98	Time:
Weather:	Equipment:	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Bottom
WP-1	4.93	—	5.99	6.12	8.13	243	299	
WP-2	5.41	—	6.84	7.99	6.51	68	298	
WP-3	4.29	—	5.75	6.25	7.62	74	261	
WP-4	5.65	—	5.89	6.53	7.35	122	255	
WP-5	5.85	—	6.84	7.99	6.29	56	308	
WP-6	4.61	—	5.81	7.91	7.28	53	284	
WP-7	4.57	—	5.43	4.45	8.41	250	278	
WP-8	5.42	—	5.33	6.23	6.91	330	268	
WP-9	DRY	—						
WP-10	5.64	—	6.33	8.64	9.51	84	276	
WP-11	5.28	—	6.00	7.38	8.13	148	312	
WP-12	7.40	—		INSUFFICIENT WATER				
WP-13	DESTROYED							
WP-14	6.39	—	7.06	7.36	8.01	63	239	
WP-15	6.08	—	5.77	7.16	8.43	54	266	
WP-16R	7.65	—	7.12	7.32	7.12	309	212	
WP-17R	7.82	—	8.12	8.12	6.94	210	224	
WP-18R	6.64	—	6.38	6.12	9.28	56	271	
WP-20	DESTROYED							
WP-21	6.53	—	7.68	8.19	6.94	134	286	
WP-22	6.51	—	6.91	6.99	8.12	801	312	

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SVC	Date: 12/21/98	Time:
Weather: OVERCAST	Equipment:	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Bottom
54	6.68	–	7.20	10.33	1.93	189	227	
61R	5.23	–	5.75	7.10	8.38	103	279	
62	8.61	–	5.78	6.89	9.12	68	212	
44	3.05	–	5.89	6.66	7.19	63	269	
43	7.10	–	YSI	WON'T	GO	PAST	BEND	
211	7.18	–	5.81	8.17	7.45	102	252	
213	6.03	–	6.64	8.37	7.70	46	241	
51	4.25	–	5.93	8.21	10.98	61	289	
49	5.67	–	5.95	8.89	5.87	106	247	
46	5.27	–	5.91	8.52	7.24	222	251	
58	6.17	–	6.19	9.02	7.78	55	234	

Comments:

EA 5120 0794-7

Appendix C

Field Record of Biosparging Well Point Monitoring Forms

EA Engineering, Science, and Technology

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: BA, SC	Date: 7/2/98	Time:
Weather: overcast 85°	Instrument(s): TVA-1000, GA-90	

Location	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	CH_4	CO_2	O_2	Comments
WP-1	140	7250	0.1	0.0	21.4	
WP-2	1600	1.39%	0.2	0.6	21.0	
WP-3	9	2.25%	0.1	0.1	21.4	
WP-4	148	3%	0.1	4.8	15.5	
WP-5	258	3.8%	0.1	1.9	19.7	
WP-6	144	2.67%	0.1	0.0	21.5	
WP-7	9740	1.45	1.8	0.6	21.1	
WP-8	149	2.55%	0.0	0.0	21.5	
WP-9	49	2.72%	0.0	0.1	20.7	
WP-10	0.0	1.0%	0.0	0.2	21.4	
WP-11	107	1.12%	0.0	0.2	21.3	
WP-12	0	2164	0.0	6.5	14.7	
WP-13	destroyed		—	—	—	
WP-14	53	4.2%	0.0	0.3	20.7	
WP-15	0	1.61%	0.0	0.1	21.2	
WP-16 R	0	22%	0.0	1.9	19.9	
WP-17 R	0	4060	0.0	2.6	18.9	
WP-18 R	0	83	0.0	0.0	21.4	
WP-19	destroyed		—	—	—	
WP-20	destroyed		—	—	—	
WP21	0	160	5.4	0.7	19.9	
WP-22	256	68	1.5	0.0	21.2	

EA 5120 0794-4

* Note PID Instrument response problems
Instrument appears to be over responding

EA Engineering, Science, and Technology

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SD, BA	Date: 8/5/98	Time: 0840
Weather: Sunny, warm	Instrument(s): TVA 1000, GA-90	

Location	FID TVH (ppm_v)	PID TVH (ppm_v)	CH_4	CO_2	O_2	Comments
WP-1	71	1390	0	0	21.4	
WP-2	1618	870	1.0	3.0	18.6	
WP-3	98	196	.2	.1	21.2	
WP-4	230	103	.2	1.4	19.7	
WP-5	16	1950	.1	3.0	19.1	
WP-6	62	440	.1	0	21.5	
WP-7	4700	170	1.1	1.4	20.3	
WP-8	2%	41	2.0	3.4	17.9	
WP-9	0	2	.1	.2	21.2	
WP-10	0	600	.1	1.8	20	
WP-11	44	20	.1	20	18.8	
WP-12	1	34	.1	11	12.1	
WP-13	Destroyed →					
WP-14	0	14	.2	1.8	20.0	
WP-15	2	22	.1	3	17.4	
WP-16R	0	14	.1	3	19.1	
WP-17R	0	28	.1	1.5	20.3	
WP-18R	0	3	.1	0	21.3	
WP-21	15	5	.1	0	21.4	
WP-22	3	2	.1	0	21.7	

EA Engineering, Science, and Technology

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: BB, SYC	Date: 9/25/98	Time:
Weather: overcast	Instrument(s):	

Location	FID TVH (ppm_v)	PID TVH (ppm_v)	CH_4	CO_2	O_2	Comments
WP-1	90	1.5	0.0	4.9	16.8	
WP-2	1800	300	1.4	4.6	16.2	
WP-3	101	1.6	0.1	0.3	21.3	
WP-4	16.7	9.3	0.1	4.4	16.5	
WP-5	0.0	0.6	0.0	1.6	19.8	
WP-6	126	2	0.1	4.2	17.8	
WP-7	1100	120	1.6	1.7	19.9	
WP-8	67	3.8	0.2	7.6	13.0	
WP-9	0	1	0.1	1.4	19.8	
WP-10	22	5	0.1	12.4	11.5	
WP-11	2.6	2	0.0	1.6	20.1	
WP-12	0.0	2.2	0.1	2.4	19.8	
WP-13	destroyed					
WP-14	0.0	0.4	0.0	2.3	19.2	
WP-15	0.0	1.2	0.0	2.2	20.4	
WP-16R	0.0	0.5	0.0	0.0	21.8	
WP-17R	10.0	6.2	0.1	0.0	21.6	
WP-18R	0.0	1.8	0.1	0.0	21.6	
WP-21	0.0	0.4	0.1	0.0	21.4	
WP-22	0.0	0.0	0.1	0.0	21.6	

EA 5120 0794-4

EA Engineering, Science, and Technology

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SC, SD	Date: 10/22/98	Time:
Weather: sunny, windy	Instrument(s): TVA-1000	

Location	FID TVH (ppm_v)	PID TVH (ppm_v)	CH_4	CO_2	O_2	Comments
WP-1	6.4	97.8	0.2	0.3	20.7	
WP-2	549	174	0.2	0.6	20.5	
WP-3	128	15.6	0.2	3.2	19.4	
WP-4	61	54	0.1	0.0	20.7	
WP-5	534	101	0.5	3.0	9.7	
WP-6	39.23	37.8	0.2	1.3	19.7	
WP-7	16.1	23.2	0.2	0.1	20.7	
WP-8	54	12.6	0.2	0.2	20.7	
WP-9	3.1	21.3	0.1	0.0	20.7	
WP-10	0.0	45.9	0.1	0.0	20.7	
WP-11	0.0	20.2	0.1	0.1	20.7	
WP-12	6.2	10.5	0.1	1.3	17.0	
WP-13	[illegible]	[illegible]	—			
WP-14	0.0	20.6	0.2	0.1	17.9	
WP-15	0.0	20.3	0.1	1.0	20.0	
WP-16R	0.0	0.1	0.0	0.0	20.5	
WP-17R	0.0	0.1	0.0	0.0	20.5	
WP-18R	0.0	33.2	0.2	0.0	20.5	
WP-21	0.0	1.3	0.0	0.0	20.8	
WP-22	0.0	0.5	0.1	0.0	20.5	

EA Engineering, Science, and Technology

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA-Personnel: SYC	Date: 11/23/98	Time:
Weather: overcast	Instrument(s): TVA-1000, GA-90	

Location	FID TVH (ppm_v)	PID TVH (ppm_v)	CH_4	CO_2	O_2	Comments
WP-1	202	0.4	0.0	0.0	21.0	
WP-2	328	79.8	1.0	0.5	20.2	
WP-3	75	1.4	0.5	0.1	20.9	
WP-4	144	36	0.5	0.0	20.7	
WP-5	805	13.2	6.9	0.8	20.2	
WP-6	14.2	1.4	0.1	0.0	20.9	
WP-7	237	59	6.3	2.2	18.9	
WP-8	445	0.4	1.2	0.0	20.9	
WP-9	4.2	1.8	0.4	0.0	21.1	
WP-10	0.0	0.0	0.0	0.0	21.0	
WP-11	0.5	0.5	0.2	0.1	20.9	
WP-12	0.0	0.0	0.0	0.0	20.8	
WP-13	—	—	—	—	—	
WP-14	0.4	0.1	0.0	0.1	20.8	
WP-15	0.7	0.4	0.0	8.1	12.9	
WP-16R	0.0	0.0	0.0	0.0	20.9	
WP-17R	0.0	0.0	0.0	0.0	21.0	
WP-18R	0.4	0.1	0.1	0.1	20.9	
WP-21	29	0.0	0.3	0.6	20.4	
WP-22	0.0	0.0	0.1	0.0	21.0	

EA 5120 0794-4

EA Engineering, Science, and Technology

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING

Biosparging System, Old Navy Fuel Farm, Naval Air Station, Brunswick Maine

EA Personnel: SD / BA	Date: 12-3-98	Time:
Weather: overcast 45°	Instrument(s): TVA-1000	

