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SUMMARY REPORT
BIOSPARGING SYSTEM OPERATIONS
AT OLD NAVY FUEL FARM
AUGUST-DECEMBER 1996
NAVAL AIR STATION, BRUNSWICK, MAINE

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

Prepared for

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February 1997
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RE: Contract No. N62472-92-D-1296; CTO No. 0035	

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CTO Manager

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BIOSPARGING SYSTEM OPERATIONS
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AUGUST-DECEMBER 1996
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Contract No. N62472-92-D-1296
Contract Task Order No. 0035

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February 1997
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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 layout of the Old Navy Fuel Farm is shown on Figure 1-2.

NAS Brunswick is an active base 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 hydrocarbons in site soil and ground water at the Old Navy Fuel Farm.

This report provides the results for baseline ground-water sampling, including chemical and microbial analyses, as well as operational data for the first 4 months of biosparging system operations. Results of the ground-water sampling event conducted in December 1996 are also discussed in this report.

1.2 SITE HISTORY

The Old Navy Fuel Farm site is located on the northeast portion of the NAS Brunswick grounds, and is bounded on the south by Fitch Avenue, on the west by 6th Street, and to 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/aquifer air sparging [SVE/AAS] system), installed following facility decommissioning, and a storm sewer system, exist at the site. Surface grade consists of a level field of grass.

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. Drainage from the

eastern part of NAS Brunswick, which includes the Old Navy Fuel Farm site, is directed to Mere Brook which feeds into Harpswell Cove about 3 mi to the south. Harpswell Cove is a marine inlet and is tidally influenced.

Previous hydrogeologic investigations (O'Brien & Gere Engineers, Inc. 1990, 1992) revealed 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 south-southeasterly parallel to the surface topography.

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 which 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 were 100,000-gal capacity tanks used for storage of JP-5.

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. This plume previously extended downgradient from the former location of T-202 toward the south-southeast and consisted primarily of benzene, toluene, ethylbenzene, and xylene (BTEX) compounds. Monitoring well MW-J is currently located adjacent to the former location of T-202.

The second dissolved-phase hydrocarbon plume was located 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 consisted principally of BTEX compounds, although at significantly lower concentrations than the eastern hydrocarbon plume. Well point WP-05 is currently located in the vicinity of the former locations of T-104 and T-105.

1.2.3 Summary of Soil Vapor Extraction/Aquifer Air Sparging System Installation and Pre-Operational Inspection

Construction of the SVE/AAS system and treatment plant (current biosparging system) was finalized in Spring 1996. A pre-start up investigation was conducted in June 1996 to examine the readiness of the treatment system for activation. During this assessment, it was found that the water table was elevated to the point that many of the SVE/AAS utility vaults (installed to approximately 3-4 ft below grade) were flooded. An assessment was, therefore, made of the average seasonal water table elevations in the vicinity of the Old Navy Fuel Farm remedial area, and of the as-built condition of the SVE system. Water table elevation data collected during installation of the AAS wells were assessed in conjunction with monitoring well gauging data to evaluate the average seasonal elevation of the water table. It was determined that the depth to ground water during the winter and spring seasons is typically within 4 ft of ground surface, and often less than 3 ft below surface grade.

Based on the SVE/AAS system installation plans and field observations, the lateral SVE intake screens and vapor collection lines are located at 3 ft and 4 ft below grade, respectively. The shallow installation depths, in conjunction with the shallow water table, indicated a high potential for water intake and/or flooding of the intake screens and return lines during SVE/AAS system operation. Additionally, since the SVE collection lines were installed at a depth below the lateral SVE intake screens, ground water which drains or is drawn into the SVE screens has the potential to become trapped in the collection lines, preventing the extraction of soil vapor. This was confirmed when the SVE blowers were activated in an attempt to prove-out SVE system flow and vacuum. The SVE blowers were not capable of pulling the ground water from the flooded collection lines and immediately went into vacuum relief status (i.e., the automatic vacuum relief valves opened after maximum operational vacuum was exceeded). In effect, all three of the SVE blowers were "dead-headed" due to flooding of the SVE system collection lines and intake screens.

In an effort to clear water from the SVE lines, modifications were made to the SVE/AAS piping system to allow pressurized air from the AAS compressors to be directed into the SVE system vapor collection lines. AAS compressor C-2 was activated on 13 June 1996 and used in an attempt to clear ground water from the SVE vapor collection lines. Pressurized air (8 pressure per square inch gauge [psig]) was directed into the western and eastern SVE system collection lines for 30 minutes per section. During the clear-out process, the SVE field service vaults were monitored to prove-out flow in each of the 18 SVE vapor collection lines. Flow and pressure were confirmed in SVE collection lines 1-7 (western system) and lines 13-18 of the eastern system. Air flow was not observed in lines 8-12 of the eastern system. In all cases where air flow was observed, entrapped water was evident in the SVE vapor collection lines. The entrapped water was flowing through the SVE vapor collection lines in audible "slugs" and continued to be present throughout the clear-out period. It is believed that flow was not observed in SVE vapor collection lines 8-12 due to "short-circuiting" through vapor collection lines with

less resistance. Inspection of the flooded SVE service vaults revealed that compressed air was being released from the SVE intake screens below the standing water table. This last observation confirmed that the SVE collection lines and intake screens were submerged within the saturated zone.

Without significant reduction of the water table elevation in the vicinity of the Old Navy Fuel Farm remediation area, it was determined that the SVE system could not be operated in the extraction mode (i.e., extracting soil vapor from the vadose zone as opposed to injecting low pressure air).

Also, on 13 June 1996, the AAS system was temporarily activated and sparge pressure and air flow to the AAS utility vaults was confirmed. However, the flooded condition of the lateral SVE trenches prevented operation of that system.

Since effective operation of the SVE/AAS system was not possible due to the shallow depth to ground water, the Navy obtained approval by the State of Maine Department of Environmental Protection (MEDEP) on 22 July 1996 to operate the SVE/AAS system in a mode to enhance the potential for *in situ* bioremediation (i.e., biosparging). In order to operate as a biosparging system, modifications to the original SVE/AAS equipment, operating parameters, and monitoring procedures were required.

1.3 SUMMARY OF MODIFICATIONS FOR CONVERSION TO BIOSPARGING

As discussed above, the Old Navy Fuel Farm SVE/AAS equipment was re-configured to operate as a biosparging system. Biosparging is a proven technology for remediating petroleum impacted areas. 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. Additional monitoring procedures necessary to evaluate the effectiveness of the biosparging system include water quality indicator parameter measurements, microbial population studies, and alternate electron acceptor and nutrient sampling. To provide sufficient ground-water sampling locations for biosparging effectiveness monitoring, 20 shallow well points were installed throughout the targeted remedial area.

The existing biosparging system includes a 1,350 ft^2 treatment building and a network of lateral aeration trenches and vertical sparge wells located to the east of the treatment building. The configuration of the biosparging system is provided on Figure 1-2. Operation of the existing system in biosparging mode utilizes low-flow air injection from the existing network of sparge wells and lateral aeration trenches. Mechanical, operational, and effectiveness monitoring modifications, as discussed below, were necessary prior to commencement of biosparging activities.

1.3.1 Piping and Process Control Modifications

When operated in the biosparging mode, AAS system flow rates and injection pressures are adjusted to maximize the delivery of oxygen to the ground water and limited vadose zone, while minimizing 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 long-term operations, site personnel monitor injection pressures in conjunction with hydrostatic resistance (as a function of current well gauging data) and re-adjust the system as necessary. A photoionization detector (PID)/flame ionization detector (FID) is used to monitor volatile hydrocarbon concentrations in the service vaults and vadose zone soil (via newly installed well points) to prevent excessive atmospheric discharge from occurring.

Each of the existing sparge compressors (C-1A, C-1B, and C-2) is used to supply pressurized air to the AAS injection wells. The sparge compressors are operated at low pressure (7 psig) and high flow (300 cubic feet per minute [cfm]) settings to provide sufficient injection air to the sparge wells.

Minor piping modifications were conducted within the treatment building to allow air injection into the lateral SVE screens. Carbon steel pipe (2-in. diameter) was used to connect sparge compressor C-2 to the eastern and western SVE intake lines. Steel gate valves (2-in. diameter) were installed in conjunction with pitot tubes and Dwyer Magnehelic® differential pressure gauges calibrated for flow (for air flow measurement) and pressure gauges (0-20 psig) to modulate injection flow and pressure between the eastern and western sections of the SVE system. However, it was determined upon activation of the AAS system that all three sparge compressors were required to supply sufficient aeration at the sparge wells. Therefore, the newly installed gate valves were used to isolate the SVE system from sparge compressor C-2, and the three sparge compressors were used for biosparging operations.

A number of equipment repair and/or modification requirements were necessary prior to activation of the AAS system. A pressure gauge (0-20 psig) was used to provide rapid assessment of injection pressure at each field service vault. Also, the rugged-vane flowmeters were cleaned out and/or repaired as necessary to allow measurement of sparge air injection rate. However, due to weathering effects, and installation technique, repairs were not possible at several of the flowmeter locations. Prior to activation of the sparge system, each AAS supply line was purged with high pressure air to remove entrained ground water and/or condensate.

1.3.2 Biosparging System Effectiveness Monitoring Procedures

Since biosparging is a low pressure air injection, *in situ* remedial process, the effectiveness of biosparging systems must be assessed by verifying increased microbial activity (via direct microbial population studies and/or biodegradation indicator parameters such as electron acceptor and nutrient studies) and a corresponding reduction in hydrocarbon concentrations.

Therefore, the effectiveness of biosparging operations at the Old Navy Fuel Farm is monitored by conducting ground-water sampling for petroleum-related hydrocarbons, sulfate, nitrate, iron, and hydrocarbon-degrading microorganisms. Well gauging and water quality indicator parameter data (particularly dissolved oxygen, reduction-oxidation potential [redox], and pH) are obtained to ensure that subsurface conditions sufficient to support the hydrocarbon degrading microbial population are maintained and to assess the effect of the biosparging system on active metabolic processes. Well riser headspace total volatile hydrocarbon (TVH) and methane gas concentrations are also obtained to assess the effect of the biosparging system on active metabolic processes.

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). Additional offsite laboratory analyses included nutrient availability analyses and comparative enumeration analyses. The purpose of the comparative enumeration analyses is to quantify the indigenous microbial population and to identify the fraction of petroleum hydrocarbon degrading bacteria within the total microbial population. The microbial enumeration data are used to confirm that petroleum hydrocarbons are being metabolized by having facilitated the growth of the petroleum hydrocarbon degrading bacteria relative to the non-degrader microbial population.

Available nutrient analyses are conducted as part of the comparative enumeration analysis and includes quantification of nutrient availability as a function of dissolved-phase nitrogen (ammonia, total organic nitrogen, nitrate, and nitrite) and phosphorous concentrations. Although oxygen uptake is the primary limiting factor to *in situ* biodegradation, nutrient availability is also crucial for sustained (i.e., long-term) biodegradation processes, and is monitored to ensure that microbial nutrient uptake does not deplete the indigenous nutrient supply.

1.3.3 Installation of Well Points

To provide sufficient ground-water sampling locations for the biosparging effectiveness monitoring program discussed above, 20 shallow well points (identified as WP-01 through WP-20) were installed throughout the targeted remedial area at the Old Navy Fuel Farm. Well point installation also enhances the collection of water level data and water quality indicator parameter data.

Each well point consists of a 3-ft section of 0.010-in. slotted Schedule 40 polyvinyl chloride (PVC) well screen (2-in. diameter) and a 6-ft section of 2-in. diameter Schedule 40 PVC riser pipe. The well points are capped with 2-in. Schedule 40 PVC endcaps. Figure 1-2 provides the locations of the well points.

Installation was accomplished using a mechanical post hole digger, which was used to bore 8-in. outer diameter holes to approximately 6-7 ft below surface grade. In some cases, refusal was encountered at approximately 5 ft below grade. The well point assemblies (consisting of the 2-in. PVC screens and risers) were installed directly into the open borings and driven an additional 2-6 in. into the bottom of the boreholes with a 5-lb sledgehammer. Native soil generated from boring cuttings was used to backfill around the well points. The well points were capped immediately after installation. Due to the nature of the installation and packing material, which reduced the potential for significant ground-water recharge rates, the well points were not developed or purged.

During the well point installation process, ground-water samples were collected and analyzed at an onsite mobile laboratory equipped with a gas chromatograph with an FID and electron capture detector to provide rapid analytical data for optimizing placement of well points. Three well points (WP-01, WP-02, and WP-04) were installed upgradient of the remedial target area to serve as controls for documentation of increased *in situ* biodegradation associated with active biosparging.

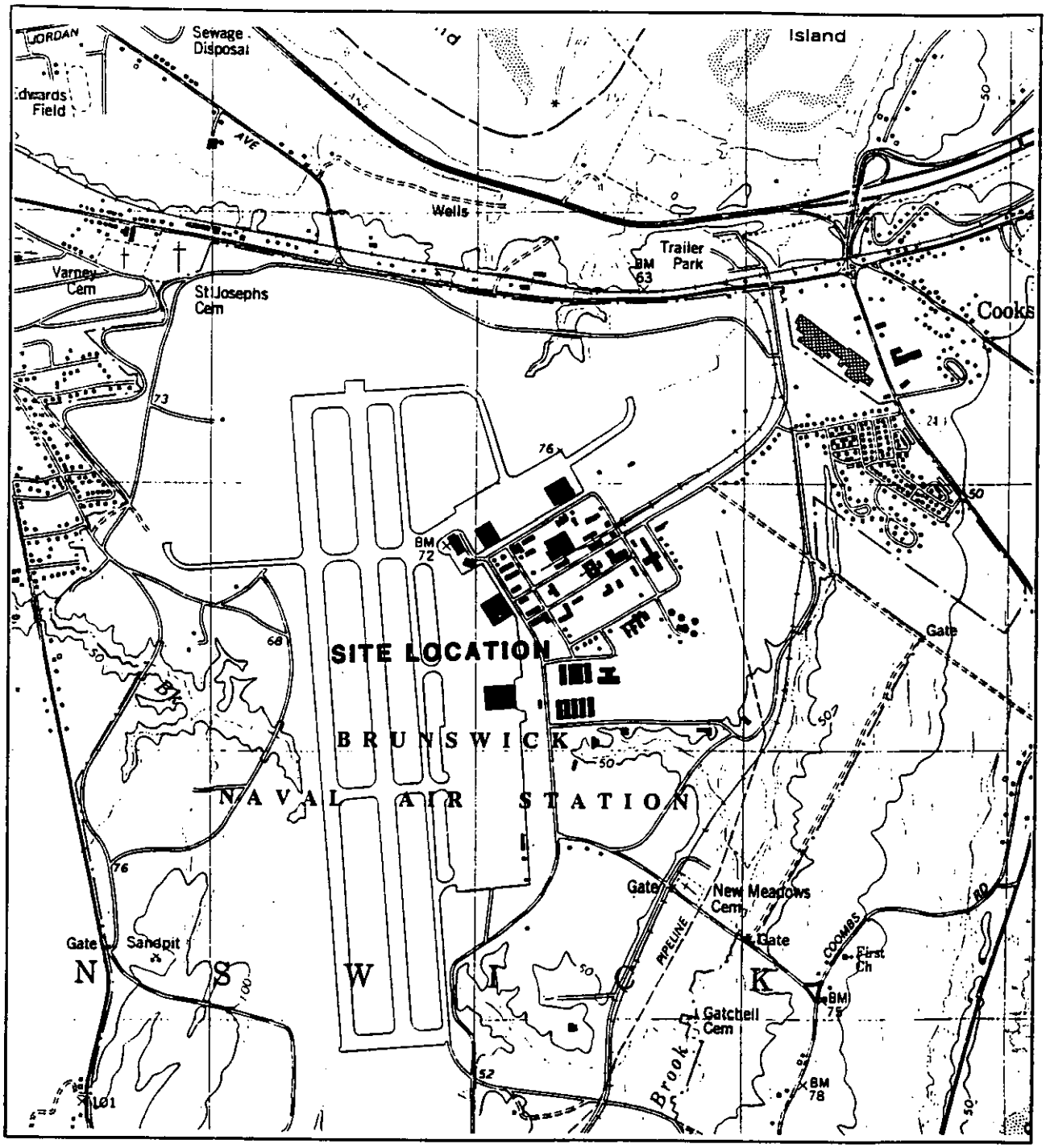
1.4 REPORT ORGANIZATION

The remaining chapters of this report address the following topics: implementation of field monitoring and sampling activities, presentation of biosparging system performance data, summarization of chemical and biological analytical results, and assessment of biosparging system performance.

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.

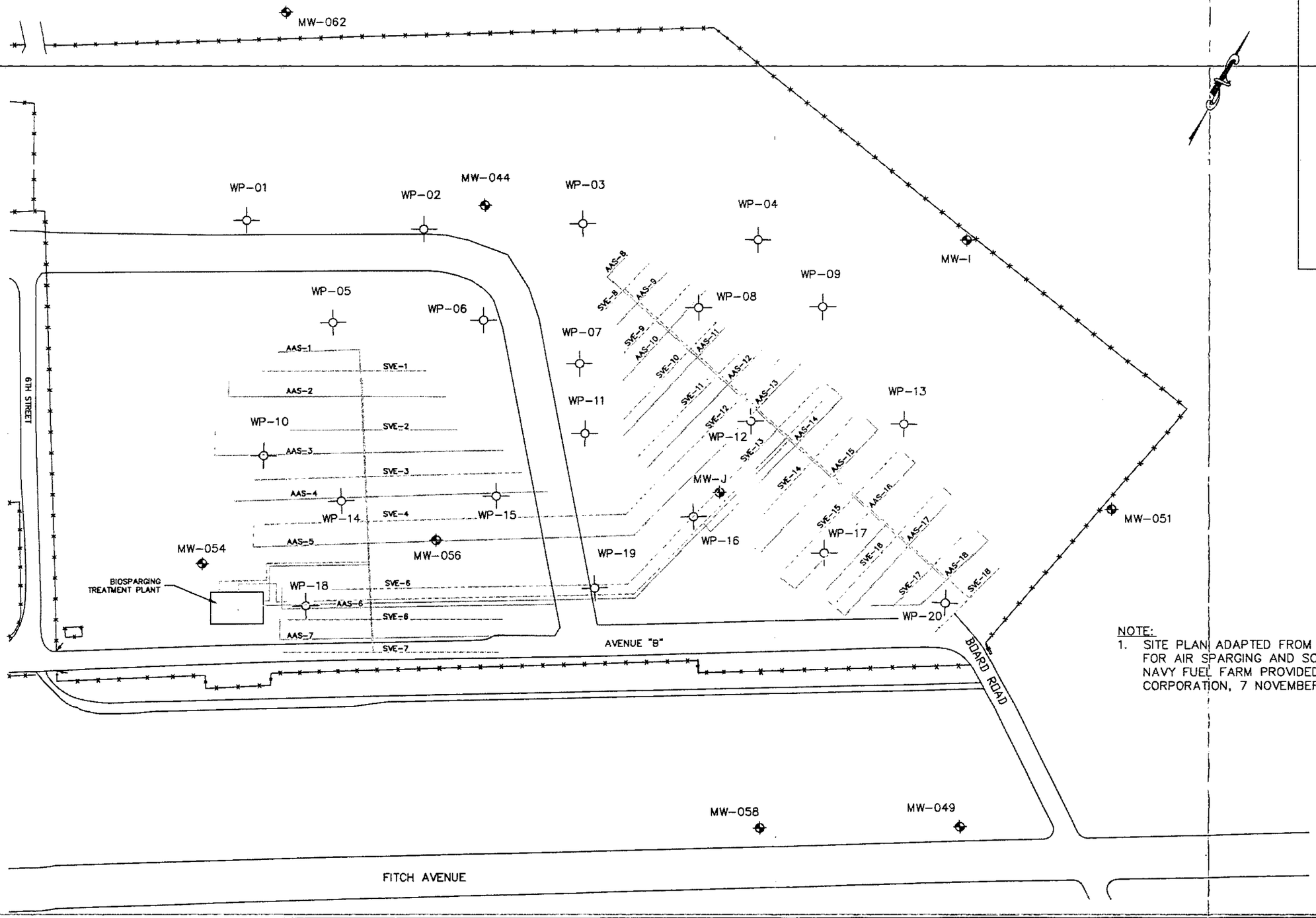
Chapter 3, Discussion of Results, discusses in detail the results of the monitoring and sampling activities detailed in Chapter 2.

NAVAL AIR STATION, BRUNSWICK MAINE



Source: U.S. Geological Survey 7.5-Minute Series
Topographic Quandrangle Map
Brunswick, Maine Quadrangle, 1980

Figure 1-1. Site location, Naval Air Station, Brunswick, Maine, U.S. Geological Survey 7.5-minute series topographic quadrangle map.



LEGEND

- MW-044 — MONITORING WELL LOCATION
- WP-01 — WELL POINT LOCATION
- CHAIN LINK FENCE
- SOIL VAPOR EXTRACTION LINE
- AIR SPARGING LINE

NOTE:
1. SITE PLAN ADAPTED FROM OPERATIONS AND MAINTENANCE PLAN FOR AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM AT OLD NAVY FUEL FARM PROVIDED BY OHM REMEDIATION SERVICES CORPORATION, 7 NOVEMBER 1995.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFARMDP2.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	OLD NAVY FUEL FARM BIOSPARGING SYSTEM NAVAL AIR STATION, BRUNSWICK, MAINE	FIGURE 1-2 SITE PLAN OLD NAVY FUEL FARM BIOSPARGING SYSTEM	DESIGNED BY SY	DRAWN BY SY	DATE 02/20/97	PROJECT NO. 29600.35	FILE NAME FFARMDP2
			CHECKED BY MSB	PROJECT MGR. MSB	SCALE AS SHOWN	DRAWING NO. –	SHEET NO.

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 the 16 site operating and monitoring visits during the August-December 1996 operational period, except when prevented due to equipment failure and/or severe weather conditions. Field personnel gauged accessible monitoring wells (10 total) and newly installed well points (20 total) to determine depth to water and absence/presence of light, non-aqueous phase liquid (LNAPL). Immediately following well gauging, water quality indicator parameters were recorded. Well locations are shown on Figure 1-2.

2.1.1 Well Gauging Methodology

Well gauging data were collected over a short time interval to permit assessment of ground-water flow. Upon opening each well, a Foxboro TVA-1000 PID/FID was used to monitor the presence of TVH at the mouth of the well and in the breathing zone. Following safety and health clearance monitoring, well gauging was conducted using either a Solinst Model 121 interface meter or an Oil Recovery Systems, Inc. oil/water interface probe; each of these instruments is capable of detecting LNAPL at thicknesses as low as 0.01 ft. These data were recorded on Field Record of Water Quality Analysis forms provided in Appendix A.

2.1.2 Water Quality Indicator Parameter Measurement Methodology

Measurements of water quality indicator parameters were obtained to assess variations in water quality during periods of active biosparging. Water quality indicator parameters, including temperature, pH, conductivity, dissolved oxygen, and Eh, were measured using a Hydrolab Model H20®G multiparameter water quality meter. Measurements were obtained by immersing the instrument datasonde below the water level in each well. In-well measurements were taken in order to obtain measurements reflective of *in situ* ground-water quality. These data were recorded on Field Record of Water Quality Analysis forms provided in Appendix A.

2.2 WELL POINT AIR QUALITY MONITORING PROGRAM

During biosparging system operations, 20 well points were monitored to establish baseline TVH, methane, oxygen, and carbon dioxide concentrations at locations within the remediation area and at background locations. Measurements of these parameters were also recorded at the biosparging system access vaults, although these data are not presented in this report since they were collected for safety and health purposes only.

TVH concentration data were collected at the well points to evaluate the degree to which volatilization of hydrocarbons was occurring as a result of active biosparging. Increases in TVH concentrations may be attributable to excessive aeration of the saturated zone. Upon opening the top of each well point, a Foxboro TVA-1000 PID/FID was used to monitor the presence and concentration of TVH. These data were recorded on Field Record of Biosparging Well Point Monitoring forms provided in Appendix B.

To confirm the presence of methane and to assess the reduction of anaerobic microbial activity within the remedial target area, a Landtec Model GA-90 methane detector was used on 28 August and 3 September 1996 to directly measure methane, oxygen, and carbon dioxide concentrations. Elevated carbon dioxide concentrations, together with depleted oxygen concentrations are generally an indication of active aerobic biodegradation activity. Detections of methane above background levels may be an indication of highly anaerobic microbial activity at the site. These data were recorded on Field Record of Biosparging Well Point Monitoring forms provided in Appendix B.

2.3 GROUND-WATER SAMPLING PROGRAM

2.3.1 Overview

As discussed previously, the effectiveness of the biosparging system must be assessed by verifying increased *in situ* biodegradation (via microbial quantification data and/or nutrient/electron acceptor biodegradation indicator parameters) and a corresponding reduction in dissolved-phase hydrocarbon concentrations. Therefore, biosparging system operations at the Old Navy Fuel Farm were monitored by conducting baseline (August 1996) and interim (December 1996) ground-water sampling. Ground-water sampling included chemical analyses to assess the extent of dissolved-phase hydrocarbons in shallow ground water, and microbial and biodegradation parameter analyses to assess the presence and stability of the indigenous hydrocarbon-degrading micro-organism population.

Chemical and biological sampling was conducted at both existing monitoring wells and newly installed well points. The well points were installed to compliment the previously installed monitoring wells. Locations for the well points were selected to most effectively monitor the chemical quality of ground water and microbiological activity within and outside the effective remediation zone of the biosparging system.

Two ground-water sampling events were conducted during this reporting period. Baseline ground-water sampling was conducted on 7-8 August 1996, just prior to activation of the biosparging system on 8 August 1996. A subsequent sampling event was conducted on 4-5 December 1996. Concurrent with the collection of samples on 7-8 August 1996, a mobile laboratory was used onsite to obtain real-time chemical data on ground-water samples collected

from the well points. Sampling methodologies performed in the field are discussed below. A summary of the ground-water sampling and analysis program (chemical and biological) is provided in Table 2-1.

2.3.2 Sampling Methodology

Sampling at well points was completed using the peristaltic pumping technique. During the 7-8 August 1996 sampling event, new, dedicated polyethylene sample tubing was installed in each of the well points sampled; this tubing was used in the collection of samples during both sampling events. To obtain samples from the well points, sample collection was initiated following well gauging. A Masterflex® L/S™, or ISCO Model 2700 peristaltic pump with dedicated 3/8-in. outer diameter Masterflex Silicone C-Flex® tubing, was affixed to the 3/8-in. inner diameter dedicated polyethylene tubing set in the well. Sampling at the well points was performed without purging since the points would go dry if steadily purged. Water quality indicator parameters were measured at the well points following sampling to assure that adequate sample volumes were obtained.

During the 7-8 August 1996 sampling event, ground-water sampling at monitoring wells was completed using the peristaltic pumping technique. To facilitate pumping, new, dedicated polyethylene sample tubing was installed in each of the wells sampled. A Masterflex L/S, or ISCO Model 2700 peristaltic pump with dedicated 3/8-in. outer diameter Masterflex Silicone C-Flex tubing, was affixed to the 3/8-in. inner diameter dedicated polyethylene tubing set in the well. During the 4-5 December 1996 sampling event, monitoring wells were sampled using new, dedicated, disposable polypropylene bailers and nylon sampling line. Sample purging was initiated following well gauging. At each well, a minimum of 3 well volumes of water was purged prior to sampling. Water quality indicator parameters were recorded during purging and immediately prior to sample collection. Measurement of these parameters was accomplished to ensure that water quality had stabilized prior to the collection of samples.

To ensure discrete sampling prior to the activities and after collection of each sample, the Masterflex Silicone C-Flex tubing used with the peristaltic pump was decontaminated by washing with a solution of Alconox® soap and de-ionized water, rinsing with de-ionized water, followed by a liberal rinse of isopropyl alcohol and de-ionized water. Water generated during decontamination was discharged to the ground surface adjacent to each sampling point.

2.3.2.1 Summary of Ground-Water Sampling Conducted on 7-8 August 1996

The baseline ground-water sampling event was conducted on 7-8 August 1996 at 17 of 20 well points and 3 ground-water monitoring wells located within the remediation zone. Prior to sampling, each well was gauged to determine the absence/presence of LNAPL, depth to ground water, and depth to bottom using an Oil Recovery Systems, Inc. oil/water interface probe

graduated at 0.01-ft intervals. Well MW-61 was damaged and could not be sampled. Well points WP-16 and WP-17 were dry, and thus were not sampled. Well point WP-12 was not sampled due to a lack of sufficient ground water.

Ground-water samples were submitted for chemical analyses under two sample delivery groups. One ground-water sample was collected from each of the above wells/well points (21 total); in addition, duplicate ground-water samples were collected from well points WP-1 and WP-11 and monitoring well MW-44. Two equipment rinsate blanks were collected by running de-ionized water through new, disposable polyethylene tubing and the decontaminated Masterflex® flexible tubing and into the appropriate sample containers. Aqueous samples were shipped under chain-of-custody to the laboratory via overnight courier upon completion of each work day.

Samples collected for chemical analyses were submitted to EA Laboratories of Sparks, Maryland. Ground-water (including duplicate) samples and rinsate blanks were analyzed for BTEX and MTBE by EPA Method 602, TPH-GRO by MEDEP Laboratory Operating Procedure (LOP) 4.2.17, and TPH-DRO by MEDEP LOP 4.1.25.