Location	FID TVH (ppm_v)	PID TVH (ppm_v)	CH_4	CO_2	O_2	Comments
WP-1	~~157~~ 12	~~0~~ 0	~~0~~ 0	~~0~~ 0	~~16~~ 20.9 SD	
WP-2	419	69	0	.8	20.7	
WP-3	1	23	0	~~0~~ .4	15.5	
WP-4	174	32	0	0	19.7	
WP-5	485	20	0	.9	20.9	
WP-6	13	3	0	0	21.0	
WP-7	70	13	0	0	20.7	
WP-8	170	4	0	0	20.4	
WP-9	0	0	0	0	20.4	
WP-10	26	0	0	1.7	20.7	
WP-11	4	0	0	0	21.0	
WP-12	0	0	0	14	17	
WP-13	4	1	0	0	20.9	
WP-14	157	0	0.1	0	10	
WP-15	4	0	0	0	20.4	
WP-16	0	0	0	0	20.9	
WP-17	1	0	0	0	20.9	
WP-18	0	0	0	~~0~~ 3.1	~~20.4~~	17.3 SD
WP-19						
WP-20	destroyed					→

EA 5120 0794-4

WP-21	0	0	0	0	20.9
WP-22	0	0	0	0	20.8

Appendix D

Field Record of Well Gauging, Purging, and Sampling Forms

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	2960.35
Well ID:	WP-1	Well Lock Status:	—
Well Condition:	GOOD	Weather:	clear, cold

Gauge Date:	12/10/98	Gauge Time:	1054
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	STEIN *
Purge Method:	ESCO PUMP	Field Personnel:	RH. BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	8.23	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	4.56	C. Well Volume (L)	2.22
E. Liquid Depth (ft) (A-B)	3.67	E. Three Well Volumes (L)	6.66

Parameter	Beginning	1	2	3	4	5
Time (min.)	1054					
Depth to Water (ft)	4.56					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	6.80					
Temperature (°C)	7.25					
Conductivity (μmhos/cm)	275					
Dissolved Oxygen (mg/L)	5.34					
Turbidity (NTU)	—					
eH (mV)	413					

Total Quantity of Water Removed (L):			
Samplers:	RH / BA	Sampling Time (Start/End):	1055
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05WP006		
Sample Parameters:	VOC, TPH DRO TPH GRO, MN, FE		
Comments and Observations:			

* STEIN = PURGE DRY or STEIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-2	Well Lock Status:	—
Well Condition:	GOOD	Weather:	clear/cold

Gauge Date:	12/10/98	Gauge Time:	1449
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN. *
Purge Method:	ISCO PUMP	Field Personnel:	RH/BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	8.22	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.20	C. Well Volume (L)	1.83
E. Liquid Depth (ft) (A-B)	3.02	E. Three Well Volumes (L)	5.48

Parameter	Beginning	1	2	3	4	5
Time (min.)	1449					
Depth to Water (ft)	5.20					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	6.75					
Temperature (°C)	7.56					
Conductivity (μmhos/cm)	133					
Dissolved Oxygen (mg/L)	5.96					
Turbidity (NTU)	—					
eH (mV)	402					

Total Quantity of Water Removed (L):			
Samplers:	RH/BA	Sampling Time (Start/End):	1450
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05WP016 & NASBFF05WPXD2		
Sample Parameters:	VOC, TPH DRO & GRO, Fe & MN		
Comments and Observations:	Sheen on water		

* 5 MIN = PURGE DRY OR 5 MIN PURGE.

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-3	Well Lock Status:	—
Well Condition:	GOOD	Weather:	cold, clear

Gauge Date:	12/10/98	Gauge Time:	0945
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN
Purge Method:	ESCO PUMP	Field Personnel:	BH / BA.
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.51	D. Well Volume/ft (L):	1.605
B. Depth to Water (ft):	4.21	C. Well Volume (L)	1.996
E. Liquid Depth (ft) (A-B)	3.30	E. Three Well Volumes (L)	5.989

Parameter	Beginning	1	2	3	4	5
Time (min.)	945					
Depth to Water (ft)	4.21					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	6.71					
Temperature (°C)	8.52					
Conductivity (μmhos/cm)	78					
Dissolved Oxygen (mg/L)	6.41					
Turbidity (NTU)	—					
eH (mV)	398					

Total Quantity of Water Removed (L):			
Samplers:	SYC, BH BA	Sampling Time (Start/End):	945/
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05WP002		
Sample Parameters:	VOC, TPH GRO, TPH DRO, MN, Fe		
Comments and Observations:			

* 5 MIN = PURGE DRY / OR 5 MIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-4	Well Lock Status:	—
Well Condition:	GOOD	Weather:	clear / cold

Gauge Date:	12/10/98	Gauge Time:	1334
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN
Purge Method:	ISCO PUMP	Field Personnel:	BH / BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.62	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.38	C. Well Volume (L)	1.35
E. Liquid Depth (ft) (A-B)	2.24	E. Three Well Volumes (L)	4.06

Parameter	Beginning	1	2	3	4	5
Time (min.)	1334					
Depth to Water (ft)	5.38					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	6.63					
Temperature (°C)	8.09					
Conductivity (μmhos/cm)	119					
Dissolved Oxygen (mg/L)	6.34					
Turbidity (NTU)	—					
eH (mV)	399					

Total Quantity of Water Removed (L):	1334		
Samplers:	BH / BA	Sampling Time (Start/End):	1335 / 1345
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05WP013		
Sample Parameters:	Sheen on water VOC, TPH GRO, TPH DRO, Mn, Fe		
Comments and Observations:			

* 5 MIN = PURGE DRY OF 5 MIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	MW P-5	Well Lock Status:	—
Well Condition:	GOOD	Weather:	Clear Cold

Gauge Date:	12/10/98	Gauge Time:	1515 ~~5 MIN *~~ BH
Sounding Method:	INTER FACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN *
Purge Method:	ISCO PUMP	Field Personnel:	BH / BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.74	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.50	C. Well Volume (L)	1.35
E. Liquid Depth (ft) (A-B)	2.24	E. Three Well Volumes (L)	4.06

Parameter	Beginning	1	2	3	4	5
Time (min.)	1515					
Depth to Water (ft)	5.50					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	7.03					
Temperature (°C)	9.60					
Conductivity (μmhos/cm)	61					
Dissolved Oxygen (mg/L)	4.80					
Turbidity (NTU)	—					
eH (mV)	373					

Total Quantity of Water Removed (L):			
Samplers:	BH BA	Sampling Time (Start/End):	1517
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05WP018		
Sample Parameters:	VOC, TPH D,20 + GRO, Fe, MN		
Comments and Observations:	Sheen on water		

* 5 MIN = PURGE DRY or 5 MIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-6	Well Lock Status:	—
Well Condition:	GOOD	Weather:	Cold / Clear

Gauge Date:	12/10/98	Gauge Time:	1043
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN*
Purge Method:	ISCO PUMP	Field Personnel:	BH / BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.62	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	4.53	C. Well Volume (L)	1.87
E. Liquid Depth (ft) (A-B)	3.09	E. Three Well Volumes (L)	5.61

Parameter	Beginning	1	2	3	4	5
Time (min.)	1043					
Depth to Water (ft)	4.53					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	6.88					
Temperature (°C)	4.88					
Conductivity (μmhos/cm)	47					
Dissolved Oxygen (mg/L)	6.21					
Turbidity (NTU)	—					
eH (mV)	389					

Total Quantity of Water Removed (L):			
Samplers:	BH / BA	Sampling Time (Start/End):	1045 / 1050
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOSWP005		
Sample Parameters:	VOC, TPHGRO, TPHDRO, Mn & Fe		
Comments and Observations:			

* 5 MIN = 5 MIN PURGE or PURGED DRY

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-7	Well Lock Status:	—
Well Condition:	GOOD	Weather:	Cold Clear

Gauge Date:	12/10/98	Gauge Time:	1309
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN *
Purge Method:	ISCO PUMP	Field Personnel:	RH/BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.78	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	4.39	C. Well Volume (L)	2.05
E. Liquid Depth (ft) (A-B)	3.39	E. Three Well Volumes (L)	4.20

Parameter	Beginning	1	2	3	4	5
Time (min.)	1309					
Depth to Water (ft)	4.39					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	6.59					
Temperature (°C)	6.49					
Conductivity (μmhos/cm)	167					
Dissolved Oxygen (mg/L)	7.79					
Turbidity (NTU)	—					
eH (mV)	405					

Total Quantity of Water Removed (L):			
Samplers:	RH/BA	Sampling Time (Start/End):	1310/1330
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOSWP012	NASBFFOSWPX01	
Sample Parameters:	VOC TPH GRO	TPH DRO, Fe & Mn	
Comments and Observations:	Sheen on water		

* 5 MIN = PURGE DRY or 5 MIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-8	Well Lock Status:	No lock
Well Condition:	GOOD	Weather:	cold, clear.

Gauge Date:	12/10/98	Gauge Time:	0910
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN
Purge Method:	ISCO PUMP	Field Personnel:	BH, BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.54	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.25	C. Well Volume (L)	1.38
E. Liquid Depth (ft) (A-B)	2.29	E. Three Well Volumes (L)	4.16

Parameter	Beginning	1	2	3	4	5
Time (min.)	0910					
Depth to Water (ft)	5.25					
Purge Rate (l/min)	NA					
Volume Purged (L)	—					
pH	6.39					
Temperature (°C)	8.10					
Conductivity (μmhos/cm)	345					
Dissolved Oxygen (mg/L)	6.39					
Turbidity (NTU)	—					
eH (mV)	413					

Total Quantity of Water Removed (L):	NA		
Samplers:	BH / BA	Sampling Time (Start/End):	915 / 945
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOSWP001 MS/MSD due		
Sample Parameters:	VOC, TPH DRO, TPH GRO MS/MSD Mn, & Fe		
Comments and Observations:			

* 5 MIN = PURGE DRY or 5 MIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-9	Well Lock Status:	—
Well Condition:	GOOD	Weather:	Clear / cold

Gauge Date:	12/10/98	Gauge Time:	1015
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 min *
Purge Method:	ESCO PUMP	Field Personnel:	RH / BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.80	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	6.78	C. Well Volume (L)	0.62
E. Liquid Depth (ft) (A-B)	1.02	E. Three Well Volumes (L)	1.85

Parameter	Beginning	1	2	3	4	5
Time (min.)	1015					
Depth to Water (ft)	6.78					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	6.54					
Temperature (°C)	9.11					
Conductivity (μmhos/cm)	127					
Dissolved Oxygen (mg/L)	8.27					
Turbidity (NTU)	—					
eH (mV)	402					