Concurrent with the collection of ground-water samples for chemical analysis, additional samples were collected from the well points for offsite laboratory analyses, including nutrient availability analyses and comparative enumeration analyses. These samples were shipped to BioRenewal Technologies, Inc. of Madison, Wisconsin. The purpose of the comparative enumeration analyses was to quantify the indigenous microbial population and to identify the fraction of petroleum hydrocarbon degrading bacteria within the total microbial population. Analysis of alternate electron acceptor concentrations, including nitrate, ferrous iron, and sulfate, was performed simultaneously with the comparative enumeration analyses for evaluating microbial metabolic changes due to active biosparging. Nutrient analyses were conducted as part of the comparative enumeration analysis and included quantification of nutrient availability as a function of dissolved-phase nitrogen (ammonia, total organic nitrogen, nitrate, and sulfate) and phosphorous concentrations.

Following sample collection for offsite laboratory analyses, an additional grab sample was collected to permit onsite colorimetric testing for ferrous iron and manganese. Hach colorimetric test kits were used to obtain the concentrations of ferrous iron and manganese by Methods 8146 and 8034, respectively.

2.3.2.2 Summary of Ground-Water Sampling Conducted on 4-5 December 1996

The first sampling event completed during active biosparging was conducted on 4-5 December 1996 at 16 of 20 well points, 4 of 5 ground-water monitoring wells located within the remediation zone, and 4 of 4 perimeter monitoring wells. 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 presence of measurable LNAPL at well points WP-2 (0.03 ft), WP-4 (0.64 ft), and WP-7 (0.62 ft); therefore, these wells points were not sampled. WP-17 did not yield sufficient ground water and thus was not sampled. Wells MW-56 and MW-61 were damaged and could not be sampled. The completed Field Record of Well Gauging, Purging, and Sampling forms are provided in Appendix C.

Ground-water samples collected for chemical analyses were submitted to the laboratory under two sample delivery groups. One ground-water sample was collected from each of the wells/well points (24 total); in addition, duplicate ground-water samples were collected from well WP-3 and monitoring well MW-43. Two equipment rinsate blanks were collected. One was collected by running de-ionized water through new, disposable polyethylene tubing and Masterflex flexible tubing and into the appropriate sample containers. The second was taken by pouring de-ionized water through a new dedicated polypropylene bailer and into the appropriate sample containers. To assess the potential for contamination during sample transport, trip blanks were analyzed with each shipment of samples (2 total). Aqueous samples were shipped under chain-of-custody to the laboratory via overnight courier upon completion of each work day. Samples collected for chemical analyses were submitted to EA Laboratories of Sparks, Maryland. Ground-water (including duplicate) samples and rinsate blanks were analyzed for BTEX and MTBE by EPA Method 602, TPH-GRO by MEDEP LOP 4.2.17, and TPH-DRO by MEDEP LOP 4.1.25. Trip blank samples were analyzed only for BTEX and MTBE by EPA Method 602.

Ground-water samples collected from the well points were concurrently shipped to BioRenewal Technologies, Inc. of Madison, Wisconsin, for offsite laboratory analyses, including nutrient availability analyses and comparative enumeration analyses. Detail on these methods is provided in Subsection 2.3.2.1 above.

Following sample collection for offsite laboratory analyses, an additional grab sample was collected to permit onsite colorimetric testing for ferrous iron and manganese. Hach colorimetric test kits were used for to obtain the concentrations of ferrous iron and manganese by Methods 8146 and 8034, respectively. Ground-water chemical and microbial laboratory reports are provided in Appendix D.

2.3.3 Mobile Laboratory Gas Chromatograph Methodology

Ground water was sampled at a minimal velocity using a peristaltic pump and stored in laboratory-cleaned, 40-ml volatile organics analysis vials. The glassware was sealed, labeled, placed in a cooler, and transported to the onsite mobile laboratory for analysis. Ground-water samples were analyzed in the field to produce "real time" analysis. These analyses permitted field personnel to optimize the placement of well points as supplements to the existing monitoring well network at the site. The mobile laboratory analytical methodology results are provided in Appendix E.

TABLE 2-1 SUMMARY OF CHEMICAL AND BIOLOGICAL ANALYTICAL PROGRAM
OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Chemical Analyses	
Analyte	Method
BTEX and MTBE	EPA 602
TPH-GRO	MEDEP LOP 4.2.17
TPH-DRO	MEDEP LOP 4.1.25
Sulfate	EPA Method 300
Nitrate	EPA Method 300
Ferrous Iron	HACH Method 8146 (Field Method)
Manganese	HACH Method 8034 (Field Method)
Methane (vapor phase)	Landtec GA-90
Biological and Physico-Chemical Analyses	
Analysis	Parameters Measured
Comparative Microbial Enumeration	Total Heterotrophic Bacteria/Total Hydrocarbon Degrading Bacteria
Nutrient Availability Assessment	Nitrogen and Phosphorous Concentrations

NOTE:
BTEX = Benzene, toluene, ethylbenzene, and total xylenes.
DRO = Diesel Range Organics.
GRO = Gasoline Range Organics.
LOP = Laboratory operating procedure.
MEDEP = Maine Department of Environmental Protection.
MTBE = Methyl tertiary-butyl ether.
TPH = Total petroleum hydrocarbons.

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 of 8 August to 19 December 1996. Assessments are provided for both baseline (i.e., intrinsic) and December 1996 (i.e., active biosparging) *in situ* biodegradation potential at the Old Navy Fuel Farm.

3.1 SUMMARY OF BASELINE SAMPLING PROGRAM RESULTS

Baseline sampling at the Old Navy Fuel Farm was conducted during the period of 7-8 August 1996 to document ground-water and soil vapor conditions prior to activation of the biosparging system. Water level and water quality indicator parameter data were collected from 4 monitoring wells (MW-44, MW-51, MW-56, and MW-211) and 20 newly installed well points (WP-01 through WP-20). Well point riser headspace TVH measurements were taken using a TVA-1000 PID/FID. Headspace methane, carbon dioxide, and oxygen measurements were taken using a Landtec GA-90 methane detector.

Ground-water samples were collected from the 3 monitoring wells and 17 well points. Each sample was analyzed onsite for BTEX constituents in the mobile laboratory and for ferrous iron and manganese using Hach field test kits. Samples from the monitoring wells and well points were also sent to EA laboratories and analyzed for BTEX and MTBE by EPA Method 602, TPH-GRO by MEDEP LOP 4.2.1.7, and TPH-DRO by MEDEP LOP 4.1.2.5.

Additional ground-water samples were collected from the 18 well points and submitted to BioRenewal Technologies, Inc. of Madison, Wisconsin, for biological and physico-chemical analyses including: total heterotrophic bacteria and total hydrocarbon degrading bacteria quantification, sulfate by EPA Method 300, and nitrate by EPA Method 300. Kerosene was used as the substrate hydrocarbon during the degrader bacteria identification analyses since it was the most similar petroleum product to the constituent of concern (JP-5) available to the laboratory.

A full description of the sampling methodology and procedures is provided in Chapter 2. Sampling results are summarized and discussed in the following sections.

3.1.1 Summary of Baseline Monitoring Well and Well Point Gauging Data

Field personnel gauged 3 monitoring wells (MW-44, MW-51, and MW-56) and 20 well points on 8 August 1996 (prior to activation of the biosparging system) to determine depth to water and absence/presence of LNAPL. Well points WP-16 and WP-17 were found to be dry. An LNAPL sheen (i.e., <0.01 ft of LNAPL) was observed in WP-02 during this gauging event. LNAPL was not encountered in any other well points or monitoring wells. The ground-water elevation

ranged from 65.97 ft above mean sea level (MSL) in WP-20 to 70.29 ft above MSL in well points WP-01 and WP-04. 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 8 August 1996 gauging event conducted prior to biosparging system activation. Based on the water table elevation data, the dominant direction of ground-water flow is to the south-southeast toward Fitch Avenue.

3.1.2 Baseline Water Quality Indicator Parameter Data

Concurrent with the 8 August 1996 gauging event, field personnel measured baseline water quality parameters (including temperature, pH, conductivity, dissolved oxygen, and Eh) at 15 well points and 2 monitoring wells using a Hydrolab Model H20®G multiparameter water quality meter. Water quality parameter data were not obtained from well point WP-02 due to the presence of an LNAPL sheen, and from well points WP-07, WP-12, WP-16, and WP-17 and monitoring wells MW-54 and MW-J due to lack of sufficient ground water. Table 3-2 provides a summary of Old Navy Fuel Farm water quality parameter data for the reporting period.

Ground-water pH ranged from 3.71 (WP-09) to 5.60 (MW-51) with an average value of 4.87. Temperature ranged from 13.77°C (WP-10) to 21.11°C (WP-18) with an average of 16.59°C. Dissolved oxygen ranged from 0.34 mg/L (WP-06) to 5.40 mg/L (WP-09) with an average of 1.24 mg/L. Conductivity ranged from 60.2 μhmos (MW-51) to 787 μhmos (WP-08) with an average of 226 μhmos. Redox ranged from -100 mV (WP-01) to 352 mV (WP-18) with an average of 243 mV.

3.1.3 Baseline Well Point Riser Vapor Monitoring Data

TVH measurements were taken from the 20 well point risers on 9 August 1996 (approximately 18 hours after biosparging system activation) to assess the effect of subsurface air injection on the volatilization of hydrocarbons at the ground-water interface. Table 3-3 provides a summary of the well point headspace monitoring data.

The PID response ranged from 0.06 ppm_v (WP-09) to 155 ppm_v (WP-13). The FID response ranged from 0.0 ppm_v (WP-09) to 50,000 ppm_v (WP-08). As indicated by the data, a significant discrepancy was observed between the PID and FID responses. It was suspected that the FID was responding to elevated concentrations of methane gas, which was not detected by the PID. This was later confirmed (28 August and 3 September 1996) when direct methane concentrations were measured and compared to both FID and PID responses (Section 3.3.4).

Since the elevated FID responses observed at several well points were partially due to significant methane concentrations, the actual TVH concentrations were not able to be determined since methane interferes with the overall PID response. However, well points which did not exhibit large discrepancies between the FID and PID responses can be assumed to have limited methane

concentrations, in which case the TVH concentration can be assessed by the FID and PID responses. Additionally, for well points which did exhibit discrepancies between the FID and PID responses, but which also demonstrated significant PID response, it can be assumed the TVH concentration was equal to or greater than the concentration reported by the PID.

Applying the screening procedure discussed above to the baseline well point head space monitoring data, it is concluded that 11 of the 20 well points (WP-02, WP-07, WP-08, WP-10, WP-11, WP-12, WP-13, WP-15, WP-16, WP-17, and WP-19) had TVH readings exceeding 10 ppm_v. It can also be inferred that all but 7 of the 20 well points (WP-03, WP-05, WP-09, WP-12, WP-13, WP-14, and WP-20) had very significant methane concentrations.

3.1.4 Baseline Microbial Sampling Results

During 7-8 August 1996, ground-water samples were collected from 18 of the 20 well points and submitted for microbial analysis. Microbial samples were not collected from well points WP-16 and WP-17 due to lack of ground water (i.e., dry well points). Microbial population density (both total heterotrophic microorganisms and petroleum degrading microorganisms) was expressed in "Colony Forming Units" (CFU) per mL. Ground-water microbial degrader populations greater than 1.0×10^6 CFU/mL are generally of sufficient magnitude to support measurable biodegradation without active site augmentation (i.e., an active bioremediation system). Microbial degrader populations between 1.0×10^3 and 1.0×10^6 CFU/mL are usually indicative of intrinsic conditions which will require an active bioremediation system to promote biodegradation. Microbial degrader populations less than 1.0×10^3 CFU/mL are indicative of severely limiting conditions which may not be amenable to bioremediation (State of Wisconsin DNR 1994)[1].

The baseline (i.e., prior to biosparging system activation) total microbial populations ranged from 3.3×10^4 CFU/mL (WP-15) to 3.7×10^6 CFU/mL (WP-20) with an average of 6.87×10^5 CFU/mL. Baseline degrader microbial populations ranged from 6.3×10^4 (WP-04) to 3.0×10^6 CFU/mL (WP-20) with an average of 5.4×10^5 CFU/mL.

It should be noted that due to the nature of microbial quantification via Standard Method culture plate counts, moderate error (i.e., ±20 percent) can be encountered. When identifying total microbial populations and the fraction of petroleum degrading microbes within the total population, two sets of culture plates are prepared: one set with a generic substrate which supports the growth of widespread microbial species, and another selective substrate set which supports only microbes capable of metabolizing the target petroleum product. Both sets of culture plates are then inoculated with 1 mL of the sample media (i.e., ground water). It is expected that the set of culture plates prepared with the target petroleum product substrate (in this case kerosene as a surrogate for JP-5) will yield fewer identifiable microbial colonies than

1. Wisconsin Department of Natural Resources "site characterization requirements for natural biodegradation projects" (1994).

the generic substrate set. However, if the fraction of petroleum degrading bacteria is very close to the overall microbial population, the error associated with Standard Method plate counts can result in a total degrader quantification which exceeds that of the total microbial population quantification.

The baseline microbial sampling data indicated that the intrinsic petroleum degrader population, with an average concentration of 5.4×10^5 CFU/mL, may not have been of sufficient magnitude for natural attenuation to rapidly reduce hydrocarbon concentrations, but was of sufficient magnitude to provide the basis for successful application of biosparging at the Old Navy Fuel Farm. Table 3-4 provides a summary of the baseline microbial data.

Additional analytical data obtained for bioremediation assessment include total organic nitrogen, the carbon to nitrogen ratio (C:N), carbon to phosphorus ratio (C:P), sulfate, and nitrate. These parameters are used to assess the potential for microbial growth and biodegradation, as well as to monitor the progress of *in situ* bioremediation. The baseline total organic nitrogen concentrations ranged from 0.8 to 34.4 percent, with an average of 8.14 percent. The baseline C:N ratios ranged from 5:1 to 115:1, with an average of 26:1. The baseline C:P ratios ranged from 600:1 to 875:1 (where measurable) with an average of 742:1. Each of these parameters was above the minimal threshold for effective *in situ* biodegradation potential (total organic nitrogen $\geq$1.5 percent, C:N ratio of at least 10:1-100:1, C:P ratio of at least 100:1-200:1) given by BioRenewal Technologies, Inc. Sulfate concentrations ranged from less than 0.1 mg/L to 120 mg/L, with an average of 37.2 mg/L. Nitrate concentrations ranged from less than 0.1 mg/L to 29.0 mg/L, with an average of 3.02 mg/L. Table 3-5 provides a summary of the baseline nutrient analysis data.

3.1.5 Baseline Ground-Water Sampling Results

Baseline ground-water samples (20 total) were collected from 3 monitoring wells (MW-44, MW-51, and MW-56) and 17 well points on 7-8 August 1996. Samples were not collected from well point WP-12 due to lack of sufficient ground water and from well points WP-16 and WP-17 since they were found to be dry. Sampling methodology is provided in Chapter 2. Samples from the monitoring wells and well points were sent to EA Laboratories and analyzed for BTEX and MTBE by EPA Method 602, TPH-GRO by MEDEP Method 4.2.17, and TPH-DRO by MEDEP LOP 4.1.25. Analytical results for the baseline ground-water sampling event are summarized in Table 3-5. Figures 3-2 through 3-5 provide interpreted concentration isopleths for total BTEX, MTBE, TPH-GRO, and TPH-DRO concentrations in ground water, respectively.

Total BTEX was reported in 20 of the ground-water samples at concentrations ranging from 1.2 μg/L (MW-51) to 5,752 μg/L (WP-05). Total BTEX was reported above 100 μg/L in 5 of 20 samples: WP-02 (623.6 μg/L), WP-05 (5,752 μg/L), WP-10 (166 μg/L), WP-11 (3,998 μg/L), and WP-13 (766 μg/L). Benzene was detected in 11 of 20 samples. Toluene was the

most frequently detected compound, reported in all 20 samples. Ethylbenzene was reported in 11 of 20 samples, and total xylenes were reported in 19 of 20 samples. Total BTEX was not detected in the equipment rinsate blanks or the trip blanks.

MTBE was detected in 19 of 20 ground-water samples at concentrations ranging from 1.3 μg/L (WP-03) to 130 μg/L (WP-09). MTBE was not detected in the equipment rinsate blanks or the trip blanks.

TPH-GRO was reported in the 20 ground-water samples at concentrations ranging from 14 μg/L (MW-51) to 9,000 μg/L (WP-05). Concentrations of TPH-GRO were reported above 1,000 μg/L in 5 of 20 samples: WP-02 (4,200 μg/L), WP-05 (9,000 μg/L), WP-07 (2,500 μg/L), WP-11 (5,500 μg/L), and WP-13 (2,200 μg/L). TPH-GRO was not detected in the equipment rinsate blanks.

TPH-DRO was reported in 18 of 20 ground-water samples at concentrations ranging from 56 μg/L (MW-56) to 16,000 μg/L (WP-02). Concentrations of TPH-DRO were reported greater than or equal to 1,000 μg/L at 5 locations: WP-01 (1,000 μg/L) , WP-02 (16,000 μg/L), WP-04 (1,300 μg/L), WP-05 (1,100 μg/L), and WP-11 (3,600 μg/L). TPH-DRO was not detected in MW-44 or MW-51. TPH-DRO was not detected in the equipment rinsate blanks.

The reported concentrations of total BTEX, TPH-GRO, and TPH-DRO for the duplicate ground-water samples collected at WP-01, WP-11, and MW-44 indicated general agreement with analytical results for the original samples. TPH-GRO concentrations were not in agreement between the original and duplicate ground-water samples collected at WP-11 (5,500 μg/L and 10,000 μg/L, respectively). TPH-GRO was reported at 16.0 μg/L for the original sample at MW-44 but was not reported in the duplicate sample (<10.0 μg/L).

Colorimetric field test kits were used for onsite analysis of ferrous iron and manganese concentrations in the ground-water samples collected from 16 of the 20 well points. Insufficient ground-water was available for sample collection in well points WP-12, WP-16, and WP-17. The sample from WP-03 was too turbid for field test kit analysis. Ferrous iron concentrations ranged from non-detect in well points WP-07 and WP-09 to 4.8 mg/L in WP-04 and WP-08. Manganese concentrations ranged from non-detect in 12 of the well points to 2.0 mg/L in WP-08. A summary of the ferrous iron and manganese data is provided in Table 3-6.

3.2 ASSESSMENT OF BASELINE *IN SITU* BIODEGRADATION POTENTIAL

Ground-water parameters and vapor monitoring data collected prior to biosparging system activation at the Old Navy Fuel Farm were indicative of an anaerobic environment which had progressed to an advanced state of reducing conditions. Anaerobic conditions were evidenced by dissolved oxygen concentrations 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. Only two well points, WP-09 and WP-20, exhibited dissolved oxygen concentrations greater than 1.0 mg/L (5.4 and 3.1 mg/L, respectively). Figure 3-6 provides the

baseline (i.e., prior to biosparging system operation) interpreted dissolved oxygen concentration plume. Both of these well points were near the extremities of the interpreted 7-8 August 1996 dissolved-phase BTEX plume. It is likely that the relatively high magnitude of heterotrophic bacteria measured at these locations were actively degrading dissolved-phase hydrocarbons through aerobic metabolic pathways.

Dissolved oxygen concentrations at other locations within the target remediation zone were insufficient to promote aerobic biodegradation and were indicative of a highly anaerobic environment. Additionally, water quality indicator parameters, available nutrient and ferrous iron concentrations, and well point head space vapor monitoring data provided strong indications that the ground-water microbial environment had progressed to an advanced state of reducing conditions. Significant anaerobic biodegradation of petroleum hydrocarbons was likely in progress at this time. The presence of high concentrations of methane (as much as 5 percent of the head space vapor) within many of the well point risers indicated that methanogenic biodegradation of hydrocarbons was in progress.

Methanogenic bacteria are obligate anaerobes (i.e., occur only in completely anaerobic environments) which are capable of metabolizing petroleum hydrocarbons. During the final reaction step of methanogenesis (or methane fermentation), the carbon oxidized from the hydrocarbon substrate is reduced to methane, producing dissolved-phase methane gas (Graudy and Graudy 1988). Other products of methanogenesis are acetate and long-chain fatty acids, which may have contributed to the reduced pH conditions (average pH 4.87) observed prior to activation of the Old Navy Fuel Farm biosparging system. Methanogenesis occurs once the ground water has reached sufficiently reducing conditions. To attain these conditions, other highly oxidizing chemical species such as oxygen, nitrate, sulfate, manganese, and ferric iron (Fe^{+3}), which are favored microbially, must first be reduced. The observation of active methanogenisis usually indicates that the ground-water environment has progressed through the more favorable (i.e., higher energy-yielding potential) metabolic pathways. These pathways, in order of microbial favorableness, are: aerobic respiration, denitrification and/or manganese reduction, nitrate reduction, ferric iron reduction, and sulfate reduction. However, it should be noted that a given area within an aquifer may switch among iron reduction, sulfate reduction, and methanogenesis depending on seasonal recharge of dissolved oxygen and sulfate recharge (Naval Facilities Engineering Service Center 1996).

Redox potentials which are indicative of exclusive methanogenesis are typically in the range of -240 mV. The redox potentials measured prior to activation of the Old Navy Fuel Farm biosparging system ranged from -100 to 352 mV with an average of 243 mV. This range of redox potentials is closer to the typical range for iron reduction (-50 mV). Reduced, or ferrous iron, concentrations were observed up to 4.8 mg/L with an average of 1.51 mg/L, indicating that iron reduction had likely occurred in the ground water at the Old Navy Fuel Farm. Sufficient concentrations of sulfate (up to 120 mg/L) were also present as an electron receptor for the sulfate reduction pathway. Due to the range of redox potentials observed and the presence of

nutrients required for metabolic pathways other than methanogenisis, it is likely that anaerobic biodegradation of dissolved-phase hydrocarbons was occurring through multiple pathways prior to activation of the biosparging system.

Most conditions measured at the Old Navy Fuel Farm remedial area prior to activation of the biosparging system indicated a high potential for successful utilization of the system. The hydrocarbon degrading microbial population measured in ground-water samples was well within the range considered amenable for active bioremediation. In fact, two of the well point ground-water samples (WP-14 and WP-20) exhibited microbial populations greater than 1.0×10^6 CFU/mL, the threshold considered by the State of Wisconsin DNR (1994) to be sufficient for natural attenuation. It should be noted that obligate anaerobes, such as methanogenic bacteria, were not quantified, and as such have not been considered in the biodegradation potential analysis.

The average ground-water temperature, ferrous iron, and TPH concentrations, and C:N:P ratios were all within acceptable ranges (10-45°C, <10 mg/L, <50,000 mg/L, and 100:1:0.5-100:10:1, respectively) given by EPA for successful application of biosparging remedial technologies (U.S. EPA 1995). Additionally, the percent of total organic nitrogen for most samples was above the minimal threshold of 1.5 percent given by State of Wisconsin DNR (1994). However, the ground-water pH was below the recommended range given by the EPA (pH range of 6-8). Ground-water pH ranges measured prior to activation of the biosparging system ranged from 3.71 to 5.60, with an average of 4.87. As mentioned previously, these pH conditions may have resulted from long-term anaerobic microbial activity at the Old Navy Fuel Farm remedial area. It was anticipated that the pH of ground water would approach neutrality as aerobic microbial activity replaced anaerobic processes following activation of the biosparging system.

3.3 SUMMARY OF BIOSPARGING SYSTEM OPERATION AND MONITORING DATA

Field personnel performed a total of 16 operating and monitoring site visits during the reporting period from 8 August (biosparging system activation date) to 19 December 1996. Operating and monitoring site visits were conducted on 9, 14, 20, and 28 August 1996; 3 and 16 September 1996; 2, 8, 17, and 25 October 1996; 1, 8, 13, and 25 November 1996; and 5 and 19 December 1996. Biosparging operating and monitoring data are provided in Field Record of Biosparging System Operations forms provided in Appendix F. Tasks performed during each site visit are summarized below:

- Monitored biosparging system operation parameters (i.e., flow rates, pressures, temperatures, etc.)
- Gauged water levels and measured water quality indicator parameters at monitoring wells and well points

- Analyzed well point head space TVH concentrations
- Inspected biosparging system components and remedial area for evidence of air injection
- Inspected biosparging system components for functionality and repaired as necessary.

3.3.1 Biosparging System Operational Summary

The Old Navy Fuel Farm biosparging system was activated on 8 August 1996 with the injection of compressed air in both lateral aeration trenches and AAS wells. Ambient air injection was accomplished by AAS compressors C-1A, C-1B, and C-2 which supplied compressed air (approximately 300 cfm each at 7.0 psig) to the eastern AAS well network, western AAS well network, and lateral aeration trenches, respectively. Injection pressures and flow rates were measured at field service vaults using dedicated gauges (when functioning) or were confirmed by visual and/or audio evidence (i.e., obvious surface water/service vault water aeration and audible supply line airflow). On 9 August 1996, approximately 18 hours after biosparging system activation, 12 of the 18 AAS injection well legs (AAS legs 4-7 and 11-18) and only 5 of the 12 lateral aeration trenches (aeration trenches 4, 5, 14, 16, and 17) were confirmed to be active. By 14 August 1996, only 7 of the 18 AAS injection well legs (AAS legs 2-7 and 12) and 7 of the 18 lateral aeration trenches (aeration trenches 2, 3, 5, 6, and 15-17) were confirmed to be active. The reduction over time in actively sparging AAS wells and lateral aeration trenches indicated that air flow was being short-circuited to injection areas exhibiting the least resistance.

On 16 September 1996, AAS compressor C1A, which was supplying air to the eastern AAS injection well network, was found to be inactive due to a drive pulley failure. Replacement parts were immediately ordered and the compressor re-activated on 30 September 1996. During the period in which compressor C1A was inactive, evidence of active biosparging activity (i.e., aeration of standing water) was significantly reduced in the eastern section of the remedial area. For this reason and due to the short-circuiting discussed above, it was determined that the AAS injection wells were significantly more effective than lateral aeration trenches, with respect to ground-water aeration, and that additional compressed air volume was required to effectively operate the AAS injection well network. Therefore, on 2 October 1996, the lateral aeration trenches were de-activated to allow AAS compressor C-2 to supply additional air to the western AAS injection well network. The Old Navy Fuel Farm biosparging system was operated in this mode (i.e., AAS injection wells only, with compressor C1A supplying air to the eastern injection well network and compressors C1B and C-2 supplying air to the western injection well network) for the remainder of the reporting period.

After conversion to AAS-only operating mode, a significant increase in sparging activity, as evidenced by visual aeration of surface water and standing water within field service vaults, was observed in the western section of the remedial area. On 8 October 1996, a frost rupture was

discovered in the main supply line of the eastern AAS injection well network, in the vicinity of well point WP-19. This rupture was repaired on 9 October 1996, after which significant increased sparging activity was also observed in the eastern section of the remedial area. In addition to aeration of surface water and water within field surface vaults, well points WP-07, WP-08, WP-13, and WP-17 exhibited ground-water aeration (i.e., visual and/or audible sparging within the well points). No well point biosparging activity was observed prior to the conversion to AAS-only air injection mode. At the time this report was prepared, the Old Navy Fuel Farm biosparging system continued to operate in this mode.

3.3.2 Monitoring Well and Well Point Gauging Data

Field personnel gauged the 20 well points and monitoring wells MW-44, MW-51, MW-56, and MW-J during each of the 16 operating and monitoring site visits, except when prevented by weather conditions and/or blocked or bent well casings. A summary of the well gauging data is provided in Table 3-1. The water table elevation fluctuated by no more than 2.5 ft, and appeared to increase gradually throughout the reporting period.

LNAPL sheens (i.e., less than 0.01 ft thickness) were observed in 12 of the 20 well points (WP-01, WP-02, WP-03, WP-04, WP-05, WP-06, WP-08, WP-10, WP-11, WP-13, WP-18, and WP-19). LNAPL sheens were not observed in the monitoring wells. Measurable LNAPL (i.e., >0.01 ft) was observed in well points WP-02 (0.03 ft), WP-04 (up to 0.82 ft), WP-07 (up to 1.95 ft), WP-10 (up to 0.10 ft), and WP-13 (0.12 ft) and monitoring well MW-J (up to 0.17 ft).

3.3.3 Water Quality Indicator Parameter Data

Field personnel measured water quality indicator parameters in the 20 well points and monitoring wells MW-44, MW-51, MW-56, and MW-J during each of the 16 operating and monitoring site visits, except when prevented by weather conditions, blocked or bent well casings, and/or the presence of LNAPL. A summary of water quality indicator parameter data is provided in Table 3-2.

During the reporting period the average pH of the ground water increased from 4.87 to 5.93, the average temperature of ground water decreased from 16.59°C to 7.30°C, and the average dissolved oxygen concentration increased from 1.24 mg/L to 4.09 mg/L. The conductivity and redox values remained essentially stable throughout the reporting period. The changes in temperature and dissolved oxygen were expected due to ambient weather conditions and active biosparging, respectively. The increase in the average ground-water pH is most likely due to modified microbial activity associated with active biosparging (i.e., transformation from anaerobic to aerobic environment).

3.3.4 Monitoring Well and Well Point Headspace Vapor Measurements

Field personnel measured headspace TVH concentrations in the 20 well points during each of the 16 operating and monitoring site visits. To confirm that elevated FID responses were due to the presence of methane, a Landtec GA-90 methane detector was used to directly measure methane, carbon dioxide, and oxygen headspace concentrations on 28 August and 3 September 1996. As expected, significant methane concentrations (ranging from 0.1 to >90 percent) were detected in well points which had previously demonstrated elevated FID responses and/or had extinguished the FID flame. Methane was detected in all but 7 of the well points (WP-01, WP-03, WP-05, WP-06, WP-09, WP-14, and WP-18). Carbon dioxide measurements ranged from 0.0 percent (well points WP-01 and WP-06) to 34.2 percent (WP-10). Oxygen measurements ranged from 0.0 percent (WP-10) to 21.8 percent in well point WP-01. Methane, carbon dioxide, and oxygen headspace concentration data are provided in Table 3-7.

As discussed previously, direct measurement of well point headspace TVH concentrations was not possible due to interference resulting from significant concentrations of methane. However, applying the screening procedure discussed in Section 3.1.3 to the well point headspace monitoring data, TVH concentrations greater than 10 ppm_v were observed in all but 5 of the 20 well point risers. TVH concentrations greater than 10 ppm_v were not confirmed within well point risers WP-01, WP-05, WP-06, WP-09, and WP-18. After conversion to AAS-only injection mode and repair of the eastern main AAS supply line, the TVH concentrations in well points WP-15 to WP-17 and WP-20 were reduced to non-detect. The TVH concentrations in well points WP-14 and WP-29 were reduced to less than 10 ppm_v. TVH concentrations greater than 10 ppm_v continue to be observed in the remaining well point risers. A summary of the well point headspace monitoring data is provided in Table 3-3.

3.4 SUMMARY OF DECEMBER 1996 SAMPLING PROGRAM RESULTS

Ground-water sampling was conducted at the Old Navy Fuel Farm during the period of 3-5 December 1996 to document ground-water conditions after approximately 4 months of active biosparging. Water level gauging and water quality indicator parameter data were collected from 8 monitoring wells (MW-44, MW-49, MW-51, MW-54, MW-58, MW-62, MW-J, and MW-213) and the 20 well points. Well point riser headspace TVH measurements were taken using a TVA-1000 PID/FID.

Ground-water samples were collected from the 8 monitoring wells and 16 well points. Each sample was analyzed onsite for ferrous iron and manganese using Hach field test kits. Samples from the monitoring wells and well points were sent to EA Laboratories and analyzed for BTEX and MTBE by EPA Method 602, TPH-GRO by MEDEP LOP 4.2.17, and TPH-DRO by MEDEP LOP 4.1.25.

Additional ground-water samples were collected from 18 of 20 well points and submitted to BioRenewal Technologies, Inc. of Madison, Wisconsin for biological and physicochemical analyses including: total heterotrophic bacteria and total hydrocarbon degrading bacteria quantification, sulfate by EPA Method 300, and nitrate by EPA Method 300. Kerosene was used as the substrate hydrocarbon during the degrader bacteria identification analyses since it was the most similar petroleum product to JP-5 available to the laboratory.

3.4.1 December 1996 Well Gauging Data

Field personnel gauged 8 monitoring wells and the 20 well points on 3 December 1996 (prior to ground-water sampling) to determine depth to water and note absence/presence of LNAPL. LNAPL was observed in WP-02 (0.03 ft), WP-04 (0.64 ft), and WP-07 (0.62 ft). LNAPL was not observed in any of the monitoring wells. The ground-water elevation ranged from 61.56 ft MSL in MW-49 to 72.80 ft MSL in MW-62. Table 3-1 provides a summary of Old Navy Fuel Farm gauging data for the reporting period.

Figure 3-7 provides the interpreted water table elevations for the 3 December 1996 gauging event. The overall ground-water flow direction observed during the 3 December 1996 gauging event, when the biosparging system was active, is similar to that observed during the August gauging event (prior to activation of the biosparging system). However, operation of the biosparging system appears to have caused minor fluctuations in water table elevations, most notably in the vicinity of the eastern leg of the biosparging system (i.e., AAS lines 8-12).

3.4.2 December 1996 Water Quality Indicator Parameter Data

Concurrent with the 3 December 1996 gauging event, field personnel measured baseline water quality indicator parameters (including temperature, pH, conductivity, dissolved oxygen, and Eh) at 16 well points and 8 monitoring wells using a Hydrolab Model H20®G multiparameter water quality meter. Water quality parameter data were not obtained from well points WP-02, WP-04, WP-07 due to the presence of LNAPL, and from WP-17 due to lack of sufficient ground water.

Ground-water pH ranged from 5.04 (WP-10) to 6.71 (WP-08) with an average value of 5.93. Temperature ranged from 4.75°C (WP-20) to 9.76°C (MW-54) with an average of 7.30°C. Dissolved oxygen ranged from 0.66 mg/L (WP-05) to 10.50 mg/L (WP-13) with an average of 4.09 mg/L. Conductivity ranged from 51.4 μhmos (MW-58) to 378 μhmos (WP-08) with an average of 155 μhmos. Redox ranged from 45 mV (WP-01) to 321 mV (WP-14) with an average of 241 mV. Table 3-2 provides a summary of Old Navy Fuel Farm water quality indicator parameter data for the reporting period.

3.4.3 December 1996 Well Point Riser Vapor Monitoring Data

TVH measurements were taken from the 20 well point risers on 5 December 1996 (approximately 4 months after biosparging system activation) to assess the effect of long-term subsurface air injection on the volatilization of hydrocarbons at the ground-water interface. Table 3-3 provides a summary of well point headspace monitoring data.

The PID response ranged from 0.0 ppm_v at 6 of 20 well points (WP-14, WP-15, WP-16, WP-17, WP-18, and WP-20) to 755 ppm_v (WP-07). The FID response ranged from 0.0 ppm_v at 6 of 20 well points (WP-13, WP-14, WP-15, WP-16, WP-18, and WP-20) to 188,000 ppm_v (WP-07). As indicated by the data, a significant discrepancy was observed between the PID and FID responses at some locations. It was previously confirmed, using a methane detector on 28 August and 3 September 1996, that the FID was responding to elevated concentrations of methane gas, which is not detected by the PID.

Applying the screening procedure discussed in Section 3.1.3 to the December 1996 well point headspace monitoring data, it is concluded that 10 of the 20 well points (WP-02 through WP-08 and WP-10 through WP-12) had TVH readings exceeding 10 ppm_v. It can also be inferred that 11 of the 20 well points (WP-10 through WP-08 and WP-10 through WP-12) had elevated methane concentrations.

3.4.4 December 1996 Microbial Sampling Results

During 4-5 December 1996, ground-water samples were collected from 18 of 20 well points and submitted to BioRenewal Technologies, Inc. of Madison, Wisconsin for microbial analysis. Microbial samples were not collected from well points WP-16 and WP-17 due to lack of available ground water. Microbial population density (both total heterotrophic micro-organisms and petroleum degrading micro-organisms) was expressed in CFU/mL. Results are summarized in Table 3-4.

The December 1996 (i.e., after approximately 4 months of active biosparging) total microbial populations ranged from 3.3×10^4 CFU/mL (WP-18) to 4.4×10^6 CFU/mL (WP-01) with an average of 1.143×10^6 CFU/mL. Degrader microbial populations ranged from 5.0×10^3 CFU/mL (WP-18) to 3.6×10^5 CFU/mL (WP-02) with an average of 6.8×10^4 CFU/mL. Table 3-4 provides a comparison of baseline and December 1996 microbial sampling results. As evident in the table, although the total heterotrophic microbial population increased from an average of 6.87×10^5 to 1.143×10^6 CFU/mL during this reporting period, the hydrocarbon degrading microbial population decreased from an average of 5.4×10^5 CFU/mL to 6.8×10^4 CFU/mL.

Total organic nitrogen concentrations ranged from 0.5 to 63.2 percent in samples collected on 4-5 December 1996, with an average of 12.2 percent. The December 1996 C:N ratios ranged from 1:1 to 44:1, with an average of 9.4:1. Only one December 1996 C:P ratio (well point

WP-15, 180:1) was reported by BioRenewal Technologies, Inc. Each average value of these parameters, with the exception of the C:N ratio, was above the minimal threshold for effective *in situ* biodegradation potential (total organic nitrogen ≥1.5 percent, C:N ratio between 10:1 and 100:1, C:P ratio between 100:1 and 200:1) given by the EPA (1995). The average C:N ratio was slightly (approximately 6 percent) below the threshold value. Sulfate concentrations ranged from 20 mg/L to 190 mg/L, with an average of 75.5 mg/L. Nitrate concentrations ranged from 3.3 mg/L to 11 mg/L, with an average of 6.4 mg/L. Table 3-5 provides a summary of the Old Navy Fuel Farm biodegradation parameter data.

3.4.5 December 1996 Ground-Water Sampling Results

A total of 24 ground-water samples were collected from 8 monitoring wells (MW-44, MW-49, MW-51, MW-54, MW-58, MW-62, MW-J, and MW-I) and 16 well points on 4-5 December 1996. Samples were not collected from well points WP-02, WP-04, and WP-07 due to the presence of LNAPL and from WP-17 due to lack of sufficient ground water. Samples from the monitoring wells and well points were sent to EA Laboratories and analyzed for BTEX and MTBE by EPA Method 602, TPH-GRO by MEDEP Method 4.2.17, and TPH-DRO by MEDEP LOP 4.1.25. Analytical results for the December 1996 ground-water sampling event are summarized in Table 3-8. Figures 3-8 through 3-11 provide interpreted concentration isopleths for total BTEX, MTBE, TPH-GRO, and TPH-DRO concentrations in ground water, respectively.

Total BTEX was reported in 18 of 24 ground-water samples at concentrations ranging from 1.0 μg/L (WP-09) to 16,320 μg/L (MW-J). Total BTEX was reported at a concentration greater than 100 μg/L in 4 of 24 samples: WP-05 (3,027 μg/L), WP-11 (269.6 μg/L), WP-12 (591.1 μg/L), and MW-J (16,320 μg/L). Benzene was reported in 3 of 24 samples. Toluene was reported in 10 of 24 samples. Ethylbenzene was reported in 8 of 20 samples. Total xylenes were the most frequently detected compounds, reported in 15 of 24 samples. Total BTEX was not detected in the equipment rinsate blanks or the trip blanks.

MTBE was detected in only 2 of 24 ground-water samples at concentrations of 8.7 μg/L (WP-05) and 120 μg/L (MW-J). MTBE was not detected in the equipment rinsate blanks or the trip blanks.

TPH-GRO was reported 20 of 24 ground-water samples at concentrations ranging from 11 μg/L (WP-16) to 30,000 μg/L (MW-J). Concentrations of TPH-GRO were reported above 1,000 μg/L in 6 of 24 wells: WP-01 (3,300 μg/L), WP-03 (4,100 μg/L), WP-05 (4,800 μg/L), WP-11 (3,400 μg/L), WP-19 (1,100 μg/L), and MW-J (30,000 μg/L). TPH-GRO was also detected in 1 of the equipment rinsate blanks at a concentration of 12 μg/L.

TPH-DRO was reported in 16 of 24 ground-water samples at concentrations ranging from 52 μg/L (MW-62) to 6,700 μg/L (MW-J). Concentrations of TPH-DRO were reported greater than 1,000 μg/L at only 2 locations: WP-13 (3,100 μg/L) and MW-J (6,700 μg/L). TPH-DRO was not detected in MW-51 or MW-58. TPH-DRO was not detected in the equipment rinsate blanks.

The reported concentrations of total BTEX, TPH-GRO, and TPH-DRO for the duplicate ground-water samples collected at WP-03 and MW-49 indicated general agreement with analytical results for the original samples, except for TPH-GRO in WP-03 which was reported at 4,100 μg/L for the original sample and at 160 μg/L in the duplicate sample.

Hach field test kits (colorimetric) were used for onsite analysis of ferrous iron and manganese concentrations in the ground-water samples from 16 of 20 well points. Samples were not collected from well points WP-02, WP-04, and WP-07 due to the presence of LNAPL. Insufficient ground water was available for sample collection in WP-17. Ferrous iron concentrations ranged from 0.05 mg/L in WP-20 to 12.0 mg/L in WP-1. Manganese concentrations ranged from non-detect in 3 well points (WP-15, WP-16, and WP-18) to 1.1 mg/L in WP-12. A summary of the ferrous iron and manganese data is provided in Table 3-6.

3.5 PRELIMINARY ASSESSMENT OF BIOSPARGING SYSTEM PERFORMANCE

Indicator parameters used to assess biosparging system performance during the reporting period include: total and petroleum degrading microbial population data, water quality parameters, dissolved nutrient and electron acceptor data, ground-water sampling results, and well point headspace vapor monitoring data. It should be noted that substantial changes in some or all (with the exception of dissolved oxygen) of the indicator parameters may be due to seasonal effects, since the baseline sampling program was conducted in August 1996 and the first operational sampling event was conducted in December 1996.

3.5.1 *In Situ* Biodegradation Conditions

After approximately 4 months of active biosparging, ground water within the Old Navy Fuel Farm remedial area appeared to be in a state of conversion from an anaerobic, highly reducing environment to aerobic conditions potentially supportive of *in situ* biodegradation of petroleum hydrocarbons by heterotrophic microorganisms. The capacity of the biosparging system for supplying oxygen to ground water within the remedial area was evidenced by significant increases in dissolved oxygen concentrations at 12 out of 15 well point locations. Insufficient data were collected (due to lack of ground water and/or the presence of LNAPL) to assess dissolved oxygen increases at well points WP-04, WP-07, WP-12, WP-16, and WP-17. Dissolved oxygen concentration isopleths for the baseline and December 1996 sampling events are provided in Figures 3-6 and 3-12, respectively. No increases in dissolved oxygen were observed at well points WP-05, WP-06, and WP-10. Significant increases in dissolved oxygen were observed at the remaining well points, especially in the central and western sections of the

remedial area (including well points WP-07, WP-08, WP-09, WP-13, WP-15, and WP-20, and monitoring well MW-J) where dissolved oxygen concentrations ranged from 5.1 mg/L to saturation. At 3 of these locations (WP-07, WP-08, and WP-13), bubbling ground water was observed within the well risers; although dry, positive air pressure was observed at WP-17, indicating active biosparging in this area.

Other water quality indicator parameter data which indicate that a conversion from anaerobic to aerobic conditions had been initiated were pH and redox potential. As discussed previously, the ground-water pH measured during the baseline sampling event at the Old Navy Fuel Farm remedial area was significantly lower than pH values typical (i.e., approximately 6.0-7.0) for other sites at NAS Brunswick. The average pH prior to activation of the biosparging system was 4.87; after approximately 4 months of biosparging, the average pH had risen to 5.93. The depressed pH conditions observed during pre-operational sampling may have resulted from acetate and long-chain fatty acid accumulation during methanogenesis (Naval Facilities Engineering Service Center 1996). Methanogenic bacteria cannot tolerate oxygen and would have been destroyed in areas which experienced significant increases in dissolved oxygen, thereby minimizing the pH-reducing effects of methanogenesis (Graudy and Graudy 1988). Increases in pH correlate to dissolved oxygen increases, especially at well points WP-08 and WP-13, which demonstrated very significant increases in both dissolved oxygen concentration and pH. Although not as significant, there also appears to be a correlation between increased dissolved oxygen and increased redox potential at well points which had previously exhibited very low redox potentials (WP-01, WP-02, WP-08, and WP-11). Increased redox potential is associated with conversion to aerobic microbial processes (Naval Facilities Engineering Service Center 1996). However, the range of redox potentials and average redox potential measured during the December 1996 sampling event (45-321 mV and 241 mV, respectively) was still below values typical in environments where aerobic biodegradation has been fully established (usually greater than 750 mV).

The reduction in methanogenic bacteria in areas which exhibited increases in dissolved oxygen was further evidenced at many locations by a corresponding decrease in well point riser headspace methane concentrations. As discussed previously, an FID calibrated to methane gas was used concurrently with a PID to analyze headspace vapor. Significant discrepancies between the FID and PID responses were confirmed to be due to methane. Based on these analyses, significant reductions in well point riser headspace methane concentrations were observed at 7 well points (WP-08, WP-10, WP-16, WP-17, WP-18, WP-19, and WP-20). Five of these well points (WP-08, WP-15, WP-16, WP-18, and WP-19) were observed to have corresponding increases in dissolved oxygen concentration. Insufficient ground water was present in WP-17 to monitor dissolved oxygen trends; however, positive air pressure was detected at this location, indicating that nearby ground-water aeration was likely. No increase in dissolved oxygen was detected at WP-10. Apparent increases in headspace methane concentrations were observed at well points WP-03, WP-05, and WP-06. Although a slight increase in dissolved oxygen was detected at WP-03, well points WP-05 and WP-06 appear to have remained anaerobic throughout the reporting period. No apparent change in methane

concentrations was observed at 6 of the 20 well points (WP-01, WP-02, WP-04, WP-07, WP-11, and WP-12). Since installed, methane has not been observed at well points WP-09, WP-13, WP-14, and WP-20.

December 1996 electron acceptor analyses are also indicative of a conversion to an aerobic microbial environment. Both nitrate and sulfate concentrations have increased throughout the reporting period. The average nitrate concentration measured during the baseline sampling event was 3.02 mg/L and more than doubled to 6.40 mg/L by the December 1996 sampling event. The average sulfate concentration also appears to have doubled, from 37.2 mg/L to 75.5 mg/L. As discussed previously, nitrate and sulfate can serve as alternate electron acceptors to oxygen only under strictly anaerobic conditions (i.e., dissolved oxygen less than 0.5 mg/L). Therefore, microbial reduction of dissolved-phase nitrate and sulfate ceases as aerobic conditions are established. This would be evidenced by increases in both nitrate and sulfate corresponding to the aquifer's natural recharge rate for both analytes, which may explain the increases observed during the reporting period. Although nitrate concentration increases did not appear to be directly correlated to increased dissolved oxygen, a correlation was observed between sulfate concentration changes and aeration. Only 3 of 18 well point ground-water samples (WP-02, WP-05, and WP-10) were observed to have decreased sulfate concentrations throughout the reporting period. Of these locations, 2 of 3 (WP-03 and WP-10) remained anaerobic and one (WP-02) appears to have had only background dissolved oxygen availability (i.e., less than 3.0 mg/L). All other locations exhibited increases in sulfate concentrations. It should be noted that although these changes may be associated with increased aerobic conditions, they may also be due, in part or whole, to seasonal effects.

Manganese and ferric iron (Fe^{+3}) can also be used as alternate electron acceptors to oxygen under anaerobic conditions. Increases in the concentrations of manganese and/or ferric iron may be indicative of aquifer recharge based accumulation associated with conversion from anaerobic to aerobic microbial activity. The manganese concentrations do not appear to have changed significantly, and were not very significant in either the baseline or December 1996 sampling events. 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 crystallalinity. 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 (Naval Facilities Engineering Service Center 1996). Alternately, if ferrous iron concentrations are depleted, it can be inferred that dilution may be taking place in the absence of continued ferrous iron production associated with anaerobic conditions.

Out of 12 well points for which ferrous iron concentrations were quantified during the baseline and December 1996 sampling events, 6 locations exhibited decreases in ferrous iron concentration. Each of these locations also exhibited significant increases in dissolved oxygen concentrations. Two locations, WP-08 and WP-13, in which active sparging was observed and very large increases in dissolved oxygen concentration were documented, also exhibited the largest decrease in ferrous iron concentration. Of the remaining 6 well points, 2 locations

(WP-01 and WP-19) exhibited slight increases in ferrous iron concentrations and 4 locations (WP-05, WP-06, WP-10, and WP-14) exhibited relatively stable ferrous iron concentrations. WP-01 exhibited only a slight increase in dissolved oxygen. Based on ground-water data collected at well points WP-05, WP-06, and WP-10, in which no reductions in ferrous iron concentration were observed, the subsurface environment appeared to remain anaerobic throughout the reporting period. As stated previously, it should be noted that these changes may be due, in part or whole, to seasonal effects.

Microbial quantification data obtained during the baseline and December 1996 sampling events indicate that the increase in dissolved oxygen resulting from active biosparging has increased the overall microbial population by approximately 40 percent, to an average of 1.143×10^6 CFU/mL. This increase is especially noteworthy since seasonal decreases in ground-water temperature between the baseline and December 1996 sampling events would have otherwise been expected to reduce the microbial population. However, the total petroleum (i.e., kerosene or JP-5) degrading microbial population had apparently decreased to an average of 6.77×10^5 CFU/mL. This decrease may be due to a number of influences, which may include: a more favorable response to temperature and/or seasonal factors by the non-degrader portion of the microbial population, utilization of non-petroleum based substrate(s) accumulated during long-term anaerobic conditions, and/or sampling/laboratory conditions. Although data from the December 1996 sampling event indicate a decrease in the known petroleum degrading microbes, the increase in the total microbial population indicates that the biosparging system is effectively supporting conditions necessary for aerobic *in situ* biodegradation. Due to limited microbial data, the severe temperature reduction between sampling events (i.e., average ground-water temperature decreased from 16.59°C to 7.30°C), and other potential influences discussed above, a complete assessment of microbial response to biosparging activity cannot be offered at this time.

Based on water quality parameter indicator data, and nutrient and electron acceptor data collected during the December 1996 sampling event, most environmental conditions required for successful aerobic biodegradation are in place at the Old Navy Fuel Farm. Ground-water dissolved oxygen concentrations throughout the majority of the remedial area have been increased to acceptable levels (i.e., greater than 2.0 mg/L) for aerobic metabolism. It is recommended that enhanced air injection should be established in the area of well points WP-05, WP-06, and WP-10 by altering the AAS compressor configuration and adjusting air injection control valves within the western AAS service vaults. These modifications should result in aerobic conditions throughout the targeted remedial area.

The pH of the ground water has increased to minimal threshold levels for aerobic metabolism. It is expected that the pH will continue to approach neutrality as the conversion from anaerobic to aerobic conditions is completed. Similarly, the redox potential of site ground water is expected to increase as aerobic processes are fully established. The average total organic nitrogen concentration (12.2 percent) and average C:P ratio (180:1) are within acceptable ranges to sustain aerobic biodegradation of petroleum hydrocarbons. The C:N ratio is slightly (less than

10 percent) below the minimal threshold value to sustain aerobic biodegradation of petroleum hydrocarbons. The current ground-water temperature may contribute to inhibition of effective bioremediation, however, this is a seasonal attribute. It is expected that as the ground-water temperature increases and dissolved oxygen continues to be made available as the primary electron acceptor, sustained aerobic degradation of petroleum constituents will occur at the Old Navy Fuel Farm.

3.5.2 Preliminary Assessment of Dissolved-Phase Hydrocarbon Removal

Analytical data collected during baseline and December 1996 ground-water sampling events at the Old Navy Fuel Farm indicate that notable reductions in the dissolved-phase BTEX, MTBE, TPH-GRO, and TPH-DRO concentrations have occurred during the reporting period. Tables 3-6 and 3-9 provide a summary of analytical results for the baseline and December 1996 sampling events, respectively. Concentration isopleths are provided in Figures 3-2 through 3-5 and 3-8 through 3-11.

As indicated by the data, total BTEX concentrations decreased at 11 out 14 well points (WP-01, WP-03, WP-08, WP-09, WP-10, WP-11, WP-13, WP-14, WP-15, WP-18, and WP-20) and at both monitoring wells (MW-44 and MW-51) for which baseline and December 1996 samples were collected. Insufficient ground water was available for sample collection at well points WP-12, WP-16, and WP-17. December 1996 samples were not collected at well points WP-02, WP-04, and WP-07 due to the presence of LNAPL. Of the 11 well points in which total BTEX concentration reductions were observed, 9 also exhibited evidence of active biosparging. WP-01 and WP-10, which also reported decreases in total BTEX concentrations, were not affected by the biosparging system. Three sample locations (WP-05, WP-06, and WP-18) did not exhibit significant total BTEX concentration reductions. Of these, the ground water in the area of WP-05 and WP-06 remained anaerobic throughout the reporting period, and WP-18 exhibited only slight increases in dissolved oxygen.

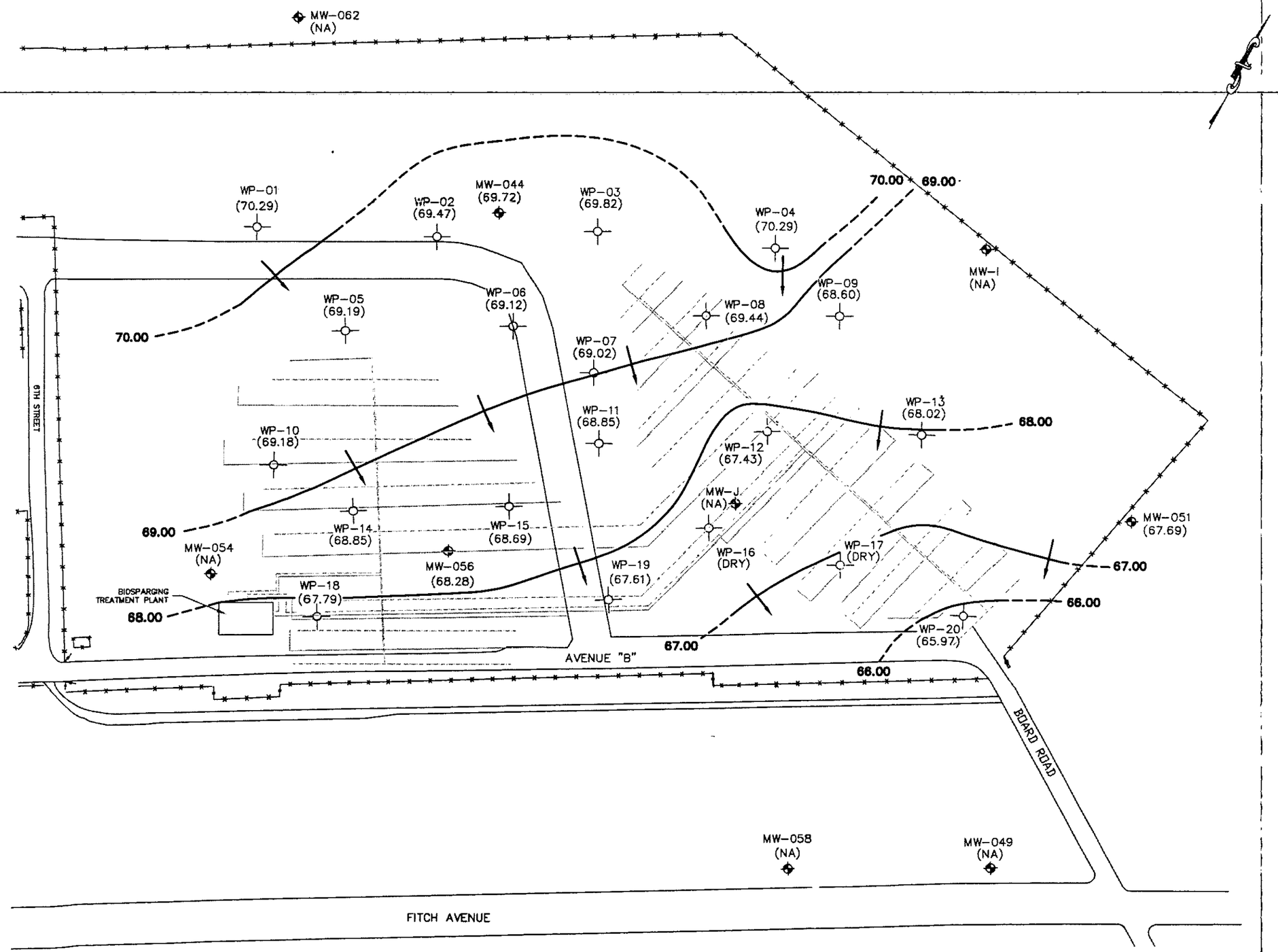
Decreased concentrations of MTBE were also indicated by the analytical data. MTBE concentrations decreased at 12 out of 14 well points and at monitoring well MW-51 during the reporting period. MTBE was not reported at well point WP-18 and monitoring well MW-44. The only location for which significant MTBE reduction was not observed was well point WP-05, which remained anaerobic throughout the reporting period.

TPH-GRO concentrations did not appear to have been affected by biosparging system operation. TPH-GRO decreased at 6 out of 16 sample locations (WP-05, WP-10, WP-13, WP-15, WP-20, and monitoring well MW-51) but increased at 5 locations (WP-01, WP-03, WP-09, WP-19, and monitoring well MW-44). Significant changes in TPH-GRO concentrations were not observed at well points WP-06, WP-08, WP-11, WP-14, and WP-18.

TPH-DRO concentrations generally decreased during the reporting period but did not appear to be attributable to biosparging activity. TPH-DRO decreased at 8 out of 14 well points (WP-05, WP-06, WP-08, WP-09, WP-10, WP-11, WP-15, and WP-18) and increased at well point WP-13 and monitoring well MW-44. Significant changes in TPH-DRO concentrations were not observed at well points WP-01, WP-03, WP-14, WP-19, and WP-20. TPH-DRO was not observed in well MW-51 during either sampling event.

The apparent reduction in dissolved-phase hydrocarbon concentrations is most likely attributable to a combination of volatilization and increased *in situ* biodegradation, both resulting from operation of the Old Navy Fuel Farm biosparging system. Although existing data are not sufficient to directly quantify the fraction of hydrocarbon reduction attributable to volatilization versus biodegradation, estimations can be made for specific compounds based on chemical-specific vapor pressure and biodegradability. MTBE, for which the most significant concentration reduction was observed, is the most volatile analyte included in the sampling program and is resistant to biodegradation. Therefore, the reduction in MTBE is most likely attributable to volatilization. Similarly, although concentration reductions were evident for each of the BTEX constituents, the fraction of samples in which reductions were observed was higher for the more volatile constituents (benzene and toluene) than the less volatile constituents (ethylbenzene and total xylenes) even though ethylbenzene and total xylenes are generally considered to be as amenable, if not more, to biodegradation as benzene or toluene. Again, the reduction in BTEX concentrations appears to be more attributable to volatilization than biodegradation. However, *in situ* biodegradation may also have contributed to the reduction in dissolved-phase hydrocarbons observed during the reporting period.