Total Quantity of Water Removed (L):			
Samplers:	RH / BA	Sampling Time (Start/End):	1020 / 1205
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	VOC NASB FFOSWP003		
Sample Parameters:	VOCs TPHGRO (TPH DRO not collected insufficient water)		
Comments and Observations:	Mn & Fe		

* .5 min = PURGE DRY or 5 min PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600 35
Well ID:	WP 10	Well Lock Status:	—
Well Condition:	GOOD	Weather:	Clear, Cold

Gauge Date:	12/10/98	Gauge Time:	1209
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN *
Purge Method:	ISCO PUMP	Field Personnel:	BH/BTA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.80	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.34	C. Well Volume (L)	1.49
E. Liquid Depth (ft) (A-B)	2.46	E. Three Well Volumes (L)	4.46

Parameter	Beginning	1	2	3	4	5
Time (min.)	1209					
Depth to Water (ft)	5.34					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	7.23					
Temperature (°C)	8.61					
Conductivity (μmhos/cm)	62					
Dissolved Oxygen (mg/L)	6.12					
Turbidity (NTU)	—					
eH (mV)	375					

Total Quantity of Water Removed (L):			
Samplers:	BH/BTA	Sampling Time (Start/End):	1210 / 1215
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOSWP007		
Sample Parameters:	VOC, TPH GRO, TPH DRO		

Comments and Observations:

5 MIN = PURGE DRY or 5 MIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-11	Well Lock Status:	—
Well Condition:	GOOD	Weather:	Cold/Clear

Gauge Date:	12/10/98	Gauge Time:	1233
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	12/9/98	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN
Purge Method:	ESCO PUMP	Field Personnel:	RH/BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.62	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.20	C. Well Volume (L)	1.46
E. Liquid Depth (ft) (A-B)	2.42	E. Three Well Volumes (L)	4.39

Parameter	Beginning	1	2	3	4	5
Time (min.)	1233					
Depth to Water (ft)	5.20					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	6.55					
Temperature (°C)	8.42					
Conductivity (μmhos/cm)	143					
Dissolved Oxygen (mg/L)	6.79					
Turbidity (NTU)	—					
eH (mV)	405					

Total Quantity of Water Removed (L):			
Samplers:	RH/BA	Sampling Time (Start/End):	1235/1245
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05WP009		
Sample Parameters:	VOC, TPH GRO, TPH DRO, Fe & Mn		
Comments and Observations:			

* 5 MIN = PURGE DRY or 5 MIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-12	Well Lock Status:	—
Well Condition:	GOOD	Weather:	clear / cold

Gauge Date:	12/10/98	Gauge Time:	1248
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN
Purge Method:	TSCO PUMP	Field Personnel:	BH / BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.80	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	7.05	C. Well Volume (L)	0.45
E. Liquid Depth (ft) (A-B)	0.75	E. Three Well Volumes (L)	1.36

Parameter	Beginning	1	2	3	4	5
Time (min.)	1248					
Depth to Water (ft)	7.05					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	8.94					
Temperature (°C)	8.64					
Conductivity (μmhos/cm)	101					
Dissolved Oxygen (mg/L)	3.91					
Turbidity (NTU)	—					
eH (mV)	249					

Total Quantity of Water Removed (L):			
Samplers:	BH / BA	Sampling Time (Start/End):	1250 /
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOSWP010		
Sample Parameters:	VOC, TPHGRO, (1 Amber for DRO) Mn, Fe		
Comments and Observations:			

* 5 MIN = PURGE DRY or 5 MIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP 14	Well Lock Status:	—
Well Condition:	GOOD	Weather:	Clear, Cold

Gauge Date:	12/10/98	Gauge Time:	1032
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	5 MIN*
Purge Method:	ISCO PUMP	Field Personnel:	RH / BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.97	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	6.17	C. Well Volume (L)	1.09
E. Liquid Depth (ft) (A-B)	1.8	E. Three Well Volumes (L)	3.27

Parameter	Beginning	1	2	3	4	5
Time (min.)	1032					
Depth to Water (ft)	6.17					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	7.56					
Temperature (°C)	9.13					
Conductivity (μmhos/cm)	69					
Dissolved Oxygen (mg/L)	5.22					
Turbidity (NTU)						
eH (mV)	372					

Total Quantity of Water Removed (L):			
Samplers:	RH / BA	Sampling Time (Start/End):	1035 / 1040
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOSWP004		
Sample Parameters:	VOC, TPH GRO, TPH DRO Mn & Fe		
Comments and Observations:			

* 5 MIN = PURGE DRY or 5 MIN PURGE.

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	MP15	Well Lock Status:	—
Well Condition:	GOOD	Weather:	CLEAR, COOL

Gauge Date:	12/10/98	Gauge Time:	1218
Sounding Method:	ISCO PUMP	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/10/98	Purge Time:	5 MIN *
Purge Method:	ISCO PUMP	Field Personnel:	RH/BM
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	7.69	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.89	C. Well Volume (L)	1.09
E. Liquid Depth (ft) (A-B)	1.8	E. Three Well Volumes (L)	3.27

Parameter	Beginning	1	2	3	4	5
Time (min.)	1218					
Depth to Water (ft)	5.89					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	6.91					
Temperature (°C)	7.78					
Conductivity (μmhos/cm)	58					
Dissolved Oxygen (mg/L)	7.30					
Turbidity (NTU)	—					
eH (mV)	243					

Total Quantity of Water Removed (L):			
Samplers:	RH/BM	Sampling Time (Start/End):	1220 / 1230
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05WP008		
Sample Parameters:	VOC + TPH GRO + TPH DRO (1 amber collected)		
Comments and Observations:	Mn & Fe		

* 5 MIN = PURGE DRY OR 5 MIN PURGE

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29660.35
Well ID:	WP-16R	Well Lock Status:	—
Well Condition:	GOOD	Weather:	Clear + cold

Gauge Date:	12/10/98	Gauge Time:	1259
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	1"

Purge Date:	12/9/98	Purge Time:	5 MIN*
Purge Method:	ISCO PUMP	Field Personnel:	BH / BM
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	13.65	D. Well Volume/ft (L):	0.04
B. Depth to Water (ft):	7.29	C. Well Volume (L)	0.25
E. Liquid Depth (ft) (A-B)	6.36	E. Three Well Volumes (L)	0.76

Parameter	Beginning	1	2	3	4	5
Time (min.)	1259					
Depth to Water (ft)	7.29					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	9.93					
Temperature (°C)	8.76					
Conductivity (μmhos/cm)	410					
Dissolved Oxygen (mg/L)	6.21					
Turbidity (NTU)	—					
eH (mV)	199					

Total Quantity of Water Removed (L):			
Samplers:	BH / BM	Sampling Time (Start/End):	1300 / 1305
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOSWAG11		
Sample Parameters:	VOC & TPH GRO - TPH DRO not collected insufficient		
Comments and Observations:	water. Mn & Fe		

* 5 MIN = PURGE OR PURGE DRY

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-17R	Well Lock Status:	GOOD
Well Condition:	GOOD	Weather:	clear/cold.

Gauge Date:	12/10/98	Gauge Time:	1349
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	1"

Purge Date:	12/9/98	Purge Time:	5 MIN*
Purge Method:	ISCO PUMP	Field Personnel:	RH/BM
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	19.15	D. Well Volume/ft (L):	0.04
B. Depth to Water (ft):	7.45	C. Well Volume (L)	0.47
E. Liquid Depth (ft) (A-B)	11.70	E. Three Well Volumes (L)	1.40

Parameter	Beginning	1	2	3	4	5
Time (min.)	1349					
Depth to Water (ft)	7.45					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	9.33					
Temperature (°C)	9.28					
Conductivity (μmhos/cm)	2.54					
Dissolved Oxygen (mg/L)	6.75					
Turbidity (NTU)	—					
eH (mV)	224					

Total Quantity of Water Removed (L):			
Samplers:	RH/BM	Sampling Time (Start/End):	1350/
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOSLUP014		
Sample Parameters:	VOC, TPHGRO TPHDRO, Mn & Fe		
Comments and Observations:	Sheenon water		

* 5 MIN = PURGE DRY or 5 MIN PURGE

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	296035
Well ID:	WP-18R	Well Lock Status:	
Well Condition:	GOOD	Weather:	Clear cold

Gauge Date:	12/10/98	Gauge Time:	1005
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	1"

Purge Date:	12/10/98	Purge Time:	5 MIN *
Purge Method:	ISCO PUMP	Field Personnel:	RH/BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	8.40	D. Well Volume/ft (L):	0.04
B. Depth to Water (ft):	6.48	C. Well Volume (L)	0.08
E. Liquid Depth (ft) (A-B)	1.92	E. Three Well Volumes (L)	0.23

Parameter	Beginning	1	2	3	4	5
Time (min.)	1005					
Depth to Water (ft)	6.48					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	7.89					
Temperature (°C)	7.39					
Conductivity (μmhos/cm)	106					
Dissolved Oxygen (mg/L)	10.33					
Turbidity (NTU)	—					
eH (mV)	263					

Total Quantity of Water Removed (L):			
Samplers:	RH BA	Sampling Time (Start/End):	
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	insufficient water		
Sample Parameters:			
Comments and Observations:			

* 5 MIN = PURGE DRY or 5 MIN PURGE

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.35
Well ID:	WP-21	Well Lock Status:	
Well Condition:	GOOD	Weather:	Clear, cold.

Gauge Date:	12/10/98	Gauge Time:	
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	2"

Purge Date:	12/10/98	Purge Time:	5 MINUTE
Purge Method:	ISCO PUMP	Field Personnel:	RH BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	13.00	D. Well Volume/ft (L):	0.04
B. Depth to Water (ft):	6.30	C. Well Volume (L)	0.27
E. Liquid Depth (ft) (A-B)	6.7	E. Three Well Volumes (L)	0.80

Parameter	Beginning	1	2	3	4	5
Time (min.)	1404					
Depth to Water (ft)	6.30					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	8.17					
Temperature (°C)	9.77					
Conductivity (μmhos/cm)	105					
Dissolved Oxygen (mg/L)	6.87					
Turbidity (NTU)	—					
eH (mV)	281					

Total Quantity of Water Removed (L):			
Samplers:	RH / BA	Sampling Time (Start/End):	1405 / 1415
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOSWP015		
Sample Parameters:	VOC TPH GRO TPH DRO Mn & Fe		
Comments and Observations:	Sheen on water		

5 MIN = PURGE DRY or 5 MIN PURGE.

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	2960.035
Well ID:	WP-22	Well Lock Status:	—
Well Condition:	GOOD	Weather:	Clear / Cold.