Although volatilization is effective for removal of the more volatile compounds present at the Old Navy Fuel Farm, less volatile compounds will likely persist without effective *in situ* biodegradation. It is expected that as the ambient temperature increases and the conversion to aerobic microbial conditions is completed, these compounds and the remaining volatile constituents will undergo sustained aerobic biodegradation.



LEGEND

MW-044 (69.72) — MONITORING WELL LOCATION
WATER TABLE ELEVATION (FT, MSL)
DRY = WELL DRY DURING GAUGING EVENT
NA = DATA NOT AVAILABLE

WP-01 (70.29) — WELL POINT LOCATION
WATER TABLE ELEVATION (FT, MSL)
DRY = WELL DRY DURING GAUGING EVENT
NA = DATA NOT AVAILABLE

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 = 1.0 FT

NOTE:
1. BIOSPARGING SYSTEM WAS NOT IN OPERATION DURING 8 AUGUST 1996 GAUGING EVENT.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFWTABLE.DWG

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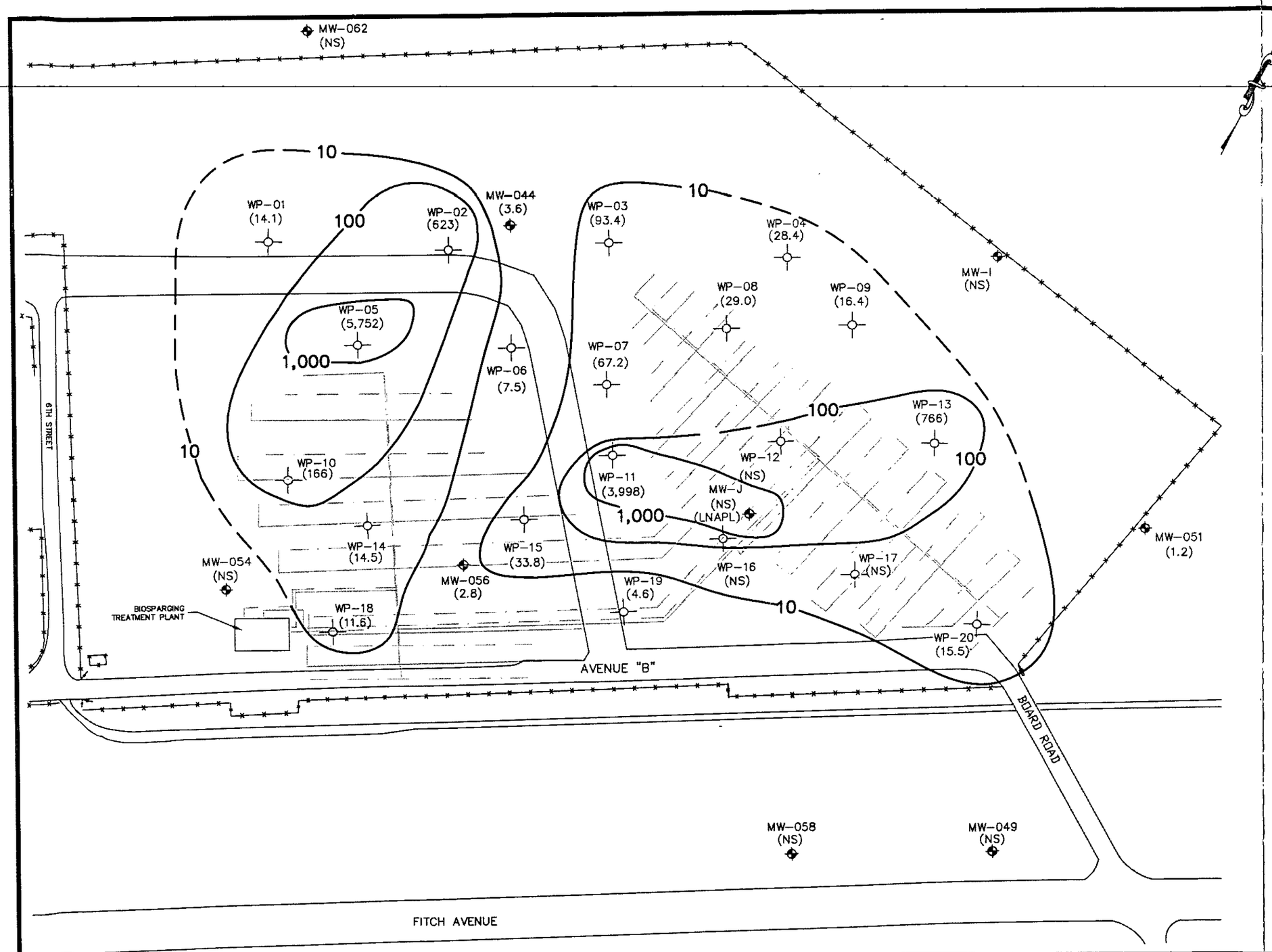
NAVAL AIR STATION BRUNSWICK, MAINE

FIGURE 3-1
INTERPRETED GROUND-WATER ELEVATION CONTOUR MAP
BASED ON DATA COLLECTED 8 AUGUST 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
PLN	SY	02/20/97	29600.35	FFWTABLE
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (3.6) — MONITORING WELL LOCATION DISSOLVED-PHASE BTEX CONCENTRATION, ug/L NS = LOCATION NOT SAMPLED

WP-01 (14.1) — WELL POINT LOCATION DISSOLVED-PHASE BTEX CONCENTRATION, ug/L NS = LOCATION NOT SAMPLED

CHAIN LINK FENCE

SOIL VAPOR EXTRACTION LINE

AIR SPARGING LINE

10 — INTERPRETED GROUND-WATER DISSOLVED-PHASE BTEX CONCENTRATION ISOPLETH (DASHED WHERE INFERRED)

BTEX INTERPRETED ISOPLETH INTERVAL

10 ug/L
100 ug/L
1,000 ug/L

NOTE:
1. LOCATIONS NOT SAMPLED DUE TO PRESENCE OF LNAPL ASSUMED TO CORRESPOND TO AREAS WITH BTEX CONCENTRATION >1,000 ug/L.
2. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFAUG.DWG

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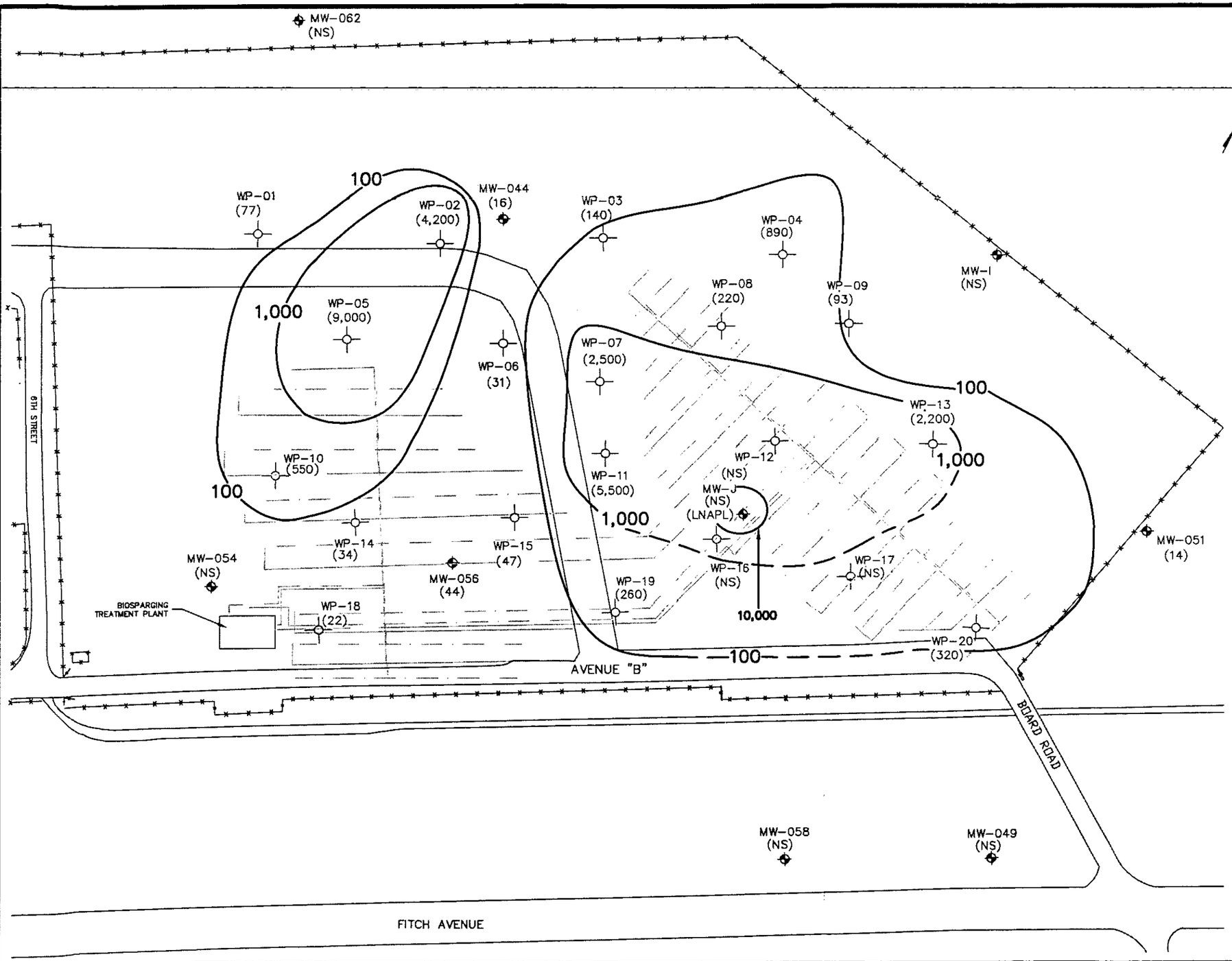
OLD NAVY FUEL FARM BIOSPARGING SYSTEM
NAVAL AIR STATION, BRUNSWICK, MAINE

FIGURE 3-2
INTERPRETED DISSOLVED-PHASE BTEX CONCENTRATION ISOPLETH MAP, GROUND-WATER SAMPLES COLLECTED 7-8 AUGUST 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
SY	SY	02/21/97	29600.35	FFAUG.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (16)	MONITORING WELL LOCATION DISSOLVED-PHASE TPH-GRO CONCENTRATION, ug/L NS = LOCATION NOT SAMPLED
WP-01 (77)	WELL POINT LOCATION DISSOLVED-PHASE TPH-GRO CONCENTRATION, ug/L NS = LOCATION NOT SAMPLED
	CHAIN LINK FENCE
	SOIL VAPOR EXTRACTION LINE
	AIR SPARGING LINE
100	INTERPRETED GROUND-WATER DISSOVED-PHASE TPH-GRO CONCENTRATION ISOPLETH (DASHED WHERE INFERRED)

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

100 ug/L
1,000 ug/L
10,000 ug/L

NOTE:
1. LOCATIONS NOT SAMPLED DUE TO PRESENCE OF LNAPL ASSUMED TO CORRESPOND TO AREAS WITH TPH-GRO CONCENTRATION >1,000 ug/L.
2. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFAUG.DWG

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OLD NAVY FUEL FARM BIOSPARGING SYSTEM
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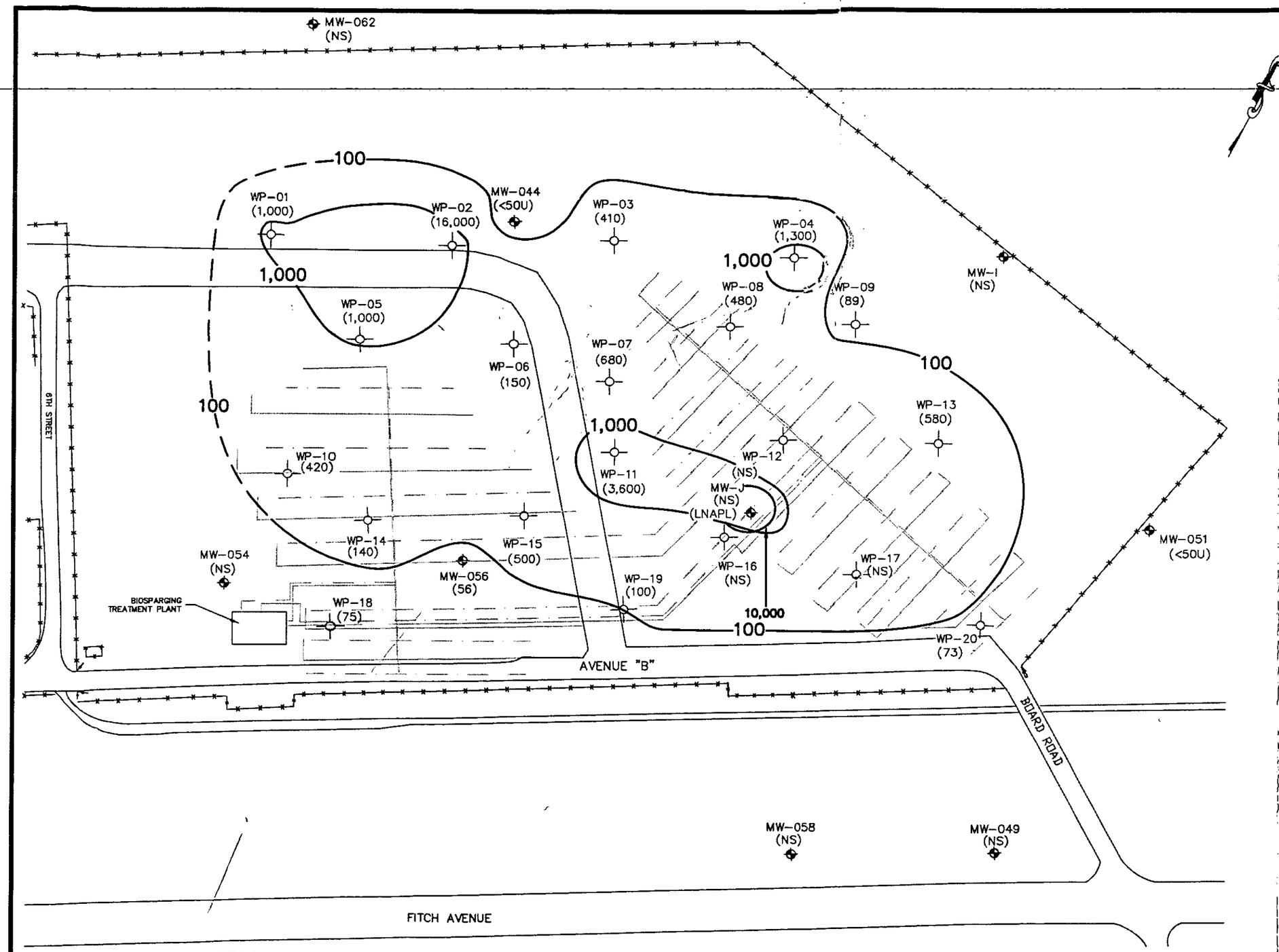
FIGURE 3-4
INTERPRETED DISSOLVED-PHASE TPH-GRO CONCENTRATION ISOPLETH MAP, GROUND-WATER SAMPLES COLLECTED 7-8 AUGUST 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
SY	SY	02/21/97	29600.35	FFAUG.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (<50U)	MONITORING WELL LOCATION DISSOLVED-PHASE TPH-DRO CONCENTRATION, ug/L NS = LOCATION NOT SAMPLED <50U = NOT DETECTED >50 ug/L
WP-01 (1,000)	WELL POINT LOCATION DISSOLVED-PHASE TPH-DRO CONCENTRATION, ug/L NS = LOCATION NOT SAMPLED
	CHAIN LINK FENCE
	SOIL VAPOR EXTRACTION LINE
	AIR SPARGING LINE
100	INTERPRETED GROUND-WATER DISSOVED-PHASE TPH-DRO CONCENTRATION ISOPLETH (DASHED WHERE INFERRED)

TPH AS DIESEL RANGE ORGANICS (TPH-DRO) ISOPLETH INTERVAL

100 ug/L
1,000 ug/L

NOTE:
1. LOCATIONS NOT SAMPLED DUE TO PRESENCE OF LNAPL ASSUMED TO CORRESPOND TO AREAS WITH DISSOLVED-PHASE TPH-DRO CONCENTRATION >1,000 ug/L.
2. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFAUG.DWG

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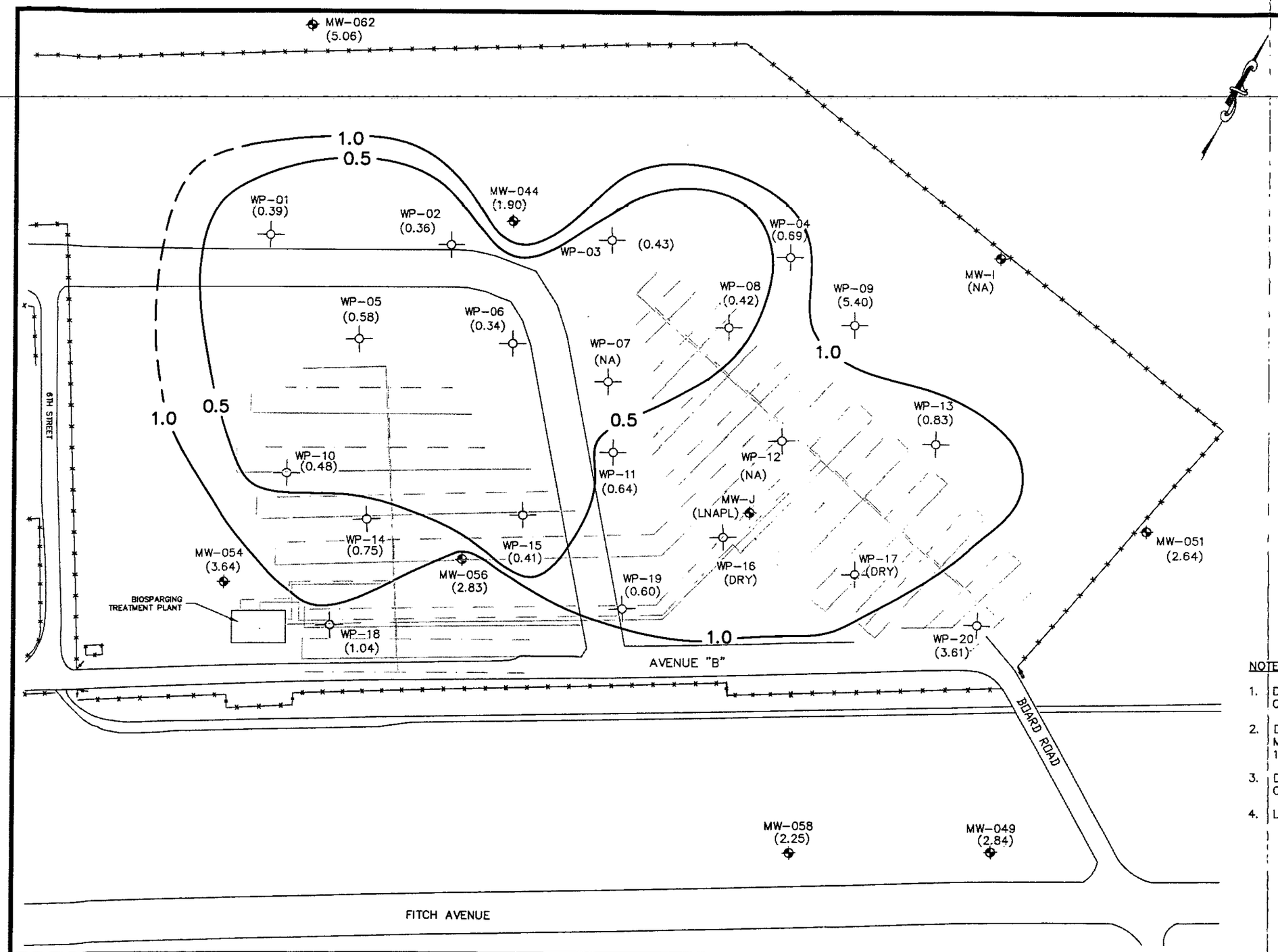
OLD NAVY FUEL FARM BIOSPARGING SYSTEM
NAVAL AIR STATION, BRUNSWICK, MAINE

FIGURE 3-5
INTERPRETED DISSOLVED-PHASE TPH-DRO CONCENTRATION ISOPLETH MAP, SAMPLES COLLECTED 7-8 AUGUST 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
SY	SY	02/21/97	29600.35	FFAUG.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (1.90)	MONITORING WELL LOCATION (DISSOLVED OXYGEN CONCENTRATION, mg/L) NA = DATA NOT AVAILABLE
WP-01 (0.39)	WELL POINT LOCATION (DISSOLVED OXYGEN CONCENTRATION, mg/L) NA = DATA NOT AVAILABLE DRY = WELL POINT DRY
	CHAIN LINK FENCE
	SOIL VAPOR EXTRACTION LINE
	AIR SPARGING LINE
1.0	INTERPRETED GROUND-WATER DISSOLVED OXYGEN ISOPLETH (DASHED WHERE INFERRED)

NOTE:

1. DISSOLVED OXYGEN ISOPLETHS DRAWN FROM LOW TO HIGH CONCENTRATIONS TO INDICATE ANAEROBIC AREAS.
2. DISSOLVED OXYGEN DATA FOR MONITORING WELLS MW-049, MW-54, MW-56, MW-58, AND MW-62 OBTAINED FROM 10 JUNE 1996 GROUND-WATER SAMPLING EVENT.
3. DISSOLVED OXYGEN DATA FOR WELL POINT WP-01 OBTAINED FROM 14 AUGUST 1996 SAMPLING EVENT.
4. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFNEW.DWG

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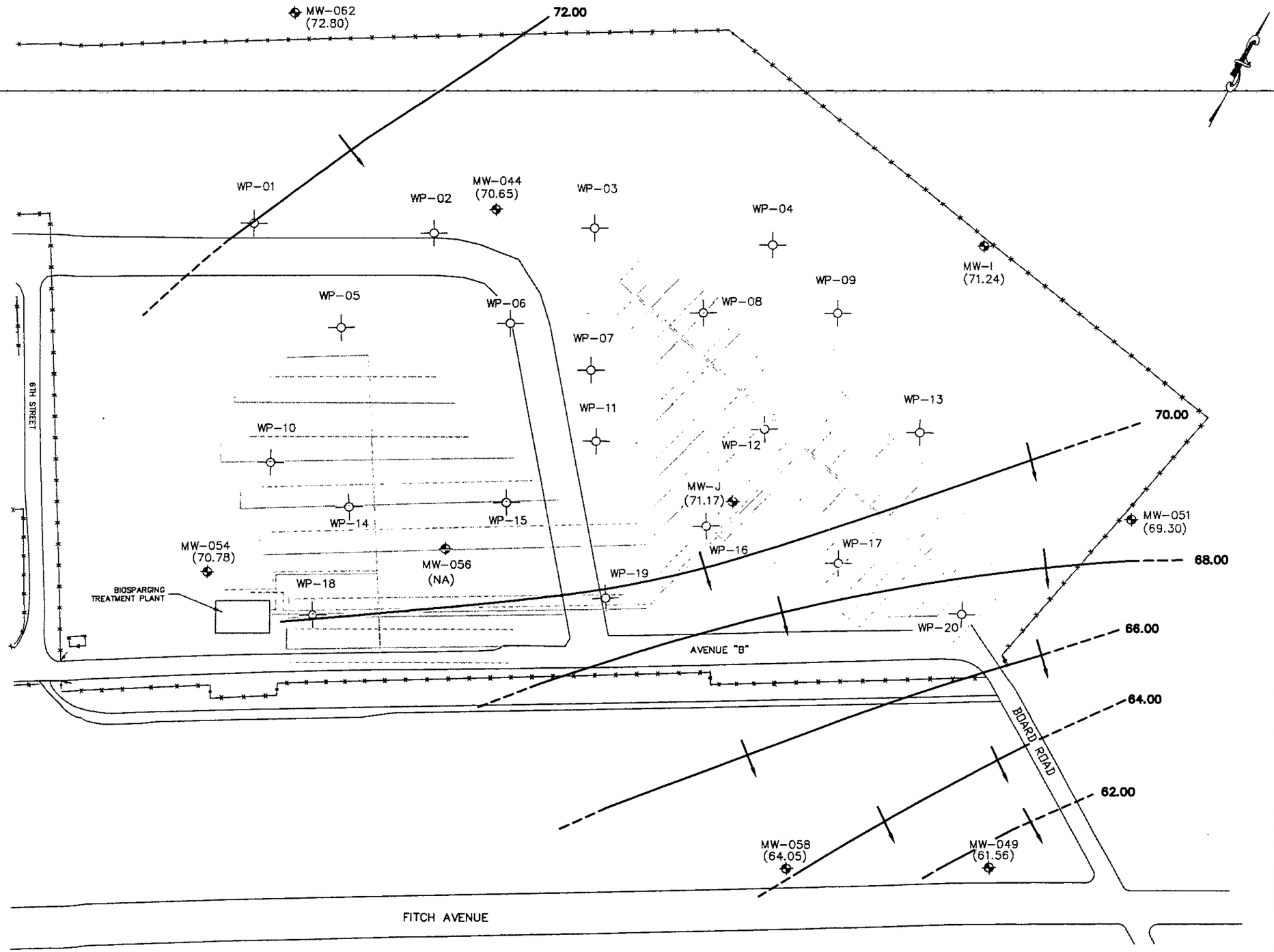
OLD NAVY FUEL FARM BIOSPARGING SYSTEM
NAVAL AIR STATION, BRUNSWICK, MAINE

FIGURE 3-6
GROUND-WATER DISSOLVED OXYGEN ISOPLETH MAP, 8 AUGUST 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
SY	SY	02/20/97	29600.35	FFNEW.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (70.65)	MONITORING WELL LOCATION WATER TABLE ELEVATION (FT, MSL) DRY = WELL DRY DURING GAUGING EVENT NA = DATA NOT AVAILABLE
WP-01	WELL POINT LOCATION
	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 ACTIVE DURING 3 DECEMBER 1996 GAUGING EVENT.
2. WELL POINT WATER TABLE ELEVATION DATA NOT SHOWN DUE TO INFLUENCES ASSOCIATED WITH ACTIVE BIOSPARGING.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFWTBLE2.DWG

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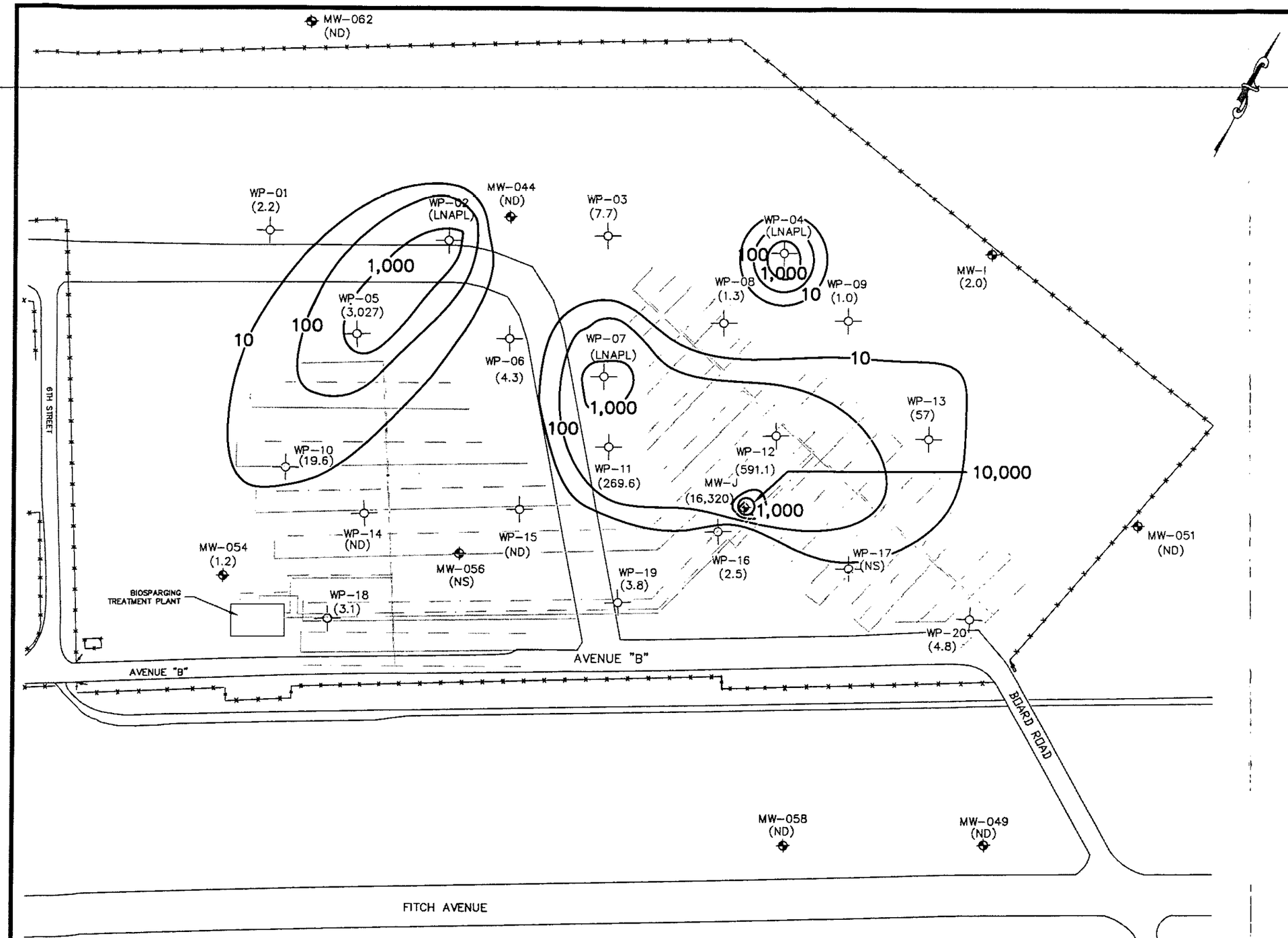
OLD NAVY FUEL FARM BIOSPARGING SYSTEM
NAVAL AIR STATION BRUNSWICK, MAINE