Gauge Date:	12/10/98	Gauge Time:	1503
Sounding Method:	INTERFACE	Measurement Ref:	TOC
Stick Up/Down (ft):	—	Well Diameter (in.):	1"

Purge Date:	12/9/98	Purge Time:	5 MIN
Purge Method:	ESCO PUMP	Field Personnel:	RH / BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	13.62	D. Well Volume/ft (L):	0.04
B. Depth to Water (ft):	6.51	C. Well Volume (L)	0.28
E. Liquid Depth (ft) (A-B)	7.11	E. Three Well Volumes (L)	0.85

Parameter	Beginning	1	2	3	4	5
Time (min.)	1503					
Depth to Water (ft)	6.51					
Purge Rate (l/min)	—					
Volume Purged (L)	—					
pH	7.82					
Temperature (°C)	7.81					
Conductivity (μmhos/cm)	765					
Dissolved Oxygen (mg/L)	8.21					
Turbidity (NTU)	—					
eH (mV)	331					

Total Quantity of Water Removed (L):			
Samplers:	RH / BA	Sampling Time (Start/End):	1505
Sampling Date:	12/10/98	Decontamination Fluids Used:	DI
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05WP017		
Sample Parameters:	VOC, TPH-GRO & DRO, MN, FE		
Comments and Observations:	Sheen on water		

* 5 MIN = PURGE DRY or 5 MIN PURGE

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Fuel Farm	Project Number:	29660.B5
Well ID:	MW-43	Well Lock Status:	Good
Well Condition:	Good	Weather:	Cloudy, cold.

Gauge Date:	12/9/98	Gauge Time:	1347
Sounding Method:	Solinist probe	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2"

Purge Date:	NA	Purge Time:	NA
Purge Method:	NA	Field Personnel:	BH, BA
Ambient Air VOCs (ppm):	0	Well Mouth VOCs (ppm):	

WELL VOLUME

A. Well Depth (ft):		D. Well Volume/ft (L):	
B. Depth to Water (ft):	-DRY-	C. Well Volume (L)	
E. Liquid Depth (ft) (A-B)		E. Three Well Volumes (L)	

Parameter	Beginning	1	2	3	4	5
Time (min.)						
Depth to Water (ft)						
Purge Rate (l/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Total Quantity of Water Removed (L):			
Samplers:		Sampling Time (Start/End):	
Sampling Date:		Decontamination Fluids Used:	
Sample Type:		Sample Preservatives:	
Sample Bottle IDs:			
Sample Parameters:			
Comments and Observations:	Insufficient water to sample.		

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Fuel Farm	Project Number:	29600.35
Well ID:	MW-NASB-44	Well Lock Status:	locked
Well Condition:	good	Weather:	Sunny, 40°

Gauge Date:	12/9/98	Gauge Time:	1110
Sounding Method:	Solinst	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	1113
Purge Method:	Low Flow	Field Personnel:	BA, SC
Ambient Air VOCs (ppm):	0	Well Mouth VOCs (ppm):	0

WELL VOLUME

A. Well Depth (ft):	15.74	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	2.92	C. Well Volume (L)	7.76
E. Liquid Depth (ft) (A-B)	12.82	E. Three Well Volumes (L)	23.27

Parameter	Beginning	1	2	3	4	5
Time (min.)	1118	1123	1128	1133	1138	1143
Depth to Water (ft)	3.21	3.18	3.10	3.10	3.10	3.10
Purge Rate (l/min)	0.2	0.2	0.2	0.2	0.2	0.2
Volume Purged (L)	1.0	2.0	3.0	4.0	5.0	6.0
pH	5.30	5.59	5.61	5.61	5.62	5.61
Temperature (°C)	10.34	11.79	12.05	12.12	12.17	12.13
Conductivity (μmhos/cm)	83	77	72	70	71	70
Dissolved Oxygen (mg/L)	1.20	0.20	0.17	0.13	0.12	0.12
Turbidity (NTU)	180	161	104	64	58	45
eH (mV)	-141	-135	-131	-131	-129	-128

Total Quantity of Water Removed (L):	11.7		
Samplers:	SC, BA	Sampling Time (Start/End):	1205 / 1210
Sampling Date:	12/9/98	Decontamination Fluids Used:	DI, Isoprop, alcohol
Sample Type:	Grab	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFFOS MW008		
Sample Parameters:	VOC, TPH DRO, TPH GRO		
Comments and Observations:	Cleared up @ 1119		

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name: Fuel Farm Project Number: 29600.35 Date: 12/9/98
Well ID: MW-NASB-044 Field Personnel: BA, SC

Parameter	6	7	8	9	10	11
Time (min.)	1148	1153	1158	1203		
Depth to Water (ft)	3.10	3.09	3.09	3.09		
Purge Rate (L/min)	0.2	0.2	0.2	0.2		
Volume Purged (L)	7.0	8.0	9.0	10.0		
pH	5.61	5.62	5.63	5.62		
Temperature (°C)	12.22	12.19	12.25	12.23		
Conductivity (μmhos/cm)	70	69	68	69		
Dissolved Oxygen (mg/L)	0.10	0.10	0.09	0.09		
Turbidity (NTU)	38	30	29	30		
eH (mV)	-131	-132	-135	-136		

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations:

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Fuel Farm	Project Number:	29600.35
Well ID:	MW-NASB-46	Well Lock Status:	locked
Well Condition:	good	Weather:	overcast

Gauge Date:	12/8/98	Gauge Time:	1234
Sounding Method:	Solinst.	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2

Purge Date:	12/8/98	Purge Time:	1237
Purge Method:	Grundfos Low Flow	Field Personnel:	BH, SC
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	15.10	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.00	C. Well Volume (L)	6.11
E. Liquid Depth (ft) (A-B)	10.10	E. Three Well Volumes (L)	8.33

Parameter	Beginning	1	2	3	4	5
Time (min.)	1240	1245	1250	1255	1300	1305
Depth to Water (ft)	6.11	6.02	5.85	5.85	5.85	5.85
Purge Rate (l/min)	0.2	0.2	0.2	0.2	0.2	0.2
Volume Purged (L)	0.6	1.6	2.6	3.6	4.6	5.6
pH	6.17	6.22	6.25	6.27	6.29	6.28
Temperature (°C)	9.83	11.13	11.63	12.16	12.35	12.44
Conductivity (μmhos/cm)	219	230	232	216	226	224
Dissolved Oxygen (mg/L)	0.67	1.28	0.93	1.11	1.24	0.62
Turbidity (NTU)	109	239	90	44	32	26
eH (mV)	125	126	124	120	123	116

Total Quantity of Water Removed (L):	10.6		
Samplers:	BH, SC	Sampling Time (Start/End):	1325 / 1330
Sampling Date:	12/8/98	Decontamination Fluids Used:	~~none~~ DI, Isopropyl alcohol
Sample Type:	Grab	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05MW003		
Sample Parameters:	VOC TPH GRO + DRO		
Comments and Observations:			

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name:	Fuel Farm	Project Number:	29600.35	Date:	12/8/98
Well ID:	MW-NASB-046	Field Personnel:	BA, SC		

Parameter	6	7	8	9	10	11
Time (min.)	1310	1315	1318	1321		
Depth to Water (ft)	5.85	5.85	5.85	5.85		
Purge Rate (L/min)	0.2	0.2	0.2	0.2		
Volume Purged (L)	6.6	7.6	8.2	8.8		
pH	6.31	6.32	6.33	6.32		
Temperature (°C)	12.47	12.54	12.52	12.51		
Conductivity (μmhos/cm)	220	215	219	216		
Dissolved Oxygen (mg/L)	0.67	0.76	0.75	0.77		
Turbidity (NTU)	27	9	7	2		
eH (mV)	115	114	114	113		

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations:

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Fuel Farm	Project Number:	29600.35
Well ID:	MW-NASB-049	Well Lock Status:	GOOD
Well Condition:	GOOD	Weather:	cloudy, cold (30°)

Gauge Date:	12/8/98	Gauge Time:	1038
Sounding Method:	oil interface/sonilist	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2"

Purge Date:	12/8/98	Purge Time:	1046-
Purge Method:	Low Flow	Field Personnel:	BDA, SYC
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	14.40	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.70	C. Well Volume (L)	5.26
E. Liquid Depth (ft) (A-B)	8.70	E. Three Well Volumes (L)	15.79

Parameter	Beginning	1	2	3	4	5
Time (min.)	1050	1055	1600	1103	1106	1109
Depth to Water (ft)	5.89	5.89	5.90	5.90	5.90	5.91
Purge Rate (l/min)	.2	.2	.2	.2	.2	.2
Volume Purged (L)	.8	1.8	2.8	3.3	3.8	4.3
pH	5.52	5.68	5.76	5.78	5.79	5.80
Temperature (°C)	9.34	10.23	11.61	11.65	11.80	11.61
Conductivity (μmhos/cm)	115	116	119	120	121	122
Dissolved Oxygen (mg/L)	0.03	0.06	0.14	0.15	0.14	0.15
Turbidity (NTU)	37	13	8	6	5	3
eH (mV)	127	68	32	20	20	17

Total Quantity of Water Removed (L):	6.0		
Samplers:	BDA, SYC	Sampling Time (Start/End):	1113
Sampling Date:	12/8/98	Decontamination Fluids Used:	DI/Liquidnox/Isopropal
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASB-FF-05-MW002		
Sample Parameters:	VOC, TPH-GRO & DRO		
Comments and Observations:	sulfur smell		

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Fuel Farm	Project Number:	29600.35
Well ID:	MW-NASB-051	Well Lock Status:	GOOD
Well Condition:	GOOD	Weather:	cloudy, 30, snow flurries