FIGURE 3-7
INTERPRETED GROUND-WATER ELEVATION CONTOUR MAP
BASED ON DATA COLLECTED 3 DECEMBER 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
PLN	SY	02/20/97	29600.35	FFWTBLE2.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (ND)	MONITORING WELL LOCATION DISSOLVED-PHASE BTEX CONCENTRATION, ug/L NS = LOCATION NOT SAMPLED ND = NOT DETECTED
WP-01 (2.2)	WELL POINT LOCATION DISSOLVED-PHASE BTEX CONCENTRATION, ug/L NS = LOCATION NOT SAMPLED ND = NOT DETECTED
	CHAIN LINK FENCE
	SOIL VAPOR EXTRACTION LINE
	AIR SPARGING LINE
10	INTERPRETED GROUND-WATER DISSOLVED-PHASE BTEX CONCENTRATION ISOPLETH (DASHED WHERE INFERED)

BTEX INTERPRETED ISOPLETH INTERVAL

10 ug/L
100 ug/L
1,000 ug/L
10,000 ug/L

NOTE:
1. LOCATIONS NOT SAMPLED DUE TO PRESENCE OF LNAPL ASSUMED TO CORRESPOND TO AREAS WITH BTEX CONCENTRATION >1,000 ug/L.
2. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFAUG.DWG

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OLD NAVY FUEL FARM BIOSPARGING SYSTEM
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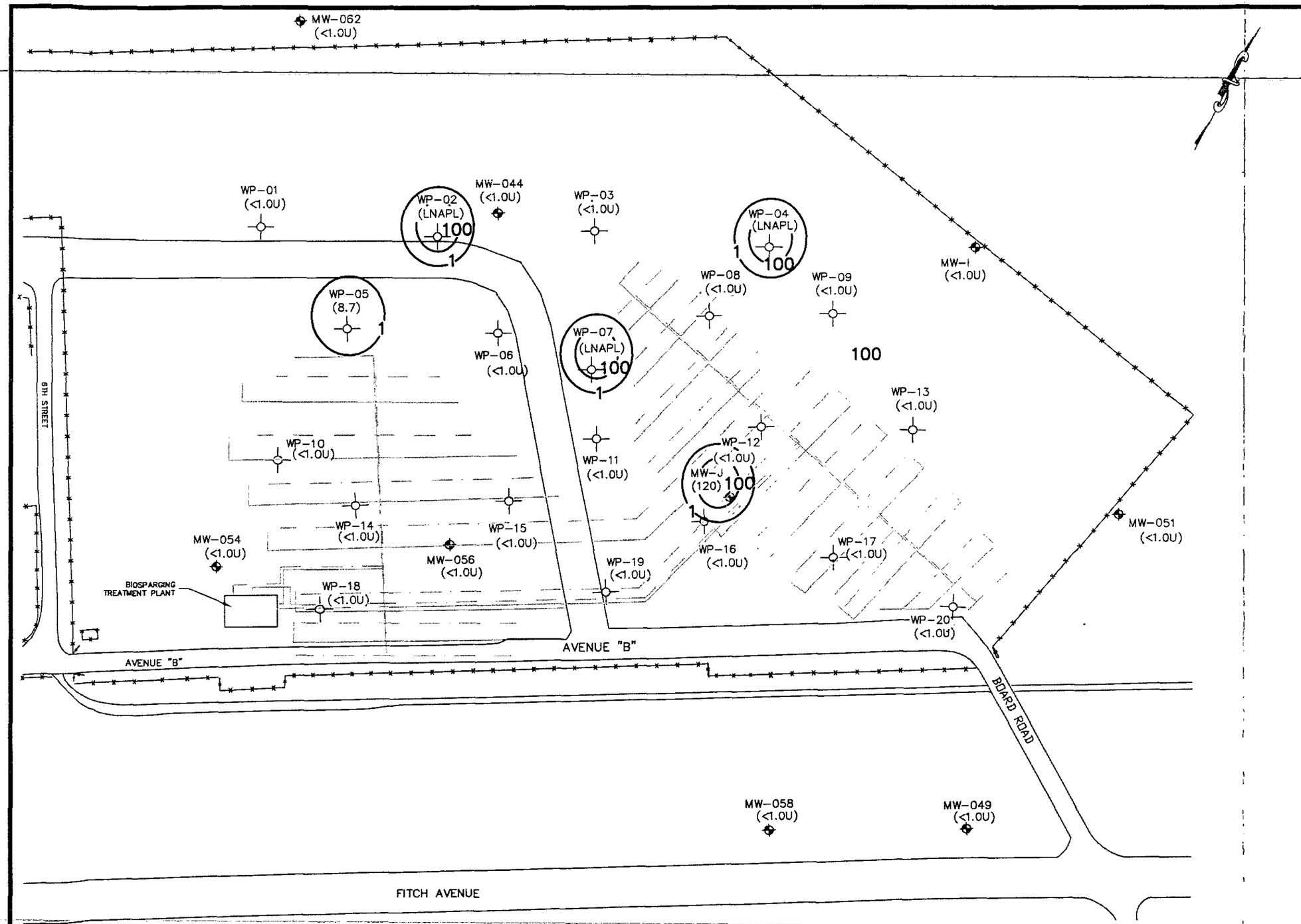
FIGURE 3-8
INTERPRETED DISSOLVED-PHASE BTEX CONCENTRATION ISOPLETH MAP, GROUND-WATER SAMPLES COLLECTED 4-5 DECEMBER 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
SY	SY	02/21/97	29600.35	FFAUG.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (<1.0U) — MONITORING WELL LOCATION
DISSOLVED-PHASE MTBE CONCENTRATION, ug/L
NS = LOCATION NOT SAMPLED
ND = NOT DETECTED
<1.0U = NOT DETECTED >1.0 ug/L

WP-01 (<1.0U) — WELL POINT LOCATION
DISSOLVED-PHASE MTBE CONCENTRATION, ug/L
NS = LOCATION NOT SAMPLED
ND = NOT DETECTED
<1.0U = NOT DETECTED >1.0 ug/L

CHAIN LINK FENCE

SOIL VAPOR EXTRACTION LINE

AIR SPARGING LINE

10 — INTERPRETED GROUND-WATER DISSOVED-PHASE MTBE CONCENTRATION ISOPLETH (DASHED WHERE INFERRED)

MTBE INTERPRETED CONTOUR INTERVAL

1 ug/L
100 ug/L

NOTE:
1. LOCATIONS NOT SAMPLED DUE TO PRESENCE OF LNAPL ASSUMED TO CORRESPOND TO AREAS WITH DISSOVED-PHASE MTBE CONCENTRATION >100 ug/L.
2. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFAUG.DWG

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OLD NAVY FUEL FARM BIOSPARGING SYSTEM
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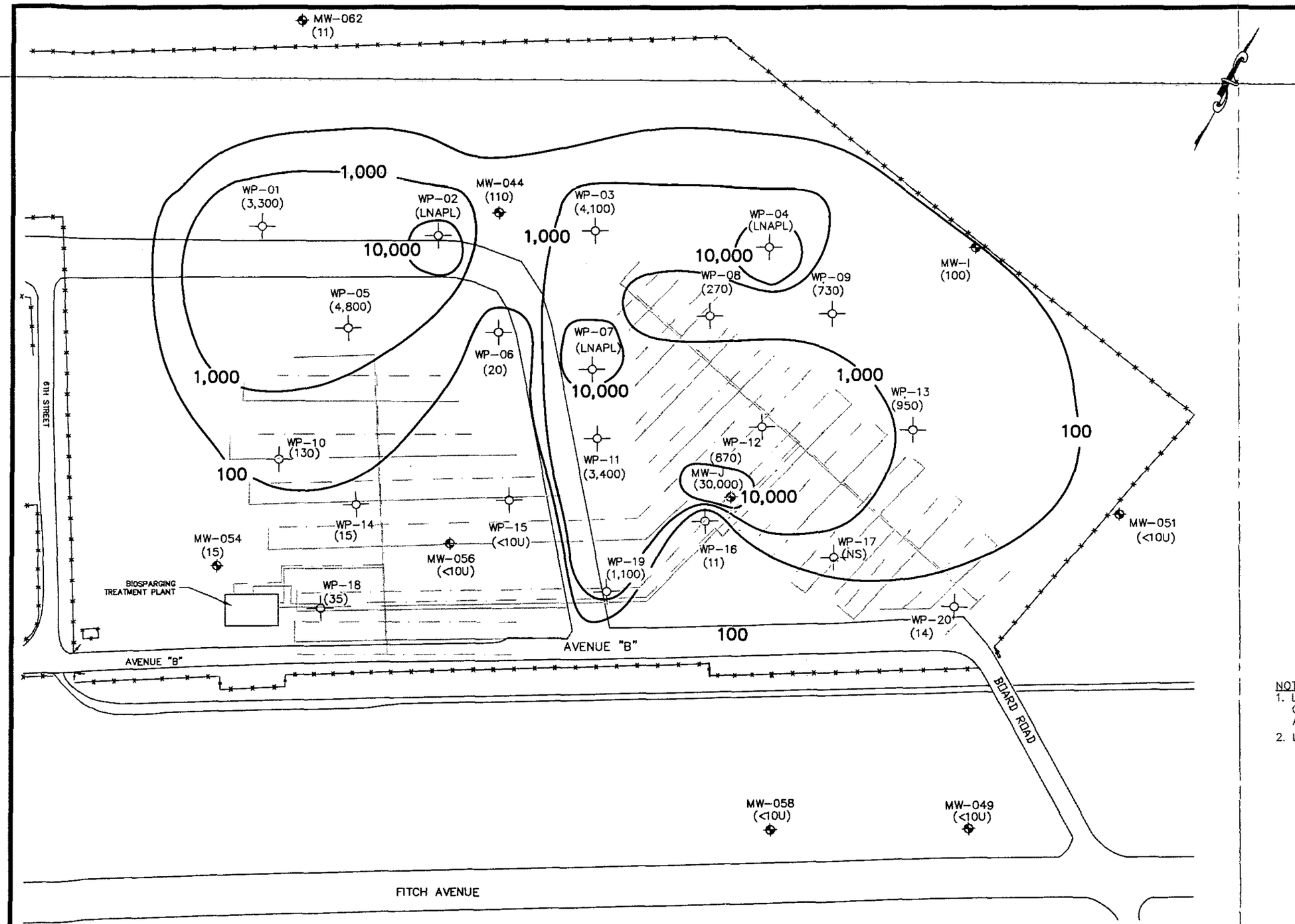
FIGURE 3-9
INTERPRETED DISSOLVED-PHASE MTBE CONCENTRATION ISOPLETH MAP, GROUND-WATER SAMPLES COLLECTED 4-5 DECEMBER 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
SY	SY	02/21/97	29600.35	FFAUG.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (110) — MONITORING WELL LOCATION
DISSOLVED-PHASE TPH-GRO CONCENTRATION, ug/L
NS = LOCATION NOT SAMPLED
ND = NOT DETECTED
<10U = NOT DETECTED >10 ug/L

WP-01 (3,300) — WELL POINT LOCATION
DISSOLVED-PHASE TPH-GRO CONCENTRATION, ug/L
NS = LOCATION NOT SAMPLED
ND = NOT DETECTED
<10U = NOT DETECTED >10 ug/L

CHAIN LINK FENCE

SOIL VAPOR EXTRACTION LINE

AIR SPARGING LINE

100 — INTERPRETED GROUND-WATER DISSOVED-PHASE TPH-GRO CONCENTRATION ISOPLETH (DASHED WHERE INFERRED)

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

100 ug/L
1,000 ug/L
10,000 ug/L

NOTE:
1. LOCATIONS NOT SAMPLED DUE TO PRESENCE OF LNAPL ASSUMED TO CORRESPOND TO AREAS WITH TPH-GRO CONCENTRATION >10,000 ug/L.
2. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFAUG.DWG

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OLD NAVY FUEL FARM BIOSPARGING SYSTEM
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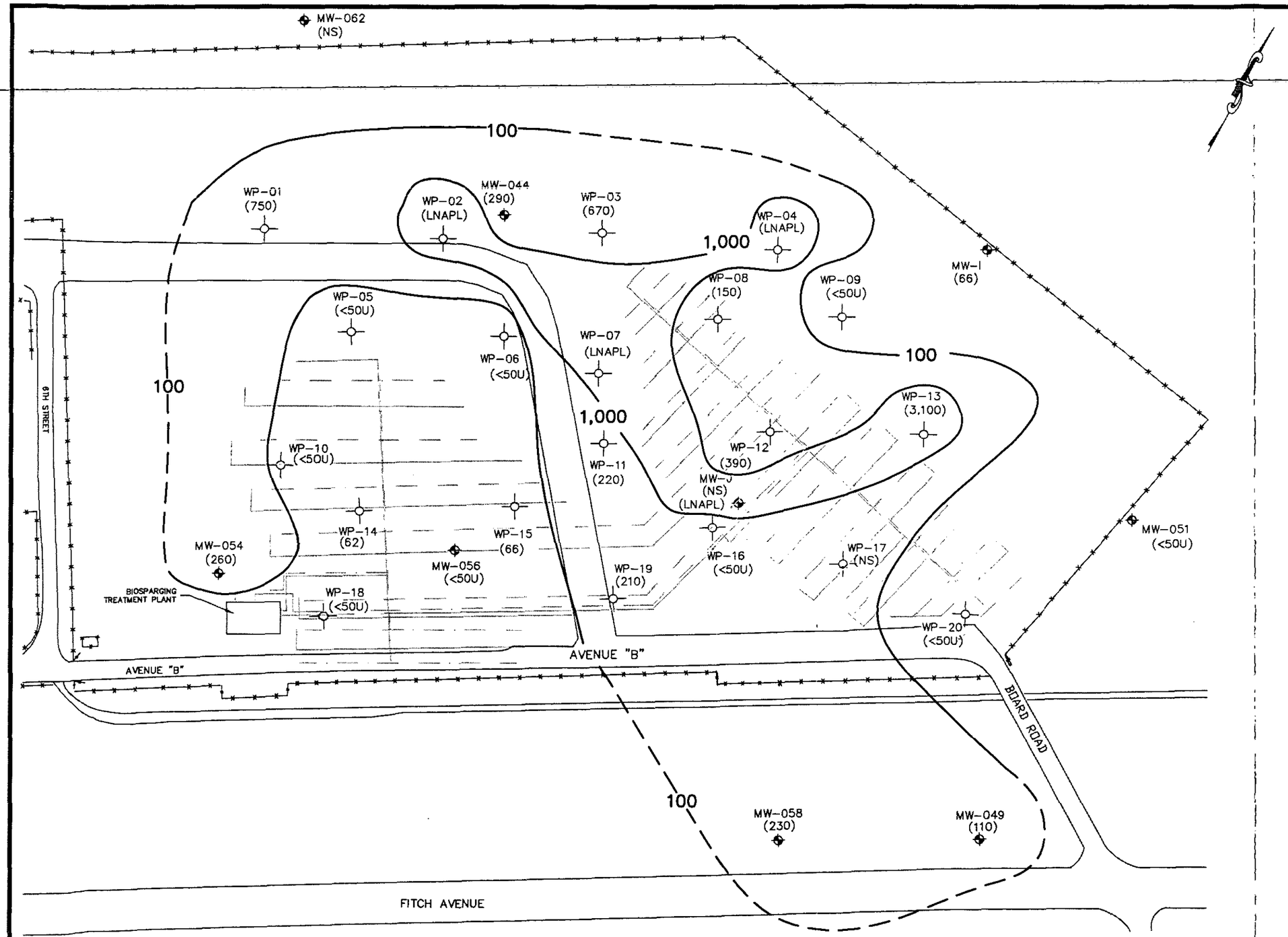
FIGURE 3-10
INTERPRETED DISSOLVED-PHASE TPH-GRO CONCENTRATION ISOPLETH MAP, GROUND-WATER SAMPLES COLLECTED 4-5 DECEMBER 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
SY	SY	02/21/97	29600.35	FFAUG.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (<50U) — MONITORING WELL LOCATION
~~DISSOLVED-PHASE TPH-DRO~~
CONCENTRATION, ug/L
NS = LOCATION NOT SAMPLED
ND = NOT DETECTED
<50U = NOT DETECTED >50 ug/L

WP-01 (1,000) — WELL POINT LOCATION
DISSOLVED-PHASE TPH-DRO
CONCENTRATION, ug/L
NS = LOCATION NOT SAMPLED
ND = NOT DETECTED
<50U = NOT DETECTED >50 ug/L

CHAIN LINK FENCE

SOIL VAPOR EXTRACTION LINE

AIR SPARGING LINE

100 — INTERPRETED GROUND-WATER DISSOLVED-PHASE TPH-DRO CONCENTRATION ISOPLETH (DASHED WHERE INFERRED)

TPH AS DIESEL RANGE ORGANICS (TPH-DRO) ISOPLETH INTERVAL

100 ug/L
1,000 ug/L

NOTE:
1. LOCATIONS NOT SAMPLED DUE TO PRESENCE OF LNAPL ASSUMED TO CORRESPOND TO AREAS WITH DISSOLVED-PHASE TPH-DRO CONCENTRATION >1,000 ug/L.
2. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFAUG.DWG

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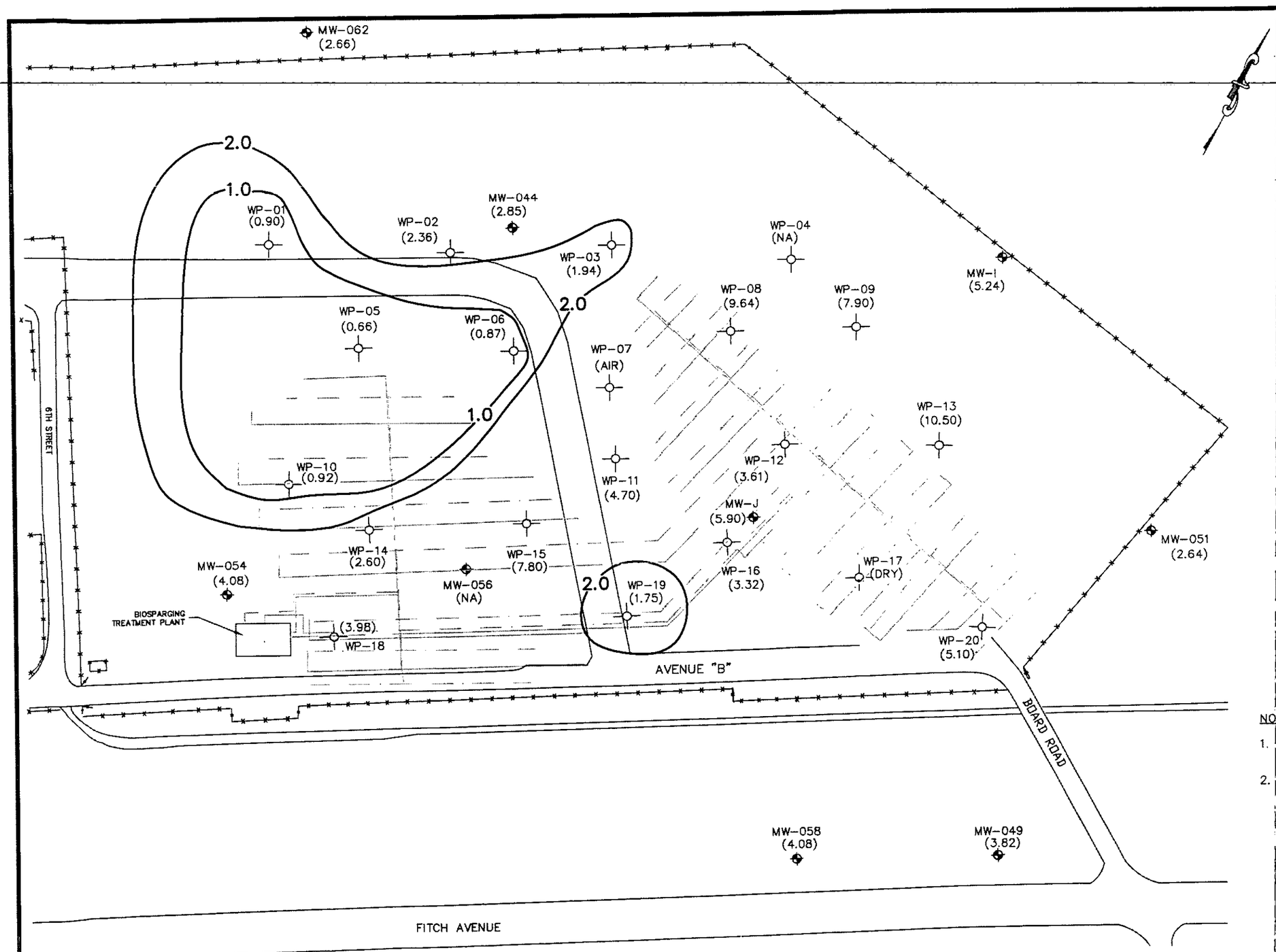
OLD NAVY FUEL FARM BIOSPARGING SYSTEM
NAVAL AIR STATION, BRUNSWICK, MAINE

FIGURE 3-11
INTERPRETED DISSOLVED-PHASE TPH-DRO CONCENTRATION ISOPLETH MAP, SAMPLES COLLECTED 4-5 DECEMBER 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
SY	SY	02/21/97	29600.35	FFAUG.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–



LEGEND

MW-044 (2.85)	MONITORING WELL LOCATION (DISSOLVED OXYGEN CONCENTRATION, mg/L) NA = DATA NOT AVAILABLE
WP-01 (0.90)	WELL POINT LOCATION (DISSOLVED OXYGEN CONCENTRATION, mg/L) NA = DATA NOT AVAILABLE DRY = WELL POINT DRY AIR = POSITIVE AIR PRESSURE
	CHAIN LINK FENCE
	SOIL VAPOR EXTRACTION LINE
	AIR SPARGING LINE
1.0	INTERPRETED GROUND-WATER DISSOLVED OXYGEN ISOPLETH (DASHED WHERE INFERRED)

NOTE:

1. DISSOLVED OXYGEN ISOPLETHS DRAWN FROM LOW TO HIGH CONCENTRATIONS TO INDICATE ANAEROBIC AREAS.
2. DISSOLVED OXYGEN DATA FOR WELL POINT WP-02 OBTAINED FROM 25 NOVEMBER 1996 SAMPLING EVENT.

0 90
APPROXIMATE SCALE (ft)

DWG. FILE No. F:\CAD\29600\35\FFNEW.DWG

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OLD NAVY FUEL FARM BIOSPARGING SYSTEM
NAVAL AIR STATION, BRUNSWICK, MAINE

FIGURE 3-12
GROUND-WATER DISSOLVED OXYGEN ISOPLETH MAP, 5 DECEMBER 1996

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	FILE NAME
SY	SY	02/20/97	29600.35	FFNEW.DWG
CHECKED BY	PROJECT MGR.	SCALE	DRAWING NO.	SHEET NO.
MSB	MSB	AS SHOWN	–	–

TABLE 3-1 SUMMARY OF WELL GAUGING DATA COLLECTED FROM 8 AUGUST THROUGH 19 DECEMBER 1996 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)[a]
WP-1					
08 AUG 1996	74.84	4.55	4.55	0.00	70.29
14 AUG 1996	74.84	4.87	4.87	Sheen (<0.01)	69.97
20 AUG 1996	74.84	5.09	5.09	0.00	69.75
28 AUG 1996	74.84	5.21	5.21	0.00	69.63
03 SEP 1996	74.84	4.97	4.97	0.00	69.87
16 SEP 1996	74.84	4.15	4.15	0.00	70.69
02 OCT 1996	74.84	4.40	4.40	0.00	70.44
08 OCT 1996	74.84	4.75	4.75	0.00	70.09
17 OCT 1996	74.84	4.75	4.75	0.00	70.09
25 OCT 1996	74.84	3.80	3.80	0.00	71.04
01 NOV 1996	74.84	3.87	3.87	0.00	70.97
08 NOV 1996	74.84	4.05	4.05	0.00	70.79
13 NOV 1996	74.84	4.25	4.25	0.00	70.59
25 NOV 1996	74.84	4.45	4.45	0.00	70.39
03 DEC 1996	74.84	3.33	3.33	0.00	71.51
19 DEC 1996	74.84	3.25	3.25	0.00	71.59
WP-2					
08 AUG 1996	75.25	5.78	5.78	Sheen (<0.01)	69.47
14 AUG 1996	75.25	6.00	6.00	0.00	69.25
20 AUG 1996	75.25	6.17	6.17	Sheen (<0.01)	69.08
28 AUG 1996	75.25	6.27	6.27	0.00	68.98
03 SEP 1996	75.25	6.08	6.08	0.00	69.17
16 SEP 1996	75.25	5.35	5.35	0.00	69.90
02 OCT 1996	75.25	5.67	5.67	0.00	69.58
08 OCT 1996	75.25	5.92	5.92	0.00	69.33
17 OCT 1996	75.25	5.85	5.85	0.00	69.40
25 OCT 1996	75.25	5.18	5.18	0.00	70.07
01 NOV 1996	75.25	5.15	5.15	0.00	70.10
08 NOV 1996	75.25	5.22	5.22	0.00	70.03
13 NOV 1996	75.25	5.50	5.50	0.00	69.75
25 NOV 1996	75.25	5.61	5.61	0.00	69.64
03 DEC 1996	75.25	4.71	4.68	0.03	70.56
19 DEC 1996	75.25	4.33	4.33	0.00	70.92

(a) Water table elevations in wells containing LNAPL calculated based on an assumed specific gravity of 0.83 for the LNAPL.

NOTE: LNAPL = Light, non-aqueous phase liquid; MSL = Mean sea level.