Gauge Date:	12/8/98	Gauge Time:	1345
Sounding Method:	Smilist	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2"

Purge Date:	12/8/98	Purge Time:	~~1350~~ 1420
Purge Method:	Low Flow	Field Personnel:	SYC, BDA
Ambient Air VOCs (ppm):	0	Well Mouth VOCs (ppm):	0

WELL VOLUME

A. Well Depth (ft):	16.00	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	4.37	C. Well Volume (L)	11.02
E. Liquid Depth (ft) (A-B)	11.63	E. Three Well Volumes (L)	33.07

Parameter	Beginning	1	2	3	4	5
Time (min.)	1425	1428	1431	1434	1437	1440
Depth to Water (ft)	4.65	4.65	4.66	4.66	4.66	4.66
Purge Rate (l/min)	0.2	0.2	0.2	0.2	0.2	0.2
Volume Purged (L)	1.0	1.6	2.2	2.8	3.4	4.0
pH	6.09	6.02	6.00	5.98	5.96	5.95
Temperature (°C)	9.72	10.25	10.78	11.20	11.34	11.44
Conductivity (μmhos/cm)	81	76	76	77	78	79
Dissolved Oxygen (mg/L)	4.95	3.85	3.67	3.34	2.89	2.80
Turbidity (NTU)	0	6	5	8	3	0
eH (mV)	61	65	66	67	67	67

Total Quantity of Water Removed (L):	6.6		
Samplers:	BA, SC	Sampling Time (Start/End):	1450 / 1453
Sampling Date:	12/8/98	Decontamination Fluids Used:	DI / isopropyl alcohol
Sample Type:	Grab	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05MW004		
Sample Parameters:	VOC, TPH GRO, DRO		

Comments and Observations: problems w/ YSI, ran well from 1350 to 1400. Fixed YSI restarted well at 1420

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name: Fuel Farm Project Number: 2960035 Date: 12/8/98
Well ID: MW-NASB-051 Field Personnel: SC, BA

Parameter	6	7	8	9	10	11
Time (min.)	1443					
Depth to Water (ft)	4.66					
Purge Rate (L/min)	0.2					
Volume Purged (L)	4.6					
pH	5.95					
Temperature (°C)	11.55					
Conductivity (μmhos/cm)	80					
Dissolved Oxygen (mg/L)	2.75					
Turbidity (NTU)	0					
eH (mV)	66					

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations:

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FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Fuel Farm	Project Number:	29600.35
Well ID:	MW-NASB-054	Well Lock Status:	Good
Well Condition:	Good	Weather:	clear, sun, 32°

Gauge Date:	12/9/98	Gauge Time:	1305
Sounding Method:	Sonilist probe	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	1308-1352
Purge Method:	Low Flow	Field Personnel:	BDA, BH
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	16.14	D. Well Volume/ft (L):	0.605
B. Depth to Water (ft):	6.62	C. Well Volume (L)	5.76
E. Liquid Depth (ft) (A-B)	9.52	E. Three Well Volumes (L)	17.28

Parameter	Beginning	1	2	3	4	5
Time (min.)	1310	1315	1320	1325	1330	1335
Depth to Water (ft)	6.60	6.60	6.60	6.60	6.60	6.60
Purge Rate (l/min)	0.1	0.1	0.1	0.1	0.1	0.1
Volume Purged (L)	0.2	0.7	1.2	1.7	2.2	2.7
pH	4.46	4.80	4.93	4.80	4.79	4.68
Temperature (°C)	10.50	10.53	12.27	14.67	13.56	17.75
Conductivity (μmhos/cm)	145	146	143	139	140	148
Dissolved Oxygen (mg/L)	3.30	1.01	0.84	1.82	1.50	0.87
Turbidity (NTU)	39	42	35	13	7	12
eH (mV)	134	144	150	157	158	156

Total Quantity of Water Removed (L):	6.0		
Samplers:	BH, BA	Sampling Time (Start/End):	1345 - 1352
Sampling Date:	12/9/98	Decontamination Fluids Used:	DI / Isopropanol
Sample Type:	Grab	Sample Preservatives:	HCL
Sample Bottle IDs:	NASBFF05-MW00C		
Sample Parameters:	VOCs, TPH GRO and DRO		
Comments and Observations:	Tank (H_2O) excavation near well.		

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name: Fuel Farm Project Number: 29600.35 Date: 12/9/98

Well ID: MW-NASB-054 Field Personnel: BH, BDH

Parameter	6	7	8	9	10	11
Time (min.)	1338	1347	1344			
Depth to Water (ft)	6.60	6.60	6.60			
Purge Rate (L/min)	0.1	0.1	0.1			
Volume Purged (L)	3.2	3.7	4.2			
pH	4.69	4.70	4.69			
Temperature (°C)	17.12	17.21	17.08			
Conductivity (μmhos/cm)	150	149	147			
Dissolved Oxygen (mg/L)	0.83	0.80	0.77			
Turbidity (NTU)	9	8	9			
eH (mV)	156	156	156			

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations:

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Fuel Farm	Project Number:	29600.35
Well ID:	MW-NASB-058	Well Lock Status:	Good
Well Condition:	Good	Weather:	partly cloudy, 35°

Gauge Date:	12/8/98	Gauge Time:	0900
Sounding Method:	Oil Interface	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2"

Purge Date:	12/8/98	Purge Time:	0913 - 1030
Purge Method:	Low Flow	Field Personnel:	BDA, SYC
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	16.56	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	6.10	C. Well Volume (L)	6.33
E. Liquid Depth (ft) (A-B)	10.46	E. Three Well Volumes (L)	18.98

Parameter	Beginning	1	2	3	4	5
Time (min.)	0915	0920	0925	0930	0935	0940
Depth to Water (ft)	6.30	6.28	6.24	6.25	6.25	6.25
Purge Rate (l/min)	.2	.2	.2	.2	.2	.2
Volume Purged (L)	.4	1.4	2.4	3.4	4.4	5.4
pH	5.45	5.56	5.65	5.66	5.67	5.70
Temperature (°C)	10.01	10.89	11.96	13.26	13.25	13.65
Conductivity (μmhos/cm)	62	58	62	63	67	69
Dissolved Oxygen (mg/L)	3.31	3.02	1.68	1.05	0.97	0.92
Turbidity (NTU)	118 (A)	79	37	19	15	11
eH (mV)	252	258	258	222	199	171

Total Quantity of Water Removed (L):	152		
Samplers:	BDA, SYC	Sampling Time (Start/End):	0955 - 1030
Sampling Date:	12/8/98	Decontamination Fluids Used:	DI / Liquidnox / Isopropyl
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASB-FF-05-MW001 MS/MSD		
Sample Parameters:	VOC, TPH GRO and DRO		
Comments and Observations:	(A) empty flow cell.		

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name: Fuel Farm Project Number: 29600.35 Date: 12/8/98
Well ID: MW-NASB-058 Field Personnel: BDA, SKC

Parameter	6	7	8	9	10	11
Time (min.)	0945	0948	0951			
Depth to Water (ft)	6.25	6.25	6.25			
Purge Rate (L/min)	.2	.2	.2			
Volume Purged (L)	6.4	6.9	7.4			
pH	5.70	5.71	5.71			
Temperature (°C)	13.83	13.83	13.83			
Conductivity (μmhos/cm)	70	71	72			
Dissolved Oxygen (mg/L)	0.86	0.85	0.83			
Turbidity (NTU)	8	6	6			
eH (mV)	146	145	142			

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations:

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Fuel Farm	Project Number:	2960035
Well ID:	MW-NASB-061R	Well Lock Status:	locked
Well Condition:	good	Weather:	Sunny, 40°

Gauge Date:	12/9/98	Gauge Time:	935
Sounding Method:	Solinst	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2

Purge Date:	12/9/98	Purge Time:	942
Purge Method:	Low Flow	Field Personnel:	BH, SC
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	12.90	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	5.04	C. Well Volume (L)	4.75
E. Liquid Depth (ft) (A-B)	7.86	E. Three Well Volumes (L)	14.26

Parameter	Beginning	1	2	3	4	5
Time (min.)	947	952	957	1002	1007	1012
Depth to Water (ft)	5.21	5.16	5.15	5.15	5.15	5.15
Purge Rate (l/min)	0.2	0.2	0.2	0.2	0.2	0.2
Volume Purged (L)	1.0	2.0	3.0	4.0	5.0	6.0
pH	5.94	5.94	5.92	5.91	5.90	5.89
Temperature (°C)	9.88	11.24	11.89	12.33	12.50	12.38
Conductivity (μmhos/cm)	118	124	128	132	133	131
Dissolved Oxygen (mg/L)	2.98	1.49	0.97	0.40	0.40	0.30
Turbidity (NTU)	350	195	116	89	80	78
eH (mV)	-201	-216	-225	-245	-254	-260

Total Quantity of Water Removed (L):	16.6		
Samplers:	BH, SC	Sampling Time (Start/End):	1100 / 1105
Sampling Date:	12/9/98	Decontamination Fluids Used:	DI, Isopropyl alcohol
Sample Type:	Grab	Sample Preservatives:	HCL
Sample Bottle IDs:	B.NASBFFOSWP007		
Sample Parameters:	VOC, TPH DRO, TPH GRO		
Comments and Observations:	sulfur smell in water		

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name: Fuel Farm Project Number: 29600.35 Date: 12/9/98
Well ID: MW-NASB-061R Field Personnel: SYC, BDA

Parameter	6	7	8	9	10	11
Time (min.)	1017	1022	1027	1032	1037	1042
Depth to Water (ft)	5.16	5.15	5.15	5.15	5.15	5.15
Purge Rate (L/min)	0.2	0.2	0.2	0.2	0.2	0.2
Volume Purged (L)	7.0	8.0	9.0	10.0	11.0	12.0
pH	5.89	5.89	5.88	5.88	5.88	5.88
Temperature (°C)	12.66	12.64	12.58	12.70	12.78	12.82
Conductivity (μmhos/cm)	135	133	133	134	134	133
Dissolved Oxygen (mg/L)	0.15	0.13	0.12	0.10	0.08	0.08
Turbidity (NTU)	56	49	39	36	31	28
eH (mV)	-271	-274	-275	-275	-275	-276

Parameter	12	13	14	15	16	17
Time (min.)	1047	1052	1057			
Depth to Water (ft)	5.15	5.15	5.15			
Purge Rate (L/min)	0.2	0.2	0.2			
Volume Purged (L)	13.0	14.0	15.0			
pH	5.88	5.88	5.87			
Temperature (°C)	12.85	12.90	12.92			
Conductivity (μmhos/cm)	132	132	133			
Dissolved Oxygen (mg/L)	0.07	0.07	0.07			
Turbidity (NTU)	24	23	23			
eH (mV)	-275	-277	-277			

Comments and Observations:

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	Fuel Farm	Project Number:	29600.35
Well ID:	MW-NASB-062	Well Lock Status:	locked
Well Condition:	good	Weather:	Sunny, 40°

Gauge Date:	12/9/98	Gauge Time:	330
Sounding Method:	Solinst	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	835
Purge Method:	Low Flow	Field Personnel:	SC, BH
Ambient Air VOCs (ppm):	0	Well Mouth VOCs (ppm):	0

WELL VOLUME

A. Well Depth (ft):	16.91	D. Well Volume/ft (L):	.605
B. Depth to Water (ft):	8.46	C. Well Volume (L)	5.11
E. Liquid Depth (ft) (A-B)	8.45	E. Three Well Volumes (L)	15.34

Parameter	Beginning	1	2	3	4	5
Time (min.)	838	841	846	851	856	901
Depth to Water (ft)	8.72	8.74	8.77	8.74	8.71	8.71
Purge Rate (l/min)	0.2	0.2	0.2	0.2	0.2	0.2
Volume Purged (L)	0.6	1.2	2.2	3.2	4.2	5.2
pH	5.79	5.83	5.79	5.76	5.77	5.77
Temperature (°C)	9.29	8.97	12.65	12.79	12.42	11.64
Conductivity (μmhos/cm)	62	57	56	56	56	55
Dissolved Oxygen (mg/L)	6.08	5.25	4.55	4.52	4.38	4.23
Turbidity (NTU)	9	167	47	20	10	9
eH (mV)	160	150	136	135	135	136

Total Quantity of Water Removed (L):	11.0		
Samplers:	BH, SC	Sampling Time (Start/End):	923/930
Sampling Date:	12/9/98	Decontamination Fluids Used:	DI, Isoprop, alcohol
Sample Type:	Grab	Sample Preservatives:	HCL
Sample Bottle IDs:	B NASBFFOSMW062		
Sample Parameters:	VOC, TPH DRO TPH GRO		
Comments and Observations:	Cleaned up @ 842		

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name:	Fuel Farm	Project Number:	2960035	Date:	12/9/98
Well ID:	MW-N45B-062	Field Personnel:	SC, BA		

Parameter	6	7	8	9	10	11
Time (min.)	906	911	916	921		
Depth to Water (ft)	8.77	8.77	8.76	8.76		
Purge Rate (L/min)	0.2	0.2	0.2	0.2		
Volume Purged (L)	6.2	7.2	8.2	9.2		
pH	5.73	5.74	5.73	5.74		
Temperature (°C)	15.37	15.52	14.94	14.86		
Conductivity (μmhos/cm)	62	63	63	61		
Dissolved Oxygen (mg/L)	3.83	3.56	3.49	3.52		
Turbidity (NTU)	20	16	15	16		
eH (mV)	127	128	125	125		

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations: Need to keep adjusting pump rate to keep flow rate consistent

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FUEL FARM	Project Number:	29600.B5
Well ID:	MW-NASB-211	Well Lock Status:	GOOD
Well Condition:	GOOD	Weather:	Cloudy / Clear

Gauge Date:	12/9/98	Gauge Time:	1405
Sounding Method:	Solinist probe	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2"

Purge Date:	12/9/98	Purge Time:	1408
Purge Method:	Low Flow	Field Personnel:	BH, BA
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	9.87	D. Well Volume/ft (L):	
B. Depth to Water (ft):	6.82	C. Well Volume (L)	
E. Liquid Depth (ft) (A-B)		E. Three Well Volumes (L)	

Parameter	Beginning	1	2	3	4	5
Time (min.)	1410	1415	1420	1425	1430	1433
Depth to Water (ft)	7.25	7.30	7.32	7.30	7.39	7.45
Purge Rate (l/min)	0.1	0.1	0.1	0.1	0.1	0.1
Volume Purged (L)	0.2	0.7	1.2	1.7	2.2	2.5
pH	5.88	5.91	5.96	5.98	6.01	5.99
Temperature (°C)	9.13	8.62	10.26	10.79	13.30	13.65
Conductivity (μmhos/cm)	115	115	122	123	130	131
Dissolved Oxygen (mg/L)	1.80	0.97	0.49	0.23	0.23	0.11
Turbidity (NTU)	134	139	48	44	45	51
eH (mV)	-172	-201	-214	-228	-232	-234

Total Quantity of Water Removed (L):			
Samplers:	BH, BA	Sampling Time (Start/End):	1442 - 1458
Sampling Date:	12/9/98	Decontamination Fluids Used:	DI / Isopropyl
Sample Type:	GRAB	Sample Preservatives:	HCL
Sample Bottle IDs:	NASB-FF-05-MW010 & NASB-FF-05-MW001		
Sample Parameters:	VOCs, TPH GRO & DRO		
Comments and Observations:			

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name: Fuel Farm Project Number: 29660035 Date: 12/9/98
Well ID: MW-NASB-211 Field Personnel: BH, BA

Parameter	6	7	8	9	10	11
Time (min.)	1436					
Depth to Water (ft)	7.45					
Purge Rate (L/min)	0.1					
Volume Purged (L)	2.8					
pH	5.99					
Temperature (°C)	13.54					
Conductivity (μmhos/cm)	133					
Dissolved Oxygen (mg/L)	0.09					
Turbidity (NTU)	46					
eH (mV)	-237					

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations:

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name:	FuelFarm	Project Number:	2960035
Well ID:	MW NASB 213	Well Lock Status:	locked
Well Condition:	good	Weather:	overcast, 35°

Gauge Date:	12/8/98	Gauge Time:	1455
Sounding Method:	Solinst	Measurement Ref:	TOC
Stick Up/Down (ft):		Well Diameter (in.):	2

Purge Date:	12/8/98	Purge Time:	1456
Purge Method:	Low Flow	Field Personnel:	BH, SC
Ambient Air VOCs (ppm):	0.0	Well Mouth VOCs (ppm):	0.0

WELL VOLUME

A. Well Depth (ft):	11.57	D. Well Volume/ft (L):	
B. Depth to Water (ft):	5.84	C. Well Volume (L)	
E. Liquid Depth (ft) (A-B)	5.73	E. Three Well Volumes (L)	

Parameter	Beginning	1	2	3	4	5
Time (min.)	1501	1506	1511	1514	1517	
Depth to Water (ft)	5.91	5.90	5.90	5.90	5.90	
Purge Rate (l/min)	0.2	0.2	0.2	0.2	0.2	
Volume Purged (L)	1.0	2.0	3.0	3.6	4.2	
pH	5.35	5.32	5.29	5.29	5.28	
Temperature (°C)	9.65	10.97	11.54	11.91	12.10	
Conductivity (μmhos/cm)	52	51	53	53	54	
Dissolved Oxygen (mg/L)	3.50	3.39	3.29	3.21	3.16	
Turbidity (NTU)	45	5	3	0	0	
eH (mV)	96	93	89	86	86	

Total Quantity of Water Removed (L):	6.4		
Samplers:	BH, SC	Sampling Time (Start/End):	1523/1528
Sampling Date:	12/8/98	Decontamination Fluids Used:	DI, Isopropyl, HCL
Sample Type:	Grab	Sample Preservatives:	
Sample Bottle IDs:	NASBFFOSMW005		
Sample Parameters:	VOC, TPH GRO, TPH DRO		
Comments and Observations:	cleared auto @ 502		

Appendix E

Laboratory Form Is and Chain-of-Custody Forms

MW AND WP SAMPLE IDENTIFICATIONS FOR OLD NAVY FUEL FARM
8-10 DECEMBER 1998

MW 44	NASBFFO5MW008
MW46	NASBFFO5MW003
MW49	NASBFFO5MW002
MW51	NASBFFO5MW004
MW54	NASBFFO5MW009
MW58	NASBFFO5MW001
MW61R	NASBFFO5MW007
MW62	NASBFFO5MW006
MW211	NASBFFO5MW010
MW211-DUP	NASBFFO5MWXD1
MW213	NASBFFO5MW005
WP01	NASBFFO5WP006
WP02	NASBFFO5WP016
WP02-DUP	NASBFF05WPXD2
WP03	NASBFF05WP002
WP04	NASBFF05WP013
WP05	NASBFF05WP018
WP06	NASBFF05WP005
WP07	NASBFF05WP012
WP07-DUP	NASBFF05WPXD1
WP08	NASBFF05WP001
WP09	NASBFF05WP003
WP10	NASBFF05WP007
WP11	NASBFF05WP009
WP12	NASBFF05WP010
WP14	NASBFF05WP004
WP15	NASBFF05WP008
WP16R	NASBFF05WP011
WP17R	NASBFF05WP014
WP21	NASBFF05WP015
WP22	NASBFF05WP017

L14141

Company Name:	Project Manager or Contact:
EA Engineering	John Carnright
Project No. 29600.35	Phone: 914 565 8100
Dept.: 2151 Task: 7250	Project Name: Fuel Farm
Sample Storage Location: VOA/K5	ATO Number:
Page 1 of	Report #: 982101

Parameter Method Numbers for Analysis

Chain of Custody Record

EA Laboratories
19 Loveton Circle
Sparks, MD 21152
Telephone: (410) 771-4920
Fax: (410) 771-4407