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
WP-3					
08 AUG 1996	74.16	4.34	4.34	0.00	69.82
14 AUG 1996	74.16	4.67	4.67	0.00	69.49
20 AUG 1996	74.16	4.90	4.90	Sheen (<0.01)	69.26
28 AUG 1996	74.16	5.08	5.08	Sheen (<0.01)	69.08
03 SEP 1996	74.16	5.04	5.04	0.00	69.12
16 SEP 1996	74.16	Data not available			
02 OCT 1996	74.16	4.58	4.58	0.00	69.58
08 OCT 1996	74.16	4.85	4.85	0.00	69.31
17 OCT 1996	74.16	4.80	4.80	0.00	69.36
25 OCT 1996	74.16	3.95	3.95	0.00	70.21
01 NOV 1996	74.16	3.85	3.85	0.00	70.31
08 NOV 1996	74.16	4.05	4.05	0.00	70.11
13 NOV 1996	74.16	4.20	4.20	0.00	69.96
25 NOV 1996	74.16	4.46	4.46	0.00	69.70
03 DEC 1996	74.16	3.51	3.51	0.00	70.65
19 DEC 1996	74.16	2.85	2.85	0.00	71.31
WP-4					
08 AUG 1996	76.18	5.89	5.89	0.00	70.29
14 AUG 1996	76.18	6.25	6.25	0.00	69.93
20 AUG 1996	76.18	4.54	4.54	0.00	71.64
28 AUG 1996	76.18	6.89	6.89	Sheen (<0.01)	69.29
03 SEP 1996	76.18	7.08	7.08	Sheen (<0.01)	69.10
16 SEP 1996	76.18	6.37	6.37	0.00	69.81
02 OCT 1996	76.18	6.40	6.40	0.00	69.78
08 OCT 1996	76.18	6.77	6.77	0.00	69.41
17 OCT 1996	76.18	3.70	3.70	0.00	72.48
25 OCT 1996	76.18	5.40	5.40	0.00	70.78
01 NOV 1996	76.18	5.35	5.35	0.00	70.83
08 NOV 1996	76.18	6.00	5.36	0.64	70.73
13 NOV 1996	76.18	6.40	5.58	0.82	70.46
25 NOV 1996	76.18	6.79	6.10	0.69	69.96
03 DEC 1996	76.18	4.70	4.06	0.64	72.01
19 DEC 1996	76.18	3.75	3.15	0.60	72.98

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
WP-5					
08 AUG 1996	74.64	5.45	5.45	0.00	69.19
14 AUG 1996	74.64	5.51	5.51	Sheen (<0.01)	69.13
20 AUG 1996	74.64	5.71	5.71	Sheen (<0.01)	68.93
28 AUG 1996	74.64	5.83	5.83	0.00	68.81
03 SEP 1996	74.64	5.78	5.78	0.00	68.86
16 SEP 1996	74.64	5.08	5.08	0.00	69.56
02 OCT 1996	74.64	6.05	6.05	0.00	68.59
08 OCT 1996	74.64	5.62	5.62	0.00	69.02
17 OCT 1996	74.64	5.53	5.53	0.00	69.11
25 OCT 1996	74.64	5.85	5.85	0.00	68.79
01 NOV 1996	74.64	4.94	4.94	0.00	69.70
08 NOV 1996	74.64	5.22	5.22	0.00	69.42
13 NOV 1996	74.64	5.11	5.11	0.00	69.53
25 NOV 1996	74.64	5.39	5.39	0.00	69.25
03 DEC 1996	74.64	4.13	4.13	0.00	70.51
19 DEC 1996	74.64	4.17	4.17	0.00	70.47
WP-6					
08 AUG 1996	73.72	4.60	4.60	0.00	69.12
14 AUG 1996	73.72	4.79	4.79	0.00	68.93
20 AUG 1996	73.72	4.98	4.98	Sheen (<0.01)	68.74
28 AUG 1996	73.72	5.11	5.11	0.00	68.61
03 SEP 1996	73.72	5.04	5.04	0.00	68.68
16 SEP 1996	73.72	4.35	4.35	Sheen (<0.01)	69.37
02 OCT 1996	73.72	4.35	4.35	0.00	69.37
08 OCT 1996	73.72	5.01	5.01	0.00	68.71
17 OCT 1996	73.72	4.81	4.81	0.00	68.91
25 OCT 1996	73.72	4.05	4.05	0.00	69.67
01 NOV 1996	73.72	3.70	3.70	0.00	70.02
08 NOV 1996	73.72	4.15	4.15	0.00	69.57
13 NOV 1996	73.72	4.37	4.37	0.00	69.35
25 NOV 1996	73.72	4.53	4.53	0.00	69.19
03 DEC 1996	73.72	3.23	3.23	0.00	70.49
19 DEC 1996	73.72	3.07	3.07	0.00	70.65

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
WP-7					
08 AUG 1996	73.92	4.90	4.90	0.00	69.02
14 AUG 1996	73.92	5.10	5.10	0.00	68.82
20 AUG 1996	73.92	5.36	5.36	0.00	68.56
28 AUG 1996	73.92	5.48	5.48	0.00	68.44
03 SEP 1996	73.92	5.47	5.47	0.00	68.45
16 SEP 1996	73.92	4.62	4.62	0.00	69.30
02 OCT 1996	73.92	5.72	5.72	0.00	68.20
08 OCT 1996	73.92	5.95	5.95	0.00	67.97
17 OCT 1996	73.92	5.05	5.05	0.00	68.87
25 OCT 1996	73.92	4.05	4.05	0.00	69.87
01 NOV 1996	73.92	3.25	3.25	0.00	70.67
08 NOV 1996	73.92	5.10	5.10	0.00	68.82
13 NOV 1996	73.92	5.10	5.10	0.00	68.82
25 NOV 1996	73.92	6.22	4.27	1.95	69.32
03 DEC 1996	73.92	3.97	3.35	0.62	70.46
19 DEC 1996	73.92	Bent riser; no data			
WP-8					
08 AUG 1996	74.99	5.55	5.55	0.00	69.44
14 AUG 1996	74.99	5.78	5.78	0.00	69.21
20 AUG 1996	74.99	5.95	5.95	0.00	69.04
28 AUG 1996	74.99	6.19	6.19	0.00	68.80
03 SEP 1996	74.99	6.28	6.28	0.00	68.71
16 SEP 1996	74.99	5.25	5.25	Sheen (<0.01)	69.74
02 OCT 1996	74.99	6.50	6.50	0.00	68.49
08 OCT 1996	74.99	Data not available (dry)			
17 OCT 1996	74.99	6.15	6.15	0.00	68.84
25 OCT 1996	74.99	2.30	2.30	0.00	72.69
01 NOV 1996	74.99	6.00	6.00	0.00	68.99
08 NOV 1996	74.99	5.18	5.18	0.00	69.81
13 NOV 1996	74.99	5.50	5.50	0.00	69.49
25 NOV 1996	74.99	5.86	5.86	0.00	69.13
03 DEC 1996	74.99	4.18	4.18	0.00	70.81
19 DEC 1996	74.99	3.55	3.55	0.00	71.44

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
WP-9					
08 AUG 1996	75.46	6.86	6.86	0.00	68.60
14 AUG 1996	75.46	7.16	7.16	0.00	68.30
20 AUG 1996	75.46	Data not available (dry)			
28 AUG 1996	75.46	Data not available (dry)			
03 SEP 1996	75.46	Data not available (dry)			
16 SEP 1996	75.46	Data not available (dry)			
02 OCT 1996	75.46	Data not available (dry)			
08 OCT 1996	75.46	Data not available (dry)			
17 OCT 1996	75.46	Data not available (dry)			
25 OCT 1996	75.46	6.25	6.25	0.00	69.21
01 NOV 1996	75.46	6.72	6.72	0.00	68.74
08 NOV 1996	75.46	7.07	7.07	0.00	68.39
13 NOV 1996	75.46	Data not available (dry)			
25 NOV 1996	75.46	Data not available (dry)			
03 DEC 1996	75.46	5.43	5.43	0.00	70.03
19 DEC 1996	75.46	4.75	4.75	0.00	70.71
WP-10					
08 AUG 1996	74.83	5.65	5.65	0.00	69.18
14 AUG 1996	74.83	5.80	5.80	0.00	69.03
20 AUG 1996	74.83	6.13	6.13	0.00	68.70
28 AUG 1996	74.83	6.32	6.32	Sheen (<0.01)	68.51
03 SEP 1996	74.83	6.42	6.41	0.01	68.42
16 SEP 1996	74.83	5.24	5.14	0.10	69.67
02 OCT 1996	74.83	5.35	5.35	0.00	69.48
08 OCT 1996	74.83	5.91	5.91	0.00	68.92
17 OCT 1996	74.83	5.87	5.87	0.00	68.96
25 OCT 1996	74.83	4.60	4.60	0.00	70.23
01 NOV 1996	74.83	4.74	4.74	0.00	70.09
08 NOV 1996	74.83	5.06	5.06	0.00	69.77
13 NOV 1996	74.83	5.22	5.22	0.00	69.61
25 NOV 1996	74.83	5.41	5.41	0.00	69.42
03 DEC 1996	74.83	3.30	3.30	0.00	71.53
19 DEC 1996	74.83	3.00	3.00	0.00	71.83

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
WP-11					
08 AUG 1996	74.06	5.21	5.21	0.00	68.85
14 AUG 1996	74.06	5.30	5.30	0.00	68.76
20 AUG 1996	74.06	5.61	5.61	0.00	68.45
28 AUG 1996	74.06	5.75	5.75	Sheen (<0.01)	68.31
03 SEP 1996	74.06	5.75	5.75	0.00	68.31
16 SEP 1996	74.06	4.93	4.93	Sheen (<0.01)	69.13
02 OCT 1996	74.06	5.10	5.10	0.00	68.96
08 OCT 1996	74.06	6.05	6.05	0.00	68.01
17 OCT 1996	74.06	5.35	5.35	0.00	68.71
25 OCT 1996	74.06	4.45	4.45	0.00	69.61
01 NOV 1996	74.06	3.95	3.95	0.00	70.11
08 NOV 1996	74.06	4.82	4.82	0.00	69.24
13 NOV 1996	74.06	4.95	4.95	Sheen (<0.01)	69.11
25 NOV 1996	74.06	5.16	5.16	0.00	68.90
03 DEC 1996	74.06	3.76	3.76	0.00	70.30
19 DEC 1996	74.06	3.66	3.66	0.00	70.40
WP-12					
08 AUG 1996	75.12	7.69	7.69	0.00	67.43
14 AUG 1996	75.12	7.70	7.70	0.00	67.42
20 AUG 1996	75.12		Data not available (dry)		
28 AUG 1996	75.12	7.88	7.88	0.00	67.24
03 SEP 1996	75.12		Data not available (dry)		
16 SEP 1996	75.12		Data not available (dry)		
02 OCT 1996	75.12		Data not available (dry)		
08 OCT 1996	75.12		Data not available (dry)		
17 OCT 1996	75.12		Data not available (dry)		
25 OCT 1996	75.12		Data not available (dry)		
01 NOV 1996	75.12	6.82	6.82	0.00	68.30
08 NOV 1996	75.12	7.45	7.45	0.00	67.67
13 NOV 1996	75.12	7.58	7.58	0.00	67.54
25 NOV 1996	75.12		Data not available (dry)		
03 DEC 1996	75.12	5.87	5.87	0.00	69.25
19 DEC 1996	75.12	4.81	4.81	0.00	70.31

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
WP-13					
08 AUG 1996	74.34	6.32	6.32	0.00	68.02
14 AUG 1996	74.34	6.57	6.57	0.00	67.77
20 AUG 1996	74.34	6.80	6.80	Sheen (<0.01)	67.54
28 AUG 1996	74.34	7.12	7.12	Sheen (<0.01)	67.22
03 SEP 1996	74.34	Data not available (dry)			
16 SEP 1996	74.34	5.35	5.35	Sheen (<0.01)	68.99
02 OCT 1996	74.34	6.40	6.40	0.00	67.94
08 OCT 1996	74.34	6.68	6.68	0.00	67.66
17 OCT 1996	74.34	5.84	5.72	0.12	68.60
25 OCT 1996	74.34	3.55	3.55	0.00	70.79
01 NOV 1996	74.34	4.70	4.70	0.00	69.64
08 NOV 1996	74.34	5.40	5.40	0.00	68.94
13 NOV 1996	74.34	5.75	5.75	0.00	68.59
25 NOV 1996	74.34	6.78	6.78	0.00	67.56
03 DEC 1996	74.34	4.95	4.95	0.00	69.39
19 DEC 1996	74.34	3.45	3.45	0.00	70.89
WP-14					
08 AUG 1996	75.18	6.33	6.33	0.00	68.85
14 AUG 1996	75.18	6.36	6.36	0.00	68.82
20 AUG 1996	75.18	6.73	6.73	0.00	68.45
28 AUG 1996	75.18	6.93	6.93	0.00	68.25
03 SEP 1996	75.18	7.04	7.04	0.00	68.14
16 SEP 1996	75.18	5.78	5.78	0.00	69.40
02 OCT 1996	75.18	6.13	6.13	0.00	69.05
08 OCT 1996	75.18	6.68	6.68	0.00	68.50
17 OCT 1996	75.18	6.47	6.47	0.00	68.71
25 OCT 1996	75.18	5.25	5.25	0.00	69.93
01 NOV 1996	75.18	5.35	5.35	0.00	69.83
08 NOV 1996	75.18	5.73	5.73	0.00	69.45
13 NOV 1996	75.18	5.90	5.90	0.00	69.28
25 NOV 1996	75.18	5.90	5.90	0.00	69.28
03 DEC 1996	75.18	3.99	3.99	0.00	71.19
19 DEC 1996	75.18	4.15	4.15	0.00	71.03

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
WP-15					
08 AUG 1996	74.54	5.85	5.85	0.00	68.69
14 AUG 1996	74.54	5.86	5.86	0.00	68.68
20 AUG 1996	74.54	6.28	6.28	0.00	68.26
28 AUG 1996	74.54	6.45	6.45	0.00	68.09
03 SEP 1996	74.54	6.49	6.49	0.00	68.05
16 SEP 1996	74.54	5.42	5.42	0.00	69.12
02 OCT 1996	74.54	6.03	6.03	0.00	68.51
08 OCT 1996	74.54	Data not available (dry)			
17 OCT 1996	74.54	6.20	6.20	0.00	68.34
25 OCT 1996	74.54	4.98	4.98	0.00	69.56
01 NOV 1996	74.54	4.80	4.80	0.00	69.74
08 NOV 1996	74.54	5.40	5.40	0.00	69.14
13 NOV 1996	74.54	5.40	5.40	0.00	69.14
25 NOV 1996	74.54	5.80	5.80	0.00	68.74
03 DEC 1996	74.54	4.15	4.15	0.00	70.39
WP-16					
08 AUG 1996	75.6	Data not available (dry)			
14 AUG 1996	75.6	Data not available (dry)			
20 AUG 1996	75.6	Data not available (dry)			
28 AUG 1996	75.6	Data not available (dry)			
03 SEP 1996	75.6	Data not available (dry)			
16 SEP 1996	75.6	6.84	6.84	0.00	68.76
02 OCT 1996	75.6	Data not available (dry)			
08 OCT 1996	75.6	Data not available (dry)			
17 OCT 1996	75.6	Data not available (dry)			
25 OCT 1996	75.6	7.00	7.00	0.00	68.60
01 NOV 1996	75.6	7.52	7.52	0.00	68.08
08 NOV 1996	75.6	Data not available (dry)			
13 NOV 1996	75.6	Data not available (dry)			
25 NOV 1996	75.6	Data not available (dry)			
03 DEC 1996	75.6	5.60	5.60	0.00	70.00
19 DEC 1996	75.6	5.55	5.55	0.00	70.05

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
WP-17					
08 AUG 1996	76.02	Data not available (dry)			
14 AUG 1996	76.02	Data not available (dry)			
20 AUG 1996	76.02	Data not available (dry)			
28 AUG 1996	76.02	Data not available (dry)			
03 SEP 1996	76.02	Data not available (dry)			
16 SEP 1996	76.02	Data not available (dry)			
02 OCT 1996	76.02	Data not available (dry)			
08 OCT 1996	76.02	Data not available (dry)			
17 OCT 1996	76.02	Data not available (dry)			
25 OCT 1996	76.02	Data not available (dry)			
01 NOV 1996	76.02	Data not available (dry)			
08 NOV 1996	76.02	Data not available (dry)			
13 NOV 1996	76.02	Data not available (dry)			
25 NOV 1996	76.02	Data not available (dry)			
03 DEC 1996	76.02	8.05	8.05	0.00	67.97
19 DEC 1996	76.02	7.40	7.40	0.00	68.62
WP-18					
08 AUG 1996	74.30	6.51	6.51	0.00	67.79
14 AUG 1996	74.30	6.55	6.55	0.00	67.75
20 AUG 1996	74.30	Data not available (dry)			
28 AUG 1996	74.30	Data not available (dry)			
03 SEP 1996	74.30	Data not available (dry)			
16 SEP 1996	74.30	5.75	5.75	Sheen (<0.01)	68.55
02 OCT 1996	74.30	6.39	6.39	0.00	67.91
08 OCT 1996	74.30	6.60	6.60	0.00	67.70
17 OCT 1996	74.30	6.55	6.55	0.00	67.75
25 OCT 1996	74.30	5.35	5.35	0.00	68.95
01 NOV 1996	74.30	5.35	5.35	0.00	68.95
08 NOV 1996	74.30	5.59	5.59	0.00	68.71
13 NOV 1996	74.30	5.65	5.65	0.00	68.65
25 NOV 1996	74.30	5.79	5.79	0.00	68.51
03 DEC 1996	74.30	3.98	3.98	0.00	70.32
19 DEC 1996	74.30	3.85	3.85	0.00	70.45

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
WP-19					
08 AUG 1996	72.73	5.12	5.12	0.00	67.61
14 AUG 1996	72.73	5.16	5.16	0.00	67.57
20 AUG 1996	72.73	5.45	5.45	Sheen (<0.01)	67.28
28 AUG 1996	72.73	5.72	5.72	0.00	67.01
03 SEP 1996	72.73	5.76	5.76	0.00	66.97
16 SEP 1996	72.73	4.73	4.73	Sheen (<0.01)	68.00
02 OCT 1996	72.73	5.35	5.35	0.00	67.38
08 OCT 1996	72.73	5.30	5.30	0.00	67.43
17 OCT 1996	72.73	5.33	5.33	0.00	67.40
25 OCT 1996	72.73	4.33	4.33	0.00	68.40
01 NOV 1996	72.73	4.35	4.35	0.00	68.38
08 NOV 1996	72.73	4.65	4.65	0.00	68.08
13 NOV 1996	72.73	4.75	4.75	0.00	67.98
25 NOV 1996	72.73	4.96	4.96	0.00	67.77
03 DEC 1996	72.73	3.33	3.33	0.00	69.40
19 DEC 1996	72.73	3.00	3.00	0.00	69.73
WP-20					
08 AUG 1996	72.67	6.70	6.70	0.00	65.97
14 AUG 1996	72.67	6.85	6.85	0.00	65.82
20 AUG 1996	72.67	7.05	7.05	0.00	65.62
28 AUG 1996	72.67	7.25	7.25	0.00	65.42
03 SEP 1996	72.67	Data not available (dry)			
16 SEP 1996	72.67	6.17	6.17	0.00	66.50
02 OCT 1996	72.67	6.50	6.50	0.00	66.17
08 OCT 1996	72.67	6.60	6.60	0.00	66.07
17 OCT 1996	72.67	6.58	6.58	0.00	66.09
25 OCT 1996	72.67	5.28	5.28	0.00	67.39
01 NOV 1996	72.67	5.45	5.45	0.00	67.22
08 NOV 1996	72.67	5.82	5.82	0.00	66.85
13 NOV 1996	72.67	6.02	6.02	0.00	66.65
25 NOV 1996	72.67	6.39	6.39	0.00	66.28
03 DEC 1996	72.67	4.19	4.19	0.00	68.48
19 DEC 1996	72.67	3.93	3.93	0.00	68.74

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
MW-44					
08 AUG 1996	73.18	3.46	3.46	0.00	69.72
14 AUG 1996	73.18	4.25	4.25	0.00	68.93
20 AUG 1996	73.18	4.45	4.45	0.00	68.73
28 AUG 1996	73.18	4.05	4.05	0.00	69.13
03 SEP 1996	73.18	3.83	3.83	Sheen	69.35
16 SEP 1996	73.18	Data not available			
02 OCT 1996	73.18	3.47	3.47	0.00	69.71
08 OCT 1996	73.18	3.70	3.70	0.00	69.48
17 OCT 1996	73.18	6.37	6.37	0.00	66.81
25 OCT 1996	73.18	3.05	3.05	0.00	70.13
01 NOV 1996	73.18	2.90	2.90	0.00	70.28
04 NOV 1996	73.18	2.90	2.90	0.00	70.28
08 NOV 1996	73.18	2.95	2.95	0.00	70.23
13 NOV 1996	73.18	3.22	3.22	0.00	69.96
25 NOV 1996	73.18	3.32	3.32	0.00	69.86
03 DEC 1996	73.18	2.53	2.53	0.00	70.65
19 DEC 1996	73.18	2.02	2.02	0.00	71.16
MW-49					
03 SEP 1996	66.97	7.62	7.62	0.00	59.35
04 NOV 1996	66.97	5.80	5.80	0.00	61.17
03 DEC 1996	66.97	5.41	5.41	0.00	61.56
MW-51					
08 AUG 1996	73.20	5.51	5.51	0.00	67.69
14 AUG 1996	73.20	5.92	5.92	0.00	67.28
20 AUG 1996	73.20	6.28	6.28	0.00	66.92
03 SEP 1996	73.20	6.58	6.58	0.00	66.62
02 OCT 1996	73.20	5.85	5.85	0.00	67.35
04 NOV 1996	73.20	4.51	4.51	0.00	68.69
03 DEC 1996	73.20	3.90	3.90	0.00	69.30
MW-54					
03 SEP 1996	75.49	7.49	7.49	0.00	68.00
25 OCT 1996	75.49	4.20	4.20	0.00	71.29
04 NOV 1996	75.49	6.17	6.17	0.00	69.32
03 DEC 1996	75.49	4.71	4.71	0.00	70.78

Gauging Data	Well Elevation (ft MSL)	Depth to Water (ft)	Depth to LNAPL (ft)	LNAPL Thickness (ft)	Water Table Elevation (ft)[a]
MW-56					
08 AUG 1996	73.53	5.25	5.25	0.00	68.28
28 AUG 1996	73.53	3.55	3.55	0.00	69.98
03 SEP 1996	73.53	3.94	3.94	0.00	69.59
02 OCT 1996	73.53	5.10	3.55	1.95	70.05
08 OCT 1996	73.53	11.35	11.35	0.00	62.18
01 NOV 1996	73.53	4.15	4.15	0.00	69.38
04 NOV 1996	73.53	4.15	4.15	0.00	69.38
08 NOV 1996	73.53	4.72	4.72	0.00	68.81
13 NOV 1996	73.53	4.65	4.65	0.00	68.88
19 DEC 1996	73.53	Water flowing out of well			
MW-58					
03 SEP 1996	69.80	6.70	6.70	0.00	63.10
04 NOV 1996	69.80	6.02	6.02	0.00	63.78
03 DEC 1996	69.80	5.75	5.75	0.00	64.05
MW-62					
03 SEP 1996	80.78	10.51	10.51	0.00	70.27
04 NOV 1996	80.78	7.72	7.72	0.00	73.06
03 DEC 1996	80.78	7.98	7.98	0.00	72.80
MW-I					
03 SEP 1996	76.81	7.56	7.56	0.00	69.25
04 NOV 1996	76.81	6.42	6.42	0.00	70.39
03 DEC 1996	76.81	5.57	5.57	0.00	71.24
MW-J					
08 AUG 1996	75.86	Data not available			
14 AUG 1996	75.86	7.91	7.74	0.17	68.09
20 AUG 1996	75.86	8.13	7.97	0.16	67.86
28 AUG 1996	75.86	8.04	7.93	0.11	67.91
03 SEP 1996	75.86	8.29	8.09	0.20	67.74
16 SEP 1996	75.86	7.74	7.67	0.07	67.18
02 OCT 1996	75.86	7.15	7.05	0.10	68.79
08 OCT 1996	75.86	9.30	9.30	0.00	66.56
17 OCT 1996	75.86	7.85	7.85	0.00	68.01
25 OCT 1996	75.86	5.05	5.05	0.00	70.81
01 NOV 1996	75.86	6.55	6.55	0.00	69.31
04 NOV 1996	75.86	6.55	6.55	0.00	69.31
08 NOV 1996	75.86	7.15	7.15	0.00	68.71
13 NOV 1996	75.86	7.32	7.32	0.00	68.54
25 NOV 1996	75.86	8.11	8.11	0.00	67.75
03 DEC 1996	75.86	4.69	4.69	0.00	71.17
19 DEC 1996	75.86	5.23	5.23	0.00	70.63

TABLE 3-2 SUMMARY OF WATER QUALITY INDICATOR PARAMETER MEASUREMENTS COLLECTED FROM 8 AUGUST THROUGH 19 DECEMBER 1996 OLD NAVY FUEL FARM, NAVAL AIR STATION BRUNSWICK, MAINE

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-1					
08 AUG 1996	5.25	16.40	0.39	404	-100
14 AUG 1996		Sheen of LNAPL present (data not available)			
20 AUG 1996	5.49	17.09	0.45	447	-43
28 AUG 1996	5.36	17.09	0.36	451	-22
03 SEP 1996	5.40	17.20	0.25	510	-50
16 SEP 1996	5.50	16.60	0.50	200	285
02 OCT 1996	5.70	15.50	0.40	392	12
08 OCT 1996	5.80	14.31	0.47	378	41
17 OCT 1996	5.85	13.17	0.62	325	111
25 OCT 1996	5.65	12.37	0.63	95.0	271
01 NOV 1996	5.85	11.13	1.18	109	247
08 NOV 1996	6.02	11.04	0.75	377	120
13 NOV 1996	5.95	9.94	1.75	376	103
25 NOV 1996	6.07	8.18	1.10	392	130
03 DEC 1996	6.29	7.38	0.90	355	45
19 DEC 1996	6.20	6.00	1.20	292	69
WP-2					
08 AUG 1996		Sheen of LNAPL present (data not available)			
14 AUG 1996	5.15	19.00	0.36	342	-45
20 AUG 1996		Sheen of LNAPL present (data not available)			
28 AUG 1996	5.40	18.07	0.53	313	-30
03 SEP 1996	5.30	18.30	0.16	333	-59
16 SEP 1996	5.60	17.20	0.50	234	267
02 OCT 1996	5.60	15.48	0.75	283	19
08 OCT 1996	6.04	14.52	0.32	291	11
17 OCT 1996	6.03	13.03	1.13	302	110
25 OCT 1996	5.74	12.07	0.75	268	135
01 NOV 1996	5.85	10.79	1.22	280	150
08 NOV 1996	6.18	10.35	0.88	291	88
13 NOV 1996	5.74	9.81	1.35	296	198
25 NOV 1996	6.08	7.56	2.36	295	151
03 DEC 1996		Sheen of LNAPL present (data not available)			
19 DEC 1996	6.30	5.50	1.10	157	66

NOTE: LNAPL = Light, non-aqueous phase liquid; Redox = Reduction-oxidation potential.

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-3					
08 AUG 1996	4.42	16.45	0.43	64.8	241
14 AUG 1996	4.64	18.47	0.30	58.3	187
20 AUG 1996		Sheen of LNAPL present (data not available)			
28 AUG 1996		Sheen of LNAPL present (data not available)			
03 SEP 1996	4.80	18.30	0.56	53.9	60
16 SEP 1996	5.60	16.20	0.60	93.0	245
02 OCT 1996	6.00	15.06	0.94	74.4	206
08 OCT 1996	5.45	14.28	0.74	64.8	193
17 OCT 1996	5.49	13.05	3.28	71	225
25 OCT 1996	5.70	12.45	1.20	87.3	196
01 NOV 1996	5.76	11.54	1.08	71.4	189
08 NOV 1996	5.69	11.00	1.31	66.1	210
13 NOV 1996	5.71	9.94	1.12	88.5	255
25 NOV 1996	5.67	8.00	2.08	733	231
03 DEC 1996	5.95	6.67	1.94	60.2	231
19 DEC 1996	5.85	7.00	1.20	51.6	177
WP-4					
08 AUG 1996	4.77	16.94	0.69	188	232
14 AUG 1996	5.06	18.20	0.20	238	-15
20 AUG 1996	5.19	17.67	0.55	238	44
28 AUG 1996		Sheen of LNAPL present (data not available)			
03 SEP 1996		Sheen of LNAPL present (data not available)			
16 SEP 1996	5.70	17.30	0.40	282	234
02 OCT 1996	5.70	16.03	0.71	287	136
08 OCT 1996	5.67	14.95	0.75	258	186
17 OCT 1996	5.81	13.65	1.32	249	126
25 OCT 1996	5.61	13.03	0.49	263	208
01 NOV 1996	5.63	11.63	1.03	228	224
08 NOV 1996		Sheen of LNAPL present (data not available)			
13 NOV 1996		Sheen of LNAPL present (data not available)			
25 NOV 1996		Sheen of LNAPL present (data not available)			
03 DEC 1996		Sheen of LNAPL present (data not available)			
19 DEC 1996		Sheen of LNAPL present (data not available)			

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-5					
08 AUG 1996	4.25	15.51	0.58	142	175
14 AUG 1996		Sheen of LNAPL present (data not available)			
20 AUG 1996		Sheen of LNAPL present (data not available)			
28 AUG 1996	4.59	16.63	0.48	131	143
03 SEP 1996	4.70	16.50	0.37	114	2
16 SEP 1996	5.00	15.70	1.20	167	308
02 OCT 1996	5.30	14.70	0.73	108	87
08 OCT 1996	5.23	14.12	0.36	89.6	243
17 OCT 1996	5.28	12.89	1.16	103	256
25 OCT 1996	5.22	12.33	3.51	95.5	279
01 NOV 1996	5.35	11.61	0.78	88	290
08 NOV 1996	5.42	11.45	0.81	85	289
13 NOV 1996	5.26	10.02	1.28	84.6	280
25 NOV 1996	5.65	8.89	0.89	78.7	257
03 DEC 1996	5.41	7.98	0.66	86.4	295
19 DEC 1996	5.70	7.00	1.20	84.2	314
WP-6					
08 AUG 1996	5.01	15.51	0.34	97.9	225
14 AUG 1996	5.05	16.15	0.36	104	-25
20 AUG 1996		Sheen of LNAPL present (data not available)			
28 AUG 1996	5.04	16.53	0.44	114	-14
03 SEP 1996	5.10	17.05	0.21	123	-48
16 SEP 1996		Sheen of LNAPL present (data not available)			
02 OCT 1996	5.00	14.70	0.65	109	94
08 OCT 1996	5.37	14.13	0.72	102	162
17 OCT 1996	5.31	12.88	0.67	99.4	226
25 OCT 1996	5.52	12.19	0.52	109	257
01 NOV 1996	5.26	11.15	1.30	106	305
08 NOV 1996	5.30	11.15	0.85	98.1	308
13 NOV 1996	5.15	10.05	0.67	97.9	282
25 NOV 1996	5.65	8.69	0.75	92	256
03 DEC 1996	5.30	7.33	0.87	63.3	306
19 DEC 1996	6.10	6.30	1.10	50.5	315

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-7					
08 AUG 1996	Bent well riser (data not available)				
14 AUG 1996	Bent well riser (data not available)				
20 AUG 1996	Bent well riser (data not available)				
28 AUG 1996	4.85	18.23	1.01	6.8	134
03 SEP 1996	Bent well riser (data not available)				
16 SEP 1996	Bent well riser (data not available)				
02 OCT 1996	Bent well riser (data not available)				
08 OCT 1996	Bent well riser (data not available)				
17 OCT 1996	Bent well riser (data not available)				
25 OCT 1996	6.35	12.09	2.85	253	191
01 NOV 1996	Bent well riser (data not available)				
08 NOV 1996	Bent well riser (data not available)				
13 NOV 1996	Bent well riser (data not available)				
25 NOV 1996	Bent well riser (data not available)				
03 DEC 1996	Bent well riser (data not available)				
19 DEC 1996	Bent well riser (data not available)				
WP-8					
08 AUG 1996	5.55	17.08	0.42	787	222
14 AUG 1996	5.67	18.20	0.62	851	-79
20 AUG 1996	5.67	18.44	0.47	872	-86
28 AUG 1996	5.73	18.11	0.28	877	-38
03 SEP 1996	5.80	18.90	0.31	953	-71
16 SEP 1996	Sheen of LNAPL present (data not available)				
02 OCT 1996	6.20	16.02	5.80	449	166
08 OCT 1996	Dry well point (data not available)				
17 OCT 1996	6.06	13.57	6.30	409	231
25 OCT 1996	6.26	12.93	3.75	361	243
01 NOV 1996	6.36	12.33	8.38	321	271
08 NOV 1996	6.36	11.58	8.75	460	283
13 NOV 1996	5.34	10.20	8.79	440	271
25 NOV 1996	6.16	8.69	4.89	471	260
03 DEC 1996	6.71	6.17	9.64	378	255
19 DEC 1996	6.70	6.30	11.00	513	310

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-9					
08 AUG 1996	3.71	16.89	5.40	443	276
14 AUG 1996	5.20	20.77	2.21	424	275
20 AUG 1996	Insufficient water (data not available)				
28 AUG 1996	Insufficient water (data not available)				
03 SEP 1996	Insufficient water (data not available)				
16 SEP 1996	Insufficient water (data not available)				
02 OCT 1996	Insufficient water (data not available)				
08 OCT 1996	Insufficient water (data not available)				
17 OCT 1996	Insufficient water (data not available)				
25 OCT 1996	5.80	13.27	7.15	400	258
01 NOV 1996	5.81	12.03	7.02	388	279
08 NOV 1996	Insufficient water (data not available)				
13 NOV 1996	Insufficient water (data not available)				
25 NOV 1996	Insufficient water (data not available)				
03 DEC 1996	6.24	7.03	7.90	288	247
19 DEC 1996	6.20	6.30	8.30	244	222
WP-10					
08 AUG 1996	4.15	13.77	0.48	194	311
14 AUG 1996	4.23	14.95	0.68	225	-16
20 AUG 1996	4.38	14.03	0.42	265	-33
28 AUG 1996	Sheen of LNAPL present (data not available)				
03 SEP 1996	Sheen of LNAPL present (data not available)				
16 SEP 1996	Sheen of LNAPL present (data not available)				
02 OCT 1996	5.40	14.40	0.54	127	62
08 OCT 1996	5.36	13.87	0.44	145	78
17 OCT 1996	5.31	12.83	0.51	126	217
25 OCT 1996	5.08	12.38	0.67	127	328
01 NOV 1996	5.20	11.66	0.75	105	325
08 NOV 1996	5.17	11.82	0.70	954	328
13 NOV 1996	5.08	10.33	1.75	92.2	271
25 NOV 1996	5.18	9.60	1.32	93	337
03 DEC 1996	5.04	6.84	0.92	76.1	319
19 DEC 1996	5.30	5.80	1.80	72.7	352

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-11					
08 AUG 1996	4.34	16.13	0.64	172	236
14 AUG 1996	4.46	17.48	0.61	210	8
20 AUG 1996	4.46	16.50	0.73	220	15
28 AUG 1996	Sheen of LNAPL present (data not available)				
03 SEP 1996	4.60	17.90	0.31	242	4
16 SEP 1996	Sheen of LNAPL present (data not available)				
02 OCT 1996	5.10	14.90	0.93	281	262
08 OCT 1996	5.29	14.17	0.46	246	88
17 OCT 1996	5.24	12.77	1.49	274	278
25 OCT 1996	5.36	11.89	2.12	225	321
01 NOV 1996	5.35	10.71	1.02	241	310
08 NOV 1996	5.42	10.97	2.10	278	315
13 NOV 1996	Sheen of LNAPL present (data not available)				
25 NOV 1996	5.48	8.36	1.75	248	329
03 DEC 1996	5.60	6.10	4.70	138	311
19 DEC 1996	5.80	5.50	0.90	112	322
WP-12					
08 AUG 1996	Insufficient water (data not available)				
14 AUG 1996	Insufficient water (data not available)				
20 AUG 1996	Insufficient water (data not available)				
28 AUG 1996	Insufficient water (data not available)				
03 SEP 1996	Insufficient water (data not available)				
16 SEP 1996	Insufficient water (data not available)				
02 OCT 1996	Insufficient water (data not available)				
08 OCT 1996	Insufficient water (data not available)				
17 OCT 1996	Insufficient water (data not available)				
25 OCT 1996	Insufficient water (data not available)				
01 NOV 1996	Insufficient water (data not available)				
08 NOV 1996	Insufficient water (data not available)				
13 NOV 1996	Insufficient water (data not available)				
25 NOV 1996	Insufficient water (data not available)				
03 DEC 1996	5.50	6.60	3.60	222	299
19 DEC 1996	5.70	5.50	6.60	128	333

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-13					
08 AUG 1996	4.80	17.14	0.83	114	284
14 AUG 1996	4.85	19.36	0.76	246	250
20 AUG 1996		Sheen of LNAPL present (data not available)			
28 AUG 1996		Sheen of LNAPL present (data not available)			
03 SEP 1996		Sheen of LNAPL present (data not available)			
16 SEP 1996		Sheen of LNAPL present (data not available)			
02 OCT 1996	5.30	15.60	0.99	139	279
08 OCT 1996	5.45	14.60	1.26	142	245
17 OCT 1996		Sheen of LNAPL present (data not available)			
25 OCT 1996	5.72	12.07	0.75	87.6	226
01 NOV 1996	5.83	10.95	9.41	99.2	252
08 NOV 1996	5.76	10.53	9.14	103	264
13 NOV 1996	5.67	9.43	9.93	105	284
25 NOV 1996	5.80	8.35	7.70	112	251
03 DEC 1996	6.50	5.40	10.50	76.3	250
19 DEC 1996	6.70	5.50	11.00	60.6	321
WP-14					
08 AUG 1996	4.72	16.28	0.75	109	300
14 AUG 1996	4.88	17.65	0.88	126	239
20 AUG 1996	4.80	17.26	1.25	132	79
28 AUG 1996	5.01	17.29	0.92	137	26
03 SEP 1996	5.00	18.40	0.34	142	-23
16 SEP 1996	5.50	16.60	0.60	141	277
02 OCT 1996	5.40	15.30	0.95	134	216
08 OCT 1996	5.73	14.68	1.43	134	272
17 OCT 1996	5.46	12.91	3.17	108	306
25 OCT 1996	5.38	12.48	3.07	114	319
01 NOV 1996	5.59	11.59	2.93	111	329
08 NOV 1996	5.64	11.23	3.07	112	310
13 NOV 1996	5.66	10.17	3.94	112	299
25 NOV 1996	5.70	7.81	4.87	105	311
03 DEC 1996	5.60	6.60	2.60	110	321
19 DEC 1996	6.00	6.00	3.00	91.6	331

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-15					
08 AUG 1996	4.49	15.77	0.41	73.1	323
14 AUG 1996	4.70	17.72	0.78	128	187
20 AUG 1996	4.77	17.04	0.27	101	298
28 AUG 1996	4.91	16.60	0.28	107	176
03 SEP 1996	4.70	18.00	0.12	111	120
16 SEP 1996	5.60	16.60	0.40	113	286
02 OCT 1996	5.00	15.20	2.00	106	270
08 OCT 1996	Insufficient water (data not available)				
17 OCT 1996	5.64	12.88	1.39	94.8	308
25 OCT 1996	5.78	12.30	1.38	87.9	266
01 NOV 1996	5.88	10.69	2.48	93.5	316
08 NOV 1996	5.65	10.86	1.88	98.8	296
13 NOV 1996	5.49	9.50	1.68	96.4	302
25 NOV 1996	5.94	8.07	0.33	88.2	286
03 DEC 1996	5.90	6.00	7.80	70.5	272
19 DEC 1996	6.10	6.30	9.20	70.4	322
WP-16					
08 AUG 1996	Insufficient water (data not available)				
14 AUG 1996	Insufficient water (data not available)				
20 AUG 1996	Insufficient water (data not available)				
28 AUG 1996	Insufficient water (data not available)				
03 SEP 1996	Insufficient water (data not available)				
16 SEP 1996	6.20	18.04	1.20	446	329
02 OCT 1996	Insufficient water (data not available)				
08 OCT 1996	Insufficient water (data not available)				
17 OCT 1996	Insufficient water (data not available)				
25 OCT 1996	6.45	13.48	2.79	384	313
01 NOV 1996	Insufficient water (data not available)				
08 NOV 1996	Insufficient water (data not available)				
13 NOV 1996	Insufficient water (data not available)				
25 NOV 1996	Insufficient water (data not available)				
03 DEC 1996	6.28	5.93	3.32	155	279
19 DEC 1996	6.90	5.50	7.40	75.3	306

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-17					
08 AUG 1996	Insufficient water (data not available)				
14 AUG 1996	Insufficient water (data not available)				
20 AUG 1996	Insufficient water (data not available)				
28 AUG 1996	Insufficient water (data not available)				
03 SEP 1996	Insufficient water (data not available)				
16 SEP 1996	Insufficient water (data not available)				
02 OCT 1996	Insufficient water (data not available)				
08 OCT 1996	Insufficient water (data not available)				
17 OCT 1996	Insufficient water (data not available)				
25 OCT 1996	Insufficient water (data not available)				
01 NOV 1996	Insufficient water (data not available)				
08 NOV 1996	Insufficient water (data not available)				
13 NOV 1996	Insufficient water (data not available)				
25 NOV 1996	Insufficient water (data not available)				
03 DEC 1996	Insufficient water (data not available)				
19 DEC 1996	6.90	5.40	11.50	56.2000	305
WP-18					
08 AUG 1996	5.45	21.11	1.04	178	352
14 AUG 1996	5.29	25.90	0.88	178	375
20 AUG 1996	Insufficient water (data not available)				
28 AUG 1996	Insufficient water (data not available)				
03 SEP 1996	Insufficient water (data not available)				
16 SEP 1996	Insufficient water (data not available)				
02 OCT 1996	5.70	16.10	6.00	174	317
08 OCT 1996	Insufficient water (data not available)				
17 OCT 1996	Insufficient water (data not available)				
25 OCT 1996	5.43	13.17	5.20	234	318
01 NOV 1996	5.43	11.89	5.00	241	342
08 NOV 1996	5.61	12.12	5.00	249	362
13 NOV 1996	5.84	10.59	3.92	261	285
25 NOV 1996	5.79	8.54	3.75	247	313
03 DEC 1996	5.59	7.61	3.98	241	318
19 DEC 1996	6.00	8.40	4.60	180	354

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
WP-19					
08 AUG 1996	5.50	16.79	0.60	281	321
14 AUG 1996	5.20	17.62	0.77	211	328
20 AUG 1996		Sheen of LNAPL present (data not available)			
28 AUG 1996	5.96	17.07	1.00	185	149
03 SEP 1996	5.32	18.68	0.24	198	184
16 SEP 1996					
02 OCT 1996	5.80	15.70	0.86	273	303
08 OCT 1996	6.05	15.53	1.26	323	326
17 OCT 1996	6.30	13.33	1.83	316	302
25 OCT 1996	6.32	12.96	0.82	329	275
01 NOV 1996	6.20	11.53	1.14	267	316
08 NOV 1996	6.15	11.63	1.28	315	340
13 NOV 1996	6.22	10.35	2.33	316	285
25 NOV 1996	6.45	8.66	2.61	232	311
03 DEC 1996	5.98	6.79	1.75	228	288
19 DEC 1996	6.30	7.20	0.85	255	333
WP-20					
08 AUG 1996	5.52	17.69	3.61	474	314
14 AUG 1996	5.55	19.14	0.82	378	288
20 AUG 1996	6.26	19.31	3.09	338	155
28 AUG 1996		Insufficient water (data not available)			
03 SEP 1996		Insufficient water (data not available)			
16 SEP 1996	6.55	16.66	5.20	228	318
02 OCT 1996	6.30	15.80	3.10	418	336
08 OCT 1996	6.00	14.31	2.70	378	341
17 OCT 1996	6.07	12.30	3.00	388	346
25 OCT 1996	6.32	12.91	4.90	247	336
01 NOV 1996	6.29	11.10	3.94	328	328
08 NOV 1996	6.30	10.95	4.10	400	323
13 NOV 1996	6.02	9.36	4.58	477	299
25 NOV 1996	6.12	7.28	3.50	848	350
03 DEC 1996	6.36	4.75	5.10	224	256
19 DEC 1996	6.40	5.80	4.40	478	324

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
MW-44					
08 AUG 1996	5.31	17.38	1.90	65.5	111
14 AUG 1996	5.12	18.16	0.58	87.4	53
20 AUG 1996	5.35	16.89	0.55	93.2	65
28 AUG 1996	Sheen of LNAPL present (data not available)				
03 SEP 1996	Sheen of LNAPL present (data not available)				
16 SEP 1996	Sheen of LNAPL present (data not available)				
02 OCT 1996	5.70	14.58	1.00	92.1	122
08 OCT 1996	5.85	14.07	0.69	87.2	67
17 OCT 1996	6.03	13.14	0.72	98.1	52
25 OCT 1996	5.77	12.20	0.85	92.1	102
01 NOV 1996	5.87	11.56	0.97	91.7	101
08 NOV 1996	6.08	11.20	0.63	123	81
13 NOV 1996	5.71	9.15	0.89	88.8	240
25 NOV 1996	6.23	7.36	3.25	81.5	182
03 DEC 1996	6.07	8.22	2.85	73.1	106
19 DEC 1996	6.20	6.20	1.30	90	78
MW-49					
03 DEC 1996	6.11	9.56	3.82	121.5	119
MW-51					
08 AUG 1996	5.60	15.11	2.64	60.2	306
14 AUG 1996	5.34	15.73	0.55	61.3	311
20 AUG 1996	5.84	15.41	1.50	65.8	242
02 OCT 1996	5.80	12.70	0.17	85.1	194
03 DEC 1996	6.23	7.74	3.40	85.5000	252
MW-54					
03 DEC 1996	5.75	9.76	4.08	177	254
MW-56					
08 AUG 1996	Bent well casing (data not available)				
14 AUG 1996	Bent well casing (data not available)				
20 AUG 1996	Bent well casing (data not available)				
28 AUG 1996	Bent well casing (data not available)				
03 SEP 1996	Bent well casing (data not available)				
16 SEP 1996	Bent well casing (data not available)				
02 OCT 1996	Bent well casing (data not available)				
08 OCT 1996	Bent well casing (data not available)				
17 OCT 1996	Bent well casing (data not available)				
25 OCT 1996	Bent well casing (data not available)				
01 NOV 1996	Bent well casing (data not available)				
08 NOV 1996	Bent well casing (data not available)				
13 NOV 1996	Bent well casing (data not available)				
25 NOV 1996	Bent well casing (data not available)				
03 DEC 1996	Bent well casing (data not available)				
19 DEC 1996	Water flowing out of well (data not available)				

Date	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)
MW-58					
03 DEC 1996	6.09	8.89	4.08	51.4	174
MW-62					
03 DEC 1996	6.20	8.91	2.66	9.62	241
MW-I					
03 DEC 1996	5.88	8.51	5.24	67.9	248
MW-J					
08 AUG 1996	LNAPL present (data not available)				
14 AUG 1996	LNAPL present (data not available)				
20 AUG 1996	LNAPL present (data not available)				
28 AUG 1996	LNAPL present (data not available)				
03 SEP 1996	LNAPL present (data not available)				
16 SEP 1996	LNAPL present (data not available)				
02 OCT 1996	LNAPL present (data not available)				
08 OCT 1996	Insufficient water (data not available)				
17 OCT 1996	5.46	13.72	1.11	202	91
25 OCT 1996	5.67	13.50	5.17	255	125
01 NOV 1996	Strong petroleum odor (data not available)				
08 NOV 1996	5.71	12.55	5.62	186	197
13 NOV 1996	5.70	11.36	5.68	169	213
25 NOV 1996	5.72	10.51	1.38	169	145
03 DEC 1996	5.85	8.36	5.90	276	104
19 DEC 1996	6.10	6.40	11.30	258	310

TABLE 3-3 SUMMARY OF FIELD MEASUREMENTS OF TOTAL VOLATILE HYDROCARBONS AT WELL POINT RISERS ON 9 AUGUST AND 19 DECEMBER 1996 AT THE OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Location	9 August 1996		19 December 1996	
	FID TVH (ppm_v)	PID TVH (ppm_v)	FID TVH (ppm_v)	PID TVH (ppm_v)
WP-1	220	0.35	610	0.6
WP-2	2,700	85.0	7,952	651
WP-3	3.32	1.6	2,200	360
WP-4	14,400	6.62	2,348	232
WP-5	5.87	5.33	1,008	61.5
WP-6	55.62	0.77	2,650	67.5
WP-7	1,275	48.66	188,000	755
WP-8	50,000	48.0	340	45.5
WP-9	0.0	0.06	2.0	1.6
WP-10	20,000	33.28	85	12
WP-11	2,600	146	180,000	560
WP-12	67.95	115	24,000	790
WP-13	20.89	155	0.0	7.0
WP-14	7.35	1.61	0.0	0.0
WP-15	27,000	28.62	0.0	0.0
WP-16	6,027	85.62	0.0	0.0
WP-17	1,795	90.66	No data	No data
WP-18	833	5.60	0.0	0.0
WP-19	2,342	116	11.8	8.1
WP-20	5.67	0.91	0.0	0.0

NOTE: FID = Flame ionization detector.
PID = Photoionization detector.
TVH = Total volatile hydrocarbons.

TABLE 3-4 SUMMARY OF TOTAL AND DEGRADER MICROBIAL POPULATIONS MEASURED IN GROUND-WATER SAMPLES COLLECTED AT WELL POINTS ON 8 AUGUST AND 5 DECEMBER 1996 OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Location	8 August 1996		5 December 1996	
	Total (CFU/mL)[a]	Degrader (CFU/mL)[a]	Total (CFU/mL)[a]	Degrader (CFU/mL)[a]
WP-1	6.0×10^5	2.9×10^5	4.4×10^6	1.1×10^5
WP-2	3.2×10^5	2.5×10^5	5.9×10^5	3.6×10^5
WP-3	1.5×10^6	9.2×10^5	3.4×10^6	2.2×10^4
WP-4	5.3×10^4	6.3×10^4	7.3×10^4	1.0×10^4
WP-5	7.1×10^5	7.5×10^5	1.3×10^5	2.7×10^4
WP-6	1.6×10^6	6.8×10^5	5.5×10^5	5.8×10^4
WP-7	3.0×10^5	1.0×10^5	4.1×10^6	1.2×10^5
WP-8	4.9×10^5	2.2×10^5	7.7×10^4	1.3×10^4
WP-9	3.2×10^5	4.2×10^5	1.6×10^5	1.2×10^4
WP-10	1.4×10^5	1.9×10^5	7.4×10^4	1.3×10^4
WP-11	8.7×10^4	1.6×10^5	5.4×10^5	7.6×10^4
WP-12	4.7×10^5	4.5×10^5	4.9×10^5	8.3×10^4
WP-13	8.9×10^4	8.8×10^4	3.0×10^5	9.3×10^3
WP-14	8.9×10^5	1.1×10^6	6.1×10^4	1.1×10^4
WP-15	3.3×10^4	1.1×10^5	3.5×10^6	1.8×10^5
WP-16	NA	NA	NA	NA
WP-17	NA	NA	NA	NA
WP-18	3.2×10^5	2.2×10^5	3.3×10^4	5.0×10^3
WP-19	7.4×10^5	7.1×10^5	1.5×10^6	5.6×10^4
WP-20	3.7×10^6	3.0×10^6	6.0×10^5	5.3×10^4

(a) CFU/mL indicates colony forming units per milliliter of ground water.

NOTE: NA = Data not available (well point dry).

TABLE 3-5 SUMMARY OF BIODEGRADATION INDICATOR PARAMETERS AND NUTRIENTS MEASURED IN GROUND WATER ON 8 AUGUST AND 5 DECEMBER 1996 OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

	Baseline Biodegradation Indicator Parameters 8 August 1996					First Interim Biodegradation Indicator Parameters 5 December 1996				
Location	Total Organic Nitrogen	C:N	C:P	Sulfate (mg/L)	Nitrate (mg/L)	Total Organic Nitrogen	C:N	C:P	Sulfate (mg/L)	Nitrate (mg/L)
WP-01	9.1	9	NA	38.0	<0.1	49.2	1	NA	170.0	10.0
WP-02	19.9	8	750	60.0	2.2	7.7	4	NA	25.0	7.0
WP-03	34.4	10	875	10.0	2.2	28.4	1	NA	42.0	5.5
WP-04	0.8	914	NA	<0.1	3.3	0.5	44	NA	75.0	5.0
WP-05	1.7	16	NA	33.0	<0.1	10.6	2	NA	20.0	8.7
WP-06	6.6	7	NA	7.5	<0.1	14.5	2	NA	43.0	4.5
WP-07	6.0	6	NA	2.5	<0.1	5.3	7	NA	100.0	5.2
WP-08	1.8	18	NA	120.0	<0.10	1.2	16	NA	140.0	9.5
WP-09	1.2	13	NA	80.0	29.0	0.6	8	NA	118.0	6.2
WP-10	3.2	16	NA	40.0	<0.1	1.9	10	NA	23.0	3.3
WP-11	5.6	8	NA	48.0	1.1	2.5	7	NA	45.0	5.5
WP-12	10.0	6	NA	45.0	2.2	0.6	30	NA	95.0	5.0
WP-13	11.4	11	NA	<0.1	1.1	1.0	6	NA	40.0	7.5
WP-14	1.6	81	NA	25.0	<0.1	2.4	4	NA	20.0	7.0
WP-15	24.5	7	600	10.0	2.2	63.2	1	180	190.0	11.0
WP-16	Data not available; well dry					Data not available; well dry				
WP-17	Data not available; well dry					Data not available; well dry				
WP-18	2.7	115	NA	38.0	11.0	1.0	15	NA	43.0	6.0
WP-19	4.4	55	NA	35.0	<0.1	5.0	5	NA	30.0	5.5
WP-20	1.6	5	NA	78.0	<0.1	1.0	6	NA	140.0	8.0

NOTE: C:N = Carbon to nitrogen ratio.
C:P = Carbon to phosphorous ratio.
NA = Not applicable.

TABLE 3-6 SUMMARY OF ANALYTICAL RESULTS FOR GROUND-WATER SAMPLES COLLECTED ON 7-8 AUGUST 1996 AT THE OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Compound	Sample Location												
	WP-01	WP-01-DUP	WP-02	WP-03	WP-04	WP-05	WP-06	WP-07	WP-08	WP-09	WP-10	WP-11	WP-11-DUP
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 602 (μg/L)													
Benzene	(<1.0U)	(<1.0U)	5.6	17	1.6	12	(<1.0U)	(<1.0U)	15	1.0	31	78	75
Toluene	2.1	2.1	34	72	3.8	740[a]	3.8	12.0	6.4	5.4	46	3,000[a]	3,000[a]
Ethylbenzene	(<1.0U)	(<1.0U)	94	1.3	7.5	700[a]	(<1.0U)	6.0	1.5	1.3	17	170	220
Total xylenes	12.0	16.1	490	3.1	15.5	4,300[a]	3.7	49.2	6.1	8.7	72	750	980
Total BTEX	14.1	18.2	623.6	93.4	28.4	5,752	7.5	67.2	29.0	16.4	166	3,998	4,275
MTBE	16	12	34	1.3	31	14	32	9.9	29	130	49	51	32
TPH BY METHOD MEDEP LOP 4.2.17 (μg/L)													
TPH-GRO	77	54	4,200	140	890	9,000	31	2,500	220	93	550	5,500	10,000
TPH BY METHOD MEDEP LOP 4.1.25 (μg/L)													
TPH-DRO	1,000	1,100	16,000	410	1,300	1,000	150	680	480	89	420	3,600	3,000

(a) Sample concentration exceeded calibration range. Sample diluted and re-analyzed.

NOTE:
- BTEX = Benzene, toluene, ethylbenzene, and total xylenes.
- MEDEP LOP = Maine Department of Environmental Protection Laboratory Operating Procedure.
- MTBE = Methyl tertiary-butyl ether.
- TPH-GRO = Total petroleum hydrocarbons-gasoline range organics.
- TPH-DRO = Total petroleum hydrocarbons-diesel range organics.
- U = Not detected. Sample quantitation limits are shown as (<___U).

Compound	Sample Location											
	WP-13	WP-14	WP-15	WP-18	WP-19	WP-20	MW-44	MW-44-DUP	MW-51	MW-56	RBLK-1	RBLK-2
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 602 (μg/L)												
Benzene	15	(<1.0U)	5.5	(<1.0U)	(<1.0U)	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)
Toluene	380	10	19	7.8	3.4	7.2	2.5	2.7	1.2	1.8	(<1.0U)	(<1.0U)
Ethylbenzene	56	(<1.0U)	1.7	(<1.0U)	(<1.0U)	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)
Total xylenes	315	4.5	7.6	3.8	1.2	6.3	1.1	1.8	(<1.0U)	1.0	(<1.0U)	(<1.0U)
Total BTEX	766	14.5	33.8	11.6	4.6	15.5	3.6	4.5	1.2	2.8	ND	ND
MTBE	89	1.6	2.0	(<1.0U)	3.9	36	(<1.0U)	(<1.0U)	4.8	(<1.0U)	(<1.0U)	(1.0U)
TPH BY METHOD MEDEP LOP 4.2.17 (μg/L)												
TPH-GRO	2,200	34	47	22	260	320	16	(<10U)	14	44	(<10U)	(<10U)
TPH BY METHOD MEDEP LOP 4.1.25 (μg/L)												
TPH-DRO	580	140	500	75	100	73	(<50U)	(<50U)	(<50U)	56	57	74

NOTE: ND = No detected BTEX compounds.
RBLK = Equipment rinsate blank.

TABLE 3-7 SUMMARY OF FIELD TEST KIT RESULTS FOR FERROUS IRON AND MANGANESE CONCENTRATIONS IN GROUND-WATER SAMPLES COLLECTED ON 7 AUGUST AND 6 DECEMBER 1996 AT THE OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Location	7 August 1996		6 December 1996	
	Ferrous Iron (mg/L)	Manganese (mg/L)	Ferrous Iron (mg/L)	Manganese (mg/L)
WP-1	1.1	0.6	12.0	0.6
WP-2	0.9	ND	LNAPL present	LNAPL present
WP-3	NA	NA	0.6	0.1
WP-4	4.8	ND	LNAPL present	LNAPL present
WP-5	1.4	ND	0.6	0.4
WP-6	1.1	ND	0.9	0.1
WP-7	ND	ND	LNAPL present	LNAPL present
WP-8	4.8	2.0	0.3	0.2
WP-9	ND	ND	ND	ND
WP-10	0.9	ND	0.4	0.3
WP-11	0.9	ND	0.2	0.1
WP-12	NA	NA	0.5	1.1
WP-13	4.0	ND	0.2	0.1
WP-14	0.9	0.5	0.9	0.8
WP-15	2.2	ND	0.7	0.0
WP-16	NA	NA	1.3	0.0
WP-17	NA	NA	NA	NA
WP-18	0.2	ND	0.1	0.0
WP-19	0.9	ND	1.6	0.3
WP-20	0.4	ND	0.1	0.2

NOTE: LNAPL = Light, non-aqueous phase liquid.
NA = No data; well point dry or water too turbid to obtain data.
ND = Not detected; no response from test kit (i.e., <0.1 mg/L).

TABLE 3-8 SUMMARY OF WELL POINT RISER HEAD SPACE METHANE AND TOTAL VOLATILE HYDROCARBON CONCENTRATIONS OBTAINED ON 28 AUGUST AND 3 SEPTEMBER 1996 OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Location	Well Point Head Space Vapor Measurements 28 August 1996					Well Point Head Space Vapor Measurements 3 September 1996				
	FID TVH (ppm_v)	PID TVH (ppm_v)	CH_4 (%)	CO_2 (%)	O_2 (%)	FID TVH (ppm_v)	PID TVH (ppm_v)	CH_4 (%)	CO_2 (%)	O_2 (%)
WP-01	183	0.0	0.0	0.4	20.6	103	0.6	0.0	0.0	21.8
WP-02	1,210	65.4	11	5.1	15.5	3,228	263	7.6	4.8	15.3
WP-03	48.3	0.0	0.0	0.4	20.6	80.7	15.8	0.0	0.3	21.4
WP-04	130	12.1	0.1	10.5	8.5	817	90.6	0.1	15.6	4.7
WP-05	10.5	0.8	0.0	1.8	21.1	19.5	5.4	0.0	1.2	20.7
WP-06	7.4	0.0	0.0	0.0	20.9	71.3	7.1	0.0	0.2	21.6
WP-07	220	8.7	0.7	7.4	14.9	712	17.3	0.7	5.9	16.1
WP-08	1.1%	146	46.6	10.8	11.5	7.1%	170	52.6	17.5	4.8
WP-09	2.5	0.0	0.0	2.5	18.8	10.2	2.2	0.0	2.2	19.1
WP-10	5,341	6.1	7.7	34.2	0.0	1.3%	18.3	7.6	27.2	4.6
WP-11	900	75.0	1.8	4.4	17.5	3,097	182	3.9	6.2	14.9
WP-12	1,200	29.0	38.6	5.6	14.9	5.2%	220	>90.0	8.7	11.3
WP-13	3.8%	265	>90.0	6.4	7.2	14.4%	280	>90.0	8.6	1.9
WP-14	2.8	0.0	0.0	1.7	20.2	1.5	24.9	0.0	1.4	21.3
WP-15	30.9	2.4	0.0	1.8	19.7	41.3	40.1	0.2	2.0	19.4
WP-16	6.43	0.1	0.0	2.6	18.5	17.2	38.9	0.1	0.3	19.0
WP-17	2,604	135	7.2	3.5	16.7	6,525	250	6.1	2.9	17.8
WP-18	2.8	0.0	0.0	0.2	20.9	0.5	1.5	0.0	0.4	21.8
WP-19	19.0	0.6	0.0	1.4	20.4	85.4	350	0.1	4.1	17.0
WP-20	14.0	0.5	0.1	1.3	20.5	NA	50.3	0.0	0.8	20.6

NOTE: FID response expressed as ppm_v except where noted.
Background oxygen approximately 21.8 percent.
Methane, carbon dioxide, and oxygen measurements taken with a Landtec GA-90 methane detector.
Methane detection limit was 0.1 percent.
FID = Flame ionization detector.
PID = Photoionization detector
TVH = Total volatile hydrocarbons.