Report Deliverables: 1 2 3 4 D E

EDD: Yes/No

DUE TO CLIENT: 1-2-99

Date	Time	Water	Soil	Sample Identification 19 Characters	No. of Containers	VOC 602 BTEX MTBE	TPH GRO 4.2.17	TPH DRO 4.1.25	"MAINE METHOD"								EA Labs Accession Number	Remarks
12/8/98	0900	X		NASBFF05MWR B1	8	✓	✓	✓									9816416	LPM: Michael Walsh
12/8/98	0900	X		TRIP1	3	✓											9816417	EAL-PS-065
12/8/98	0955	X		NASBFF05MW001 MS/MSD	24	✓	✓	✓			MS/MSD						9816418	
12/8/98	1113	X		NASBFF05MW002	8	✓	✓	✓									9816419	
12/8/98	1325	X		NASBFF05MW003	8	✓	✓	✓									9816420	MAINE Methods
12/8/98	1450	X		NASBFF05MW004	8	✓	✓	✓									9816421	Required for
12/8/98	1523	X		NASBFF05MW005	8	✓	✓	✓									9816422	GRO and DRO
12/9/98	0925	X		NASBFF05MW006	8	✓	✓	✓									9816423	
12/9/98	1100	X		NASBFF05MW007	8	✓	✓	✓									9816424	
12/9/98	1205	X		NASBFF05MW008	8	✓	✓	✓									9816425	
12/9/98	1345	X		NASBFF05MW009	8	✓	✓	✓									9816426	
12/9/98	1442	X		NASBFF05MWX10	8	✓	✓	✓									9816427	
12/9/98	—	X		NASBFF05MWXD1	8	✓	✓	✓									9816428	
																		L15319
				*MAINE DEP LOP methods required for DRO and														
				GRO*														
																		27 cooler 87 [illegible]
																		COC#0 4413

Samples by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Brian D. Anderson	12/9/98 1600	[signature]	12/9/98 1605		
Relinquished by: (Signature)	Date/Time	Received by Laboratory: (Signature)	Date/Time	Airbill Number:	Sample Shipped by: (Circle)
		[signature]	[illegible]	807455473515	Fed Ex. Puro. UPS Hand Carried Other:

Cooler Temp. 3° C pH: ☒ Yes ☐ No Comments: Custody Seals Intact ☒ Yes ☐ No

NOTE: Please indicate method number for analyses requested. This will help clarify any questions with laboratory techniques.

WHITE—EA Laboratories YELLOW—EA Laboratories PINK—Project Manager

Shaded Areas for Lab Use Only

Chain of Custody Record

EA Laboratories
19 Loveton Circle
Sparks, MD 21152
Telephone: (410) 771-4920
Fax: (410) 771-4407

Company Name: EA Engineering

Project Manager or Contact: John Carnright
Phone: (914) 565-8100

Project No. 29600.35

Project Name: Fuel Farm

Dept.: 2151 Task: 7250

Sampl Storag Location: M4 / VOAs

ATO Number:

Page 1 of 2

Report #: 982108

Report Deliverables: 1 2 3 4 D E

EDD: Yes/No

DUE TO CLIENT: 1-4-99

Paramet rs/Method Numbers for Analysis

Dat	Tim	Water	Soil	Sample Identification 19 Characters	No. of Containers	VOC 602 BTEX MTBE	TPH GRO 4.2.17	TPH DRO 4.1.35	"State of Maine Methods for	GRO & DRO"							EA Labs Accession Number	Remarks
12/10/98	0850	X		NASBFF05WPRB1	8	X	X	X									9816513	LPM: Michael WALSH
12/10/98	0850	X		TRIP 2	3	X											9816514	EAL-R-065
12/10/98	0915	X		NASBFF05WP001 MS/MSD	8	X	X	X		MS/MSD							9816515	
12/10/98	0945	X		NASBFF05WP002	8	X	X	X									9816516	State of Maine
12/10/98	1020	X		NASBFF05WP003	8	X	X	X	2 amber gone								9816517	Methods required
12/10/98	1035	X		NASBFF05WP004	8	X	X	X									9816518	for GRO & DRO.
12/10/98	1045	X		NASBFF05WP005	8	X	X	X									9816519	
12/10/98	1055	X		NASBFF05WP006	8	X	X	X									9816520	VOCs by 602
12/10/98	1210	X		NASBFF05WP007	8	X	X	X									9816521	
12/10/98	1220	X		NASBFF05WP008	8	X	X	X	1 amber / 1 VOA gone								9816522	
12/10/98	1235	X		NASBFF05WP009	8	X	X	X									9816523	Temp. Blank with
12/10/98	1250	X		NASBFF05WP010	8	X	X	X	1 amber missing								9816524	Coolers.
12/10/98	1300	X		NASBFF05WP011	8	X	X	X	2 ambers missing								9816525	
12/10/98	1310	X		NASBFF05WP012	8	X	X	X									9816526	
12/10/98	1335	X		NASBFF05WP013	8	X	X	X									9816527	COC 1 of 2
12/10/98	1350	X		NASBFF05WP014	8	X	X	X									9816528	
12/10/98	1405	X		NASBFF05WP015	8	X	X	X									9816529	
12/10/98	1450	X		NASBFF05WP016	8	X	X	X									9816530	00004421
12/10/98	1505	X		NASBFF05WP017	8	X	X	X									9816531	
12/10/98	1517	X		NASBFF05WP018	8	X	X	X									9816532	L15322

Sampled by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Brian D. Anderson	12/10/98 1600				

Relinquished by: (Signature)	Date/Tim	Received by Laboratory: (Signature)	Date/Time	Airbill Number:	Sample Shipped by: (Circl)
Brian D. Anderson	12/10/98 1600	Joseph Blue	12/14/98 1030	8016791244 54	Fed Ex. Puro. UPS Hand Carried Other:

Cooler T mp. 4 C pH: Yes No Comments: Custody Seals Intact Yes No

NOTE: Pleas cate method number for analys s requested. This will help clarify any questions with laboratory techniques.

WHITE—EA Laboratori s YELLOW—EA Laborat ries PINK—Pr ject Manag r Shaded Areas ab Use Onl

78/1026
L 19091

Company Name:	Project Manager or Contact:
EA Engineering	John Carnright
Project No. 29600.35	Phone: (914) 565-8100
Dept.: 2151 Task: 7250	Project Name: Fuel Farm
Sample Storage Location: MW / VCA	ATO Number:
Page 2 of 2	Report #: 982108

Parameter Method Numbers for Analysis

Chain of Custody Record

EA Laboratories
19 Loveton Circle
Sparks, MD 21152
Telephone: (410) 771-4920
Fax: (410) 771-4407

Report Deliverables: 1 2 3 4 D E

EDD: Yes/No

DUE TO CLIENT: 1-4-99

Date	Time	Water	Soil	Sample Identification 19 Characters	No. of Containers	VOC 602 BTEX MTBE	TPH GRO 4.2.17	TPH DRO 4.1.25		"State of Maine Methods for		DRO & GRO"						EA Labs Accession Number	Remarks
12/10/98	—	X		NASBFF05WPXD1	8	X	X	X										9816533	LPM: Michael Walsh
12/10/98	—	X		NASBFF05WPXD2	8	X	X	X										9816534	EBL-PS-065
																			State of Maine Methods required for GRO & DRO.
																			VOC by 602.
																			Temp blank with Coolers.
																			COC 2 of 2
																			CC000421
																			LS322

Sampled by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Brian D. Anderson	12/10/98 1600				
Relinquished by: (Signature)	Date/Time	Received by Laboratory: (Signature)	Date/Time	Airbill Number:	Sample Shipped by: (Circle)
Brian D. Anderson	12/11/98 1200	Joseph Blue	12/14/98 P30	801679124454	Fed Ex. Puro. UPS Hand Carried Other:

Cooler Temp. 4 C pH: Yes No Comments: Custody Seals Intact Yes No

NOTE: Please indicate method number for analyses requested. This will help clarify any questions with laboratory techniques.

WHITE—EA Laboratories YELLOW—EA Laboratories PINK—Project Manager *Shaded Areas for Lab Use Only*

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP006

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816520

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5516.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	1	U
	m&p-Xylenes	2	
95-47-6	o-Xylene	1	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP006

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816520

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4566.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	19	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP006

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: _____ SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816520

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M642F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
	DRO AS C10-28 EVEN	690	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP016

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816530

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5526.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	3	
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	3	
	m&p-Xylenes	2	
95-47-6	o-Xylene	3	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05WP016

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816530

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4585.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/24/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	23000	E

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05WP016DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816530DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4841.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/20/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 100.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	8500	D

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP016

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816530

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M653F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	5100	E

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP016DL

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: _____ SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816530DL

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M661F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	5300	D

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05WPXD2

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816534

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5530.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	5	
108-88-3	Toluene	8	
100-41-4	Ethylbenzene	2	
	m&p-Xylenes	4	
95-47-6	o-Xylene	3	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WPXD2

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816534

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4589.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/24/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	8600	E

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WPXD2DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816534DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4840.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/20/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	13000	D

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05MWPXD2

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: _____ SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816534

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M615F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 12/15/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/01/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	7500	E

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WPXD2DL

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816534DL

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M621F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/15/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/05/99

Injection Volume: 1.0 (uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	7400	D

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05WP002

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816516

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5512.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	1	U
	m&p-Xylenes	2	
95-47-6	o-Xylene	1	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP002

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816516

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4560.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	63	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP002

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: _____ SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816516

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M637F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	150	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05WP013

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816527

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5523.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	3	
108-88-3	Toluene	3	
100-41-4	Ethylbenzene	2	
	m&p-Xylenes	2	
95-47-6	o-Xylene	2	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP013

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816527

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4573.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
	TPH-Gasoline Range	610	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP013

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816527

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M648F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
	DRO AS C10-28 EVEN	4500	E

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP013DL

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816527DL

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M658F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 8.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	5000	D

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05WP018

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816532

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5528.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	32	
108-88-3	Toluene	220	E
100-41-4	Ethylbenzene	190	
	m&p-Xylenes	610	E
95-47-6	o-Xylene	400	E

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP018DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816532DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5700.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/7/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 20.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	20	U
71-43-2	Benzene	83	D
108-88-3	Toluene	370	D
100-41-4	Ethylbenzene	280	D
	m&p-Xylenes	2600	D
95-47-6	o-Xylene	1300	D

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP018

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816532

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4587.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/24/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	12000	E

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP018DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816532DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4843.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/20/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 100.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	14000	D

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP018

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816532

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M655F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.6

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	2200	E

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP018DL

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816532DL

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M663F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 8.0

GPC Cleanup: (Y/N) N pH: 1.6

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	2500	D

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP005

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816519

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5515.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	2	
	m&p-Xylenes	2	
95-47-6	o-Xylene	1	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05WP005

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: #9816519

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4565.D

Level: (low/med) _____ Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	17	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP005

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816519

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M641F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	250	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05WP012

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816526

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5522.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	3	
100-41-4	Ethylbenzene	2	
	m&p-Xylenes	5	
95-47-6	o-Xylene	3	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05WP012

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816526

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4572.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	750	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP012

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: _____ SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816526

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M647F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	650	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05WPXD1

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816533

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5529.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	3	
108-88-3	Toluene	27	
100-41-4	Ethylbenzene	3	
	m&p-Xylenes	5	
95-47-6	o-Xylene	2	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WPXD1

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816533

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4588.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/24/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	3800	E

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WPXD1DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816533DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4837.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/20/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 20.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	1100	D

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05MWPXD1

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816533

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M612F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/15/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/01/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.6

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	800	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP001

Lab Name: EA LABORATORIES Report#: 982108

ode: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816515

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5510.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	3	
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	2	
	m&p-Xylenes	2	
95-47-6	o-Xylene	2	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05WP001

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816515

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4557.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	140	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP001

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816515

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M634F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/06/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	370	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP003

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816517

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5513.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	1	U
	m&p-Xylenes	2	
95-47-6	o-Xylene	1	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP003

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816517

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4561.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	23	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP007

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816521

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5517.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	1	U
	m&p-Xylenes	2	
95-47-6	o-Xylene	1	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP007

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816521

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4567.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
	TPH-Gasoline Range	330	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP007

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816521

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M643F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	330	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP009

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816523

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5519.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	11	
108-88-3	Toluene	46	
100-41-4	Ethylbenzene	2	
	m&p-Xylenes	2	
95-47-6	o-Xylene	2	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP009

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: #9816523

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4569.D

Level: (low/med) _____ Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	56	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP009

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816523

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M645F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
	DRO AS C10-28 EVEN	300	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP010

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816524

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5520.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	3	
108-88-3	Toluene	4	
100-41-4	Ethylbenzene	2	
	m&p-Xylenes	1	U
95-47-6	o-Xylene	1	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05WP010

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: #9816524

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4570.D

Level: (low/med) _____ Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	6500	E

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP010RE

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816524RE

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4862.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/21/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	28	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP010

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: _____ SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816524

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M646F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	320	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP004

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816518

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5514.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	1	U
	m&p-Xylenes	2	
95-47-6	o-Xylene	1	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP004

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816518

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4562.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
	TPH-Gasoline Range	10	U

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP004RE

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816518RE

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4832.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/20/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	10	U

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP004

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816518

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M640F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	140	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05WP008

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816522

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5518.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	1	U
	m&p-Xylenes	2	
95-47-6	o-Xylene	1	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP008

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816522

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4568.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	51	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP008

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816522

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M644F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	510	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP011

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816525

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5521.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	3	
108-88-3	Toluene	3	
100-41-4	Ethylbenzene	2	
	m&p-Xylenes	2	
95-47-6	o-Xylene	2	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05WP011

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: #9816525

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4571.D

Level: (low/med) _____ Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	7200	E

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP011RE

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816525RE

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4859.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/21/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	30	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05WP014

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816528

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5524.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	17	
108-88-3	Toluene	36	
100-41-4	Ethylbenzene	9	
	m&p-Xylenes	46	
95-47-6	o-Xylene	10	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05WP014

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816528

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4581.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/24/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
	TPH-Gasoline Range	2400	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05WP014DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816528DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4835.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/20/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 20.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	1800	D

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP014

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816528

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M649F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	16000	E

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP014DL

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816528DL

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M659F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 25.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	18000	D

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP015

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816529

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5525.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	11	
71-43-2	Benzene	11	
108-88-3	Toluene	75	
100-41-4	Ethylbenzene	120	E
	m&p-Xylenes	360	E
95-47-6	o-Xylene	180	E

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP015DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816529DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5647.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/30/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 5.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	25	D
71-43-2	Benzene	68	D
108-88-3	Toluene	90	D
100-41-4	Ethylbenzene	150	D
	m&p-Xylenes	570	D
95-47-6	o-Xylene	250	D

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP015

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX.FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816529

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4584.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/24/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	5100	E

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP015DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816529DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4836.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/20/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 20.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	2900	D

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP015

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816529

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M652F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
	DRO AS C10-28 EVEN	2400	E

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP015DL

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816529DL

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M660F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	2700	D

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP017

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816531

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5527.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/23/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	9	
71-43-2	Benzene	91	
108-88-3	Toluene	290	E
100-41-4	Ethylbenzene	71	
	m&p-Xylenes	220	E
95-47-6	o-Xylene	82	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05WP017DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EAENG Client: FUEL FAR Method: 602 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816531DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5648.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/30/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 5.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	25	D
71-43-2	Benzene	120	D
108-88-3	Toluene	450	D
100-41-4	Ethylbenzene	110	D
	m&p-Xylenes	450	D
95-47-6	o-Xylene	150	D

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP017

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816531

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4586.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 12/24/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
	TPH-Gasoline Range	18000	E

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05WP017DL

Lab Name: EA LABORATORIES Report#: 982108

Lab Code: EA ENG Client: NEX FUEL I Method: 4.2.17 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816531DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4842.D

Level: (low/med) Date Sampled: 12/10/98

% Moisture: not dec. 0 Date Analyzed: 1/20/99

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 100.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	8900	D

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP017

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816531

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M654F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
	DRO AS C10-28 EVEN	15000	E

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FF05WP017DL

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982108 SAS No.: SDG No.: 9816513

Matrix: (soil/water) WATER Lab Sample ID: 9816531DL

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M662F.D

Level: (low/med) LOW Date Received: 12/14/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/17/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/07/99

Injection Volume: 1.0 (uL) Dilution Factor: 25.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	16000	D

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05MW008

Lab Name: EA LABORATORIES Report#: 982101

Code: EA ENG Client: NEX FUEL Method: 601 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #98166425

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5457.D

Level: (low/med) Date Sampled: 12/9/98

% Moisture: not dec. 0 Date Analyzed: 12/18/98

GC Column: DB-VRX ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	2	
100-41-4	Ethylbenzene	2	
	m&p-Xylenes	2	
95-47-6	o-Xylene	1	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05MW008

Lab Name: EA LABORATORIES Report#: 82101

Lab Code: EA ENG Client: NEX FUEL Method: MAINE SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816425

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4541.D

Level: (low/med) Date Sampled: 12/9/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
	TPH-Gasoline Range	14	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05MW008

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982101 SAS No.: _____ SDG No.: 9816416

Matrix: (soil/water) WATER Lab Sample ID: 9816425

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M608F.D

Level: (low/med) LOW Date Received: 12/09/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 12/15/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/01/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	87	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05MW003

Lab Name: EA LABORATORIES Report#: 982101

Lab Code: EA ENG Client: NEX FUEL Method: 601 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #98166420

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5452.D

Level: (low/med) Date Sampled: 12/8/98

% Moisture: not dec. 0 Date Analyzed: 12/17/98

GC Column: DB-VRX ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	3	
100-41-4	Ethylbenzene	1	U
	m&p-Xylenes	2	
95-47-6	o-Xylene	2	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05MW003

Lab Name: EA LABORATORIES Report#: 82101

Lab Code: EA ENG Client: NEX FUEL Method: MAINE SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816420

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4534.D

Level: (low/med) Date Sampled: 12/8/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	19	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05MW003

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982101 SAS No.: SDG No.: 9816416

Matrix: (soil/water) WATER Lab Sample ID: 9816420

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M603F.D

Level: (low/med) LOW Date Received: 12/09/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/15/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/01/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	99	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

NASBFF05MW002

Lab Name: EA LABORATORIES Report#: 982101

Lab Code: EA ENG Client: NEX FUEL Method: 601 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #98166419

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5451.D

Level: (low/med) Date Sampled: 12/8/98

% Moisture: not dec. 0 Date Analyzed: 12/17/98

GC Column: DB-VRX ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	3	
100-41-4	Ethylbenzene	1	U
	m&p-Xylenes	2	
95-47-6	o-Xylene	2	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASBFF05MW002

Lab Name: EA LABORATORIES Report#: 82101

Lab Code: EA ENG Client: NEX FUEL Method: MAINE SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816419

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4533.D

Level: (low/med) Date Sampled: 12/8/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
	TPH-Gasoline Range	16	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05MW002

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982101 SAS No.: SDG No.: 9816416

Matrix: (soil/water) WATER Lab Sample ID: 9816419

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M600F.D

Level: (low/med) LOW Date Received: 12/09/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/15/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/01/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	150	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
NASBFF05MW004

Lab Name: EA LABORATORIES Report#: 982101

Lab Code: EA ENG Client: NEX FUEL Method: 601 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #98166421

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VB2A5453.D

Level: (low/med) Date Sampled: 12/8/98

% Moisture: not dec. 0 Date Analyzed: 12/17/98

GC Column: DB-VRX ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
1634-04-4	Methyl t-Butyl Ether	1	U
71-43-2	Benzene	1	U
108-88-3	Toluene	3	
100-41-4	Ethylbenzene	1	U
	m&p-Xylenes	2	
95-47-6	o-Xylene	1	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASBFF05MW004

Lab Name: EA LABORATORIES Report#: 82101

Code: EA ENG Client: NEX FUEL Method: MAINE SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: #9816421

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4J4535.D

Level: (low/med) Date Sampled: 12/8/98

% Moisture: not dec. 0 Date Analyzed: 12/22/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	Q
TPH-Gasoline Range	14	

Y: fuel pattern Z: single compound and/or non-fuel pattern

FORM I VOA

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05MW004

Lab Name: EA LABS Contract: FUEL FAR

Lab Code: EAENG Case No.: 982101 SAS No.: SDG No.: 9816416

Matrix: (soil/water) WATER Lab Sample ID: 9816421

Sample wt/vol: 1000 (g/ml) ML Lab File ID: SX4M604F.D

Level: (low/med) LOW Date Received: 12/09/98

% Moisture: decanted:(Y/N) N Date Extracted: 12/15/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 01/01/99

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 1.3

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
	DRO AS C10-28 EVEN	80	