TABLE 3-9 SUMMARY OF ANALYTICAL RESULTS FOR GROUND-WATER SAMPLES COLLECTED ON 4 AND 5 DECEMBER 1996 AT THE FUEL FARM, NAVAL AIR STATION BRUNSWICK, MAINE

Compound	Sample Location														
	WP-01	WP-03	WP-03 DUP	WP-05	WP-06	WP-08	WP-09	WP-10	WP-11	WP-12	WP-13	WP-14	WP-15	WP-16	WP-18
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 602 (μg/L)															
Benzene	(<1.0U)	(<1.0U)	(<1.0U)	17	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	9.9	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U	(<1.0U)	(<1.0U)
Toluene	(<1.0U)	2.6	1.2	240	2.9	(<1.0U)	(<1.0U)	4.0	220	190	(<1.0U)	(<1.0U)	(<1.0U	1.2	1.6
Ethylbenzene	(<1.0U)	(<1.0U)	(<1.0U)	350	(<1.0U)	(<1.0U)	(<1.0U)	2.0	1.7	9.1	(<1.0U)	(<1.0U)	(<1.0U	(<1.0U)	(<1.0U)
Total xylenes	2.2	5.1	4.7	2,420	1.4	1.3	1.0	13.6	38	392	57	(<1.0U)	(<1.0U	1.3	1.5
Total BTEX	2.2	7.7	5.9	3,027	4.3	1.3	1.0	19.6	269.6	591.1	57	ND	ND	2.5	3.1
MTBE	(<1.0U)	(<1.0U)	(<1.0U)	8.7	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U	(<1.0U)	(<1.0U)
TPH BY METHOD MEDEP LOP 4.2.17 (μg/L)															
TPH-GRO	3,300	4,100	160	4,800	20	270	730	130	3,400	870	950	15	(<10U)	11	35
TPH BY METHOD MEDEP LOP 4.1.25 (μg/L)															
TPH-DRO	750	670	400	(<50U)	(<50U)	150	(<50U)	(<50U)	220	390	3,100	62	66	(<50U)	(<50U)

NOTE:
- BTEX = Benzene, toluene, ethylbenzene, and total xylenes.
- MEDEP LOP = Maine Department of Environmental Protection Laboratory Operating Procedure.
- MTBE = Methyl tertiary-butyl ether.
- ND = No detected BTEX compounds.
- TPH-GRO = Total petroleum hydrocarbon-gasoline range organics.
- TPH-DRO = Total petroleum hydrocarbon-diesel range organics
- U = Not detected. Sample quantitation limits are shown as (<___U).

Compound	Sample Location													
	WP-19	WP-20	MW-44	MW-49	MW-49 DUP	MW-51	MW-54	MW-58	MW-62	MW-I	MW-J	Trip Blank	RBLK-1	RBLK-2
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 602 (μg/L)														
Benzene	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	1,300[a]	(<1.0U)	(<1.0U)	(<1.0U)
Toluene	1.2	1.2	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	12,000[a]	(<1.0U)	(<1.0U)	(<1.0U)
Ethylbenzene	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	1.6	(<1.0U)	1.2	(<1.0U)	(<1.0U)	2.0	250	(<1.0U)	(<1.0U)	(<1.0U)
Total xylenes	2.6	3.6	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	2770	(<1.0U)	(<1.0U)	(<1.0U)
Total BTEX	3.8	4.8	ND	ND	1.6	ND	1.2	ND	ND	2.0	16,320	ND	ND	ND
MTBE	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	120	(<1.0U)	(<1.0U)	(<1.0U)
TPH BY METHOD MEDEP LOP 4.2.17 (μg/L)														
TPH-GRO	1,100	14	110	(<10U)	(<10U)	(<10U)	15	(<10U)	11	100	30,000	NA	12	(<10U)
TPH BY METHOD MEDEP LOP 4.1.25 (μg/L)														
TPH-DRO	210	(<50U)	290	110[b]	150[b]	(<50U)[b]	260[b]	230[b]	52	66[b]	6,700[c]	NA	(<50U)	(<50U)

(a) Sample concentration exceeds calibration range. Sample diluted and re-analyzed.
(b) Chromatographic patterns indicated the presence of a heavy petroleum product, much of which eluted beyond the DRO retention time range.
(c) 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.

NOTE: NA = Not analyzed.
RBLK = Equipment rinsate blank.

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Appendix A

Field Record of Water Quality Analysis Forms

EA Engineering, Science, and Technology

- BASELINE -

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

Note: Prior to System Activation

EA Personnel: CJV, BA, MC, SC	Date: 8/8/96	Time: 16:00
Weather: Hazy, Breezy, @ 85°F	Equipment: Interface Probe / Hydrolab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µhmos) mS/cm	Redox (mV)	Riser Comments	Bottom
WP-1	4.55	–	5.25	16.40	0.39	0.404	-100	2.70	8.50
WP-2	5.78	Sheen						3.40	8.50
WP-3	4.34	–	4.42	16.45	0.43	0.0648	241	2.35	6.76
WP-4	5.89	–	4.77	16.94	0.69	0.188	232	1.85	7.75
WP-5	5.45	–	4.25	15.51	0.58	0.1415	175	2.20	7.97
WP-6	4.60	–	5.01	15.51	0.34	0.0979	225	2.00	7.92
WP-7	4.90	–	Bent Casing					2.30	8.00
WP-8	5.55	–	5.55	17.08	0.42	0.787	222	2.20	7.96
WP-9	6.86	–	3.71	16.89	5.40	0.443	276	1.40	7.72
WP-10	5.65	–	4.15	13.77	0.48	0.194	311	1.20	8.31
WP-11	5.21	–	4.34	16.13	0.64	0.172	236	2.10	7.94
WP-12	7.69	–	Insufficient Water					2.30	7.85
WP-13	6.32	–	4.80	17.14	0.83	0.1144	284	2.35	7.94
WP-14	6.33	–	4.72	16.28	0.75	0.1086	300	2.22	8.18
WP-15	5.85	–	4.49	15.77	0.41	0.0731	323	2.73	8.31
WP-16	Dry							3.57	8.00
WP-17	Dry							3.65	8.23
WP-18	6.51	–	5.45	21.11	1.04	0.178	352	1.87	7.10
WP-19	5.12	–	5.50	16.79	0.60	0.281	321	2.75	8.05
WP-20	6.70	–	5.52	17.69	3.61	0.474	314	3.58	7.93

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- Baseline -

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: CJV, ML, SC, DA	Date: 8/8/96	Time: 16:00
Weather: Hazy, Breezy, @ 85°F	Equipment: Interface Probe/Hydrolab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Kissr	B.Tl. Comments
MW-44	3.46	–	5.31	17.38	1.90	0.0655	111	1.70	15.95
MW-51	5.51	–	5.60	15.11	2.64	0.0602	306	–	16.4
MW-56	5.25	–	—	Bent	Casing	—	—	1.30	14.93
MW-J	—	Product	—	—	—	—	—	—	—
211J									

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	MOC, SYC	Date:	8/14/96	Time:	13:00
Weather:	Sunny, Breezy, ≈80°F	Equipment:	Interface Probe, Hydrolab		

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature ~~(°F)~~ °C	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	4.87	Sheen	—	—	—	—	—	
WP-2	6.00	–	5.15	19.00	0.36	0.342	-45	
WP-3	4.67	–	4.64	18.47	0.30	0.0583	187	
WP-4	6.25	–	5.06	18.20	0.20	0.238	-15	
WP-5	5.51	Sheen	—	—	—	—	—	
WP-6	4.79	–	5.05	16.15	0.36	0.1043	-25	
WP-7	5.10	–	—	Bent Risers		—	—	
WP-8	5.78	–	5.67	18.20	0.62	0.851	-79	
WP-9	7.16	–	5.20	20.77	2.21	0.424	275	
WP-10	5.80	–	4.23	14.95	0.68	0.225	-16	
WP-11	5.30	–	4.46	17.48	0.61	0.210	8	
WP-12	7.70	–	—	Insufficient Water Volume			—	
WP-13	6.57	–	4.85	19.36	0.76	0.246	250	
WP-14	6.36	–	4.88	17.65	0.88	0.1263	239	
WP-15	5.86	–	4.70	17.72	0.78	0.1279	187	
WP-16	Dry	—	—	—	—	—	—	
WP-17	Dry	—	—	—	—	—	—	
WP-18	6.55	–	5.29	25.9	0.88	0.178	375	
WP-19	5.16	–	5.20	17.62	0.77	0.211	328	
WP-20	6.85	–	5.55	19.14	0.82	0.378	288	

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MOC, SKC	Date: 8/14/96	Time: 13:00
Weather: Sunny, Breezy, 80°F	Equipment: Interface Probe, Hydrolab	

PID/FI

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	TVA 1000 Comments
MW-49	4.25	–	5.12	18.16	0.58	0.0874	53	1.5/0.0
MW-51	5.92	–	5.74	15.73	0.55	0.0613	311	NA
MW-56	– Water Bubbling			Over	Pipe	Casing	–	1.8/130
~~J-211~~	~~Water Bubbling~~							
J-211	7.91	7.74	–	–	Product	–	–	163/2680

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC	Date: 8/20/96	Time: 1410
Weather:	Equipment: inner face probe Hydrolab:	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	5.09	—	5.49	17.09	.45	.497	-43	
WP-2	6.17	Sheen						
WP-3	4.90	Sheen						
WP-4	4.54	—	5.19	17.67	.55	.238	44	
WP-5	5.71	Sheen						
WP-6	4.98	Sheen						
WP-7	5.36	—	Bent					
WP-8	5.95	—	5.67	18.44	.47	.872	-86	
WP-9	Dry							
WP-10	6.13	-	4.38	14.03	.42	.265	-33	
WP-11	5.61	-	4.46	16.50	.73	.220	15	
WP-12								
WP-13	~~Dry~~ 6.80	Sheen						
WP-14	6.73	—	4.80	17.26	1.25	.1322	79	
WP-15	6.28	—	4.77	17.04	.27	.1014	298	
WP-16	Dry							
WP-17	Dry							
WP-18	Dry							
WP-19	5.45	Sheen						
WP-20	7.05	-	6.26	19.31	3.09	.338	155	

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC	Date: 8/20/96	Time: 1410
Weather:	Equipment: Interface Probe	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
MW-51 Weed	6.28	--	5.84	15.91	1.50	.0658	242	
211-J	8.13	7.97						
MW-44 Lowner	4.45	–	5.35	16.89	.55	.0932	65	
Field	water	bubbling	and	foaming				

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	CJV, SAP	Date: 8/28/96	Time:
Weather:	Cloudy, @ 65°F	Equipment:	Interface Probe/Hydrolab

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	5.21		5.36	17.09	0.36	0.451	-22	
WP-2	6.27		5.40	18.07	0.53	0.513	-30	
WP-3	5.08	SHEEN 5.08						
WP-4	6.89	SHEEN 6.89						
WP-5	5.83		4.59	16.63	0.48	0.1307	143	
WP-6	5.11		5.04	16.53	0.44	0.1140	-14	
WP-7	5.48		4.85	18.23	0.08	0.0068	134	
WP-8	6.19		5.73	18.11	0.28	0.877	-38	
WP-9	DRY							
WP-10	6.32	6.32	Sheen					
WP-11	5.75	5.75	Sheen					
WP-12	7.88		insufficient water					
WP-13	7.12	7.12	Sheen					
WP-14	6.93		5.01	17.29	0.92	0.137	26	
WP-15	6.45		4.91	16.60	0.28	0.1068	176	
WP-16	DRY							
WP-17	DRY							
WP-18	DRY							
WP-19	5.72		5.46	17.07	1.00	0.185	149	
WP-20	7.25		insufficient water					

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	CJV, SAP	Date:	8/28/96	Time:	
Weather:	Cloudy, 65°F	Equipment:	Interface Probe/Hydrolab		

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
MW-44	4.05	4.05 Sheen						
J MW-21	8.04	7.93	Product					
MW-56	3.55							H_2O Bubbles FOAM

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC	Date: 9/3/96	Time: 930
Weather: 29.9 in.	Equipment: Hydrolab, interface probe	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Comments
WP-1	4.97	—	5.4	17.2	.25	.51	-50	
WP-2	6.08	—	5.3	18.3	.16	.333	-59	
WP-3	5.04	—	4.8	18.3	.56	.0539	60	
WP-4	7.08	Sheen						
WP-5	5.73	—	4.7	16.5	.37	.1138	2	
WP-6	5.04	—	5.1	17.05	.21	.1227	-48	
WP-7	5.47							
WP-8	6.28		5.8	18.9	.31	.953	-71	
WP-9	Dry							
WP-10	~~3.76~~ 6.42	~~4.1~~ 6.42						
WP-11	5.75	—	4.6	17.9	.31	.242	4	
WP-12	Dry							
WP-13	Dry							
WP-14	7.04	—	5.0	18.4	.34	.1418	-23	
WP-15	4.49	—	4.7	18.0	.12	.1112	120	
WP-16	Dry							
WP-17	Dry							
WP-18	Dry							
WP-19	5.76	—	5.32	18.68	.24	.198	184	
WP-20	Dry							

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC	Date: 9/16/96	Time: 3:30
Weather: [illegible]	Equipment:	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	4.15	—	5.5	16.6	.5	.200	285	
WP-2	5.35	—	5.6	17.2	.5	.234	267	
WP-3			5.6	16.2	.6	.0930	245	
WP-4	6.37	—	5.7	17.3	.4	.282	234	
WP-5	5.08	—	5.0	15.7	1.2	.167	308	
WP-6	4.35	Sheen						
WP-7	4.62	Bent						
WP-8	5.25	Sheen						
WP-9	Dry							
WP-10	5.24	5.14						
WP-11	4.93	Sheen						
WP-12	Dry							
WP-13	5.35	Sheen						
WP-14	5.78	—	5.5	16.6	.6	.1407	277	
WP-15	5.42	—	5.6	16.6	.4	.1131	286	
WP-16	6.84	—	6.2	18.04	1.2	.446	329	
WP-17	Dry							
WP-18		5.75	Sheen					
WP-19	4.73	Sheen						
WP-20	6.17	—	6.55	16.66	5.2	.228	318	

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FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 9/16/96	Time:
Weather:	Equipment:	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Comments
211-J	7.74	7.67						

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: [illegible]	Date: 10/2/96	Time: 1300
Weather: [illegible]	Equipment: [illegible]	[illegible]

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	4.40	—	5.7	15.5	.40	.392	12	
WP-2	5.67	—	5.6	15.48	.75	.353	19	
WP-3	4.58	—	6.0	15.06	.94	.0744	206	
WP-4	6.40	—	5.7	16.03	.71	.287	136	
WP-5	6.05	—	5.3	14.7	.73	.1080	87	
WP-6	4.35	—	5.0	14.7	.65	.1088	94	
WP-7	5.72	[illegible]						
* WP-8	6.50	—	6.2	16.02	5.8	.449	166	over
WP-9	Dry							
WP-10	5.35	—	5.4	14.4	.54	.127	62	
WP-11	5.10	—	5.1	14.9	.93	.281	262	
WP-12	Dry							
WP-13	6.40	—	5.3	15.6	.99	.1393	279	
WP-14	6.13	—	5.4	15.3	.95	.1338	216	
WP-15	6.03	—	5.0	15.2	2.0	.1056	270	Sediment on bottom
WP-16	Dry							
WP-17	Dry							
WP-18	6.39	—	5.7	16.1	6.0	.174	317	
WP-19	5.35	—	5.8	15.7	.86	.273	303	
WP-20	6.50	—	6.3	15.8	3.1	.418	336	

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	MDC	Date:	10/2/96	Time:	1300
Weather:	65° Cloudy	Equipment:	Solinst		Hydrolab

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
211-J	7.15	7.05						
44	3.47	—	5.7	14.58	1.0	.0931	122	
56	5.10	—	Bent well — can't hear water churning					
51	5.85	+	5.8	12.7	.17	.0851	194	

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC SYC	Date: 10/8/96	Time:
Weather: overcast, 50	Equipment: hydrolab, Solinst	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	4.75	—	5.80	14.31	0.476	.378	141	
WP-2	5.92	—	6.04	14.52	0.32	0.291	11	
WP-3	4.85	—	5.45	14.28	0.74	0.0648	193	
WP-4	6.77	—	5.67	14.95	0.75	0.258	186	
WP-5	5.62	—	5.23	14.12	0.36	0.0896	243	
WP-6	5.01	—	5.37	14.13	0.72	0.1017	162	
WP-7	5.95	—	bent casing					
WP-8	DRY	—						→
WP-9	DRY	—						→
WP-10	5.91	—	5.36	13.87	0.44	0.1446	78	
WP-11	6.05	—	5.29	14.17	0.46	0.246	88	
WP-12	DRY	—						→
WP-13	6.68	—	5.45	14.60	1.26	0.1423	245	
WP-14	6.68	—	5.73	14.68	1.43	0.1335	272	
WP-15	DRY	mud on bottom						
WP-16	DRY	—						→
WP-17	DRY	—						→
WP-18	~~DRY~~	insufficient water						→
WP-19	5.30	—	6.05	15.53	1.26	0.323	326	
WP-20	6.60	—	6.0	14.31	2.70	0.378	341	

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	MDC SFC	Date:	10/8/96	Time:	
Weather:	overcast 50°F	Equipment:	Hydrolab, Solinst		

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Comments
J-211 ✓	9.30	—	insufficient water					
44 ✓	3.70	—	5.85	14.07	0.69	0.0872	67	
56 ✓	11.35	—	bent casing					

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC SPC	Date: 10/17/96	Time:
Weather: Cool Sun Breezy	Equipment: Hydrolab [illegible]	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Comments
WP-1	4.75	—	5.85	13.17	0.62	0.325	111	
WP-2	5.85	—	6.03	13.03	1.13	0.302	110	
WP-3	4.80	—	5.49	13.05	3.28	0.0710	225	
WP-4	3.70	—	5.81	13.65	1.32	0.249	126	
WP-5	5.53	—	5.28	12.89	1.16	0.1030	256	
WP-6	4.81	—	5.31	12.88	0.67	0.0994	226	
WP-7	5.05	—		bent casing				
WP-8	6.15	—	6.06	13.57	6.30	0.409	231	Sparging
WP-9	DRY	—						
WP-10	5.87	—	5.32	12.83	0.91	0.1263	217	
WP-11	5.35	—	5.24	12.77	1.49	0.274	278	
WP-12	DRY	—						
WP-13	5.84	5.72						
WP-14	6.47	—	5.46	12.91	3.17	0.1077	306	
* WP-15	6.20	—	5.64	12.88	1.39	0.0948	308	Sparging ~~being~~
WP-16	dry	—						
WP-17	dry	—						
WP-18	6.55	—		insufficient water				
WP-19	5.33	—	6.30	13.33	1.83	0.316	302	
WP-20	6.58	—	6.07	12.30	3.00	0.388	346	

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* possibly insufficient water - data may be inaccurate

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: M.D. S.C.	Date: 10/17/96	Time:
Weather:	Equipment: [illegible]	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
* J-MW211	7.85	—	5.46	13.72	1.11	0.202	91	nyaro contaminated
MW-44	6.37	—	6.03	13.14	0.72	0.0981	52	
MW-54	water	sparging	to top	of	PVC	casing		

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* pepe pond - hydrocut Fits snug

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	SYC MDC	Date:	10/25/96	Time:	[illegible]
Weather:	[illegible]	Equipment:	[illegible]		

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	3.80	—	5.65	12.37	0.63	0.0950	271	
WP-2	5.18	—	5.74	12.07	0.75	0.268	135	
WP-3	3.95	—	5.70	12.45	1.20	0.0873	196	
WP-4	5.40	—	5.61	13.03	0.49	0.263	208	
WP-5	5.85	—	5.22	12.33	3.51	0.0955	279	
WP-6	4.05	—	5.52	12.19	0.52	0.1088	257	
WP-7	4.05	—	6.55	12.09	2.85	0.253	191	
WP-8	2.30	—	6.26	12.93	3.75	0.361	243	
WP-9	6.25	—	5.80	13.27	7.15	0.400	258	
WP-10	4.60	—	5.08	12.38	0.67	0.1266	328	
WP-11	4.45	—	5.36	11.89	2.12	0.225	321	
WP-12	[illegible]	DRY	—					
WP-13	3.55	—	5.72	12.07	0.75	0.0876	226	
WP-14	5.25	—	5.38	12.48	3.07	0.1137	319	
WP-15	4.98	—	5.78	12.30	1.38	0.0879	266	
WP-16	7.00	—	6.45	13.48	2.79	0.384	313	
WP-17	Dry	—						
WP-18	5.35	—	5.43	13.12	5.20	0.234	318	
WP-19	4.33	—	6.32	12.96	0.82	0.329	275	
WP-20	5.28	—	6.32	12.91	4.90	0.247	336	

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC, MBC	Date: 10/25/96	Time: [illegible]
Weather: [illegible]	Equipment: hydrolab, interface probe, Solinst	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Comments
MW-211 ✓	5.05	—	5.67	13.50	5.17	0.255	125	
44 ✓	3.05	—	5.77	12.20	0.85	0.0921	102	
54 ✓	4.20	bent	casing					

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC, SYC	Date: 11/1/96	Time:
Weather:	Equipment: Solinst interface probe hydrolab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	3.87	—	5.85	11.13	1.18	0.1085	247	
WP-2	5.15	—	5.85	10.79	1.22	0.280	150	hydrocarbon odor
WP-3	3.85	—	5.76	11.54	1.08	0.0714	189	
WP-4	5.35	—	5.63	11.63	1.03	0.228	224	
WP-5	4.94	—	5.35	11.61	0.78	0.0880	290	
WP-6	3.70	—	5.26	11.15	1.30	0.1055	305	
WP-7	3.25	—	bent casing					
WP-8	6.00	—	6.36	12.33	8.38	0.321	271	sparging
WP-9	6.72	—	5.81	12.05	7.03	0.388	279	
WP-10	4.74	—	5.20	11.06	0.75	0.1050	325	
WP-11	3.95	—	5.35	10.71	1.02	0.241	310	
WP-12	6.82	—	insufficient water					
WP-13	4.70	—	5.83	10.95	9.41	0.0992	252	sparging
WP-14	5.35	—	6.59	11.59	2.93	0.1109	329	
WP-15	4.80	—	5.88	10.69	2.48	0.0935	316	
WP-16	7.52	—	insufficient water					
WP-17	Dry	—						
WP-18	5.35	—	6.43	11.89	5.00	0.241	342	
WP-19	4.35	—	6.20	11.53	1.14	0.267	316	
WP-20	5.45	—	6.29	11.10	3.94	0.328	328	

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: [illegible]	Date: 11/1/96	Time:
Weather:	Equipment: Solinst Hydrolab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
MW56	4.15	—	bent casing			—		
MW-211	6.55	—	~~4.26~~	~~8.75~~		~~0.231~~	~~[illegible]~~	hydrocarbon odor
* 211 ~~MW-41~~			5.77	12.71	6.40	0.220	208	
MW-44	290	—	5.87	11.56	0.97	0.0917	101	

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* bent PVC casing - snug fit w/ hydrolab

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FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC, MDC	Date: 11/8/96	Time: ~~200~~ 1400
Weather: overcast, windy 60	Equipment: solinst interface probe hydrolab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	4.05	—	6.02	11.04	0.75	~~+28~~ 377	120	
WP-2	5.22	—	6.18	10.35	0.88	0.291	88	
WP-3	4.05	—	5.69	11.00	1.31	0.0661	210	
* WP-4	6.00	~~5.36~~						
WP-5	5.22	—	5.42	11.45	0.81	0.0850	289	
WP-6	4.15	—	5.30	11.15	0.86	0.0981	308	
WP-7	5.10	—		Bent	casing	—	—	sparging
WP-8	5.18	—	6.36	11.58	8.75	0.460	283	sparging
WP-9	7.07	—		insufficient	water	—	—	
WP-10	5.06	—	5.17	11.82	0.70	0.954	328	
WP-11	4.82	—	5.42	10.97	2.10	0.278	315	
WP-12	7.45	—		insufficient	water			
WP-13	5.40	—	5.76	10.53	9.14	0.1033	264	sparging
WP-14	5.73	—	5.64	11.23	3.07	0.1120	310	
WP-15	5.40	—	5.65	10.86	1.88	0.0988	296	
WP-16	DRY	—					→	
WP-17	DRY	—					→	positive pressure
WP-18	5.59	—	5.61	12.12	5.00	0.249	362	
WP-19	4.65	—	6.15	11.63	1.28	0.315	340	
WP-20	5.82	—	6.30	10.95	4.10	0.400	323	

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* yellow product over thick foamy substance

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FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	SYC, MDC	Date:	11/8/96	Time:	1400
Weather:	Overcast, windy 60°	Equipment:	Solinst interface probe + Hydrolab		

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
MW-56	4.72	Dent		casing				
MW-211	7.15	—	5.71	12.55	5.62	0.186	197	hydrocarbon odor
MW-44	2.95	—	6.08	11.20	0.63	0.1228	81	

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FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC, MDC	Date: 11/13/96	Time:
Weather: Sunny, 35°	Equipment: ~~Stoppell~~ Solinst Interface probe Hydrolab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
WP-1	4.25	—	5.75	9.94	1.75	0.376	103	
WP-2	5.50	—	5.74	9.31	1.35	0.296	198	
WP-3	4.20	—	5.71	9.94	1.12	0.0885	255	
* WP-4	6.70	5.58	—					→
WP-5	5.11	—	5.26	10.02	1.28	0.0846	280	
WP-6	4.37	—	5.15	10.05	0.67	0.0979	282	
WP-7	5.10	—		bent	casing			
WP-8	5.50	—	5.34	10.20	3.79	0.440	271	
WP-9	DRY	—						→
WP-10	5.22	—	5.08	10.33	1.75	0.0922	271	
WP-11	4.95	Sheen						
WP-12	7.58	—		insufficient	water			
WP-13	5.75	—	5.67	9.43	9.93	0.1646	284	
WP-14	5.90	—	5.66	10.17	3.94	0.1115	299	
WP-15	5.40	—	5.49	9.50	1.68	0.0964	302	
WP-16	DRY	—						→
WP-17	DRY	—						→
WP-18	5.65	—	5.84	10.59	3.92	0.261	285	
WP-19	4.75	—	6.22	10.35	2.33	0.316	285	
WP-20	6.02	—	6.02	9.36	4.58	0.477	299	

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* yellow product black sheen below product

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FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC MDC	Date: 11/13/96	Time:
Weather: sunny 35	Equipment: inlegow probe hydrolab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Comments
MW-211	7.32	—	5.70	11.36	5.68	0.169	213	
MW-44	3.22	—	5.71	9.15	0.89	0.0333	240	
MW-56	4.65	—	bend casing					→

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FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC	Date: 11/25/96	Time:
Weather: 40 overcast snowing	Equipment: hydrolab Hyper Fine probe	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Comments
WP-1	4.45	—	6.07	8.18	1.10	0.372	130	
WP-2	5.61	—	6.08	7.56	2.36	0.295	51	
WP-3	4.46	—	5.67	8.00	2.08	0.733	231	
* WP-4	6.79	6.10						
WP-5	5.39	—	5.65	8.89	0.89	0.0787	257	
WP-6	4.53	—	5.65	8.69	0.75	0.0920	256	
* WP-7	6.22	4.27						
WP-8	5.86	—	6.16	8.69	4.89	0.471	260	
WP-9	DRY	—						
WP-10	5.41	—	5.18	9.60	1.32	0.0930	337	
WP-11	5.16	—	5.48	8.36	1.75	0.248	329	
WP-12	DRY							
WP-13	6.78	—	5.80	8.35	7.70	0.1118	251	Sparging
WP-14	5.90	—	5.70	7.81	4.87	0.1052	311	
WP-15	5.30	—	5.94	8.07	0.33	0.0882	286	sparging
WP-16	DRY							
WP-17	DRY							
WP-18	5.79	—	5.79	8.54	3.75	0.297	313	
WP-19	4.96	—	6.45	8.66	2.61	0.232	311	
WP-20	6.39	—	6.12	7.25	3.50	0.378	350	

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* product appears to be light yellow to clear in color

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC	Date: 11/25/96	Time:
Weather: 40 overcast snowing	Equipment: Hydrolab / interface Probe	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (µhmos)	Redox (mV)	Comments
MW-56	sparging	water	surges	outside	top	casing		
MW-211	5.11	—	5.72	10.51	1.38	0.469	145	
MW-44	3.32	—	6.23	7.56	3.25	0.0315	182	

EA 5120 0794-7

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/3/96
Weather/Temperature/Barometric Pressure/Humidity: 35°, overcast		
EA Personnel: SYC	Equipment:	

Well Number	Well Elevation	Depth to Water	Depth to LNAPL	LNAPL Thickness	Corrected Water Table Elevation[a]
MW-A		6.76			
MW-B		3.97			
MW-C		4.63			
MW-D		9.62			
MW-E		7.09			
MW-F		6.73			
MW-701		14.12			
MW-702		4.95			
MW-703		5.39			
MW-704		4.90			
MW-705		7.01			
MW-706		3.04			

(a) Based on an assumed specific gravity of 0.80 for LNAPL.

NOTE: All measurements in feet.
LNAPL = Light, non-aqueous phase liquid.

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EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC MDC JAC	Date: 12/3/96 - 12/5/96	Time:
Weather:	Equipment: Solinst oil/water probe hydrolab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (~~°F~~) °C	~~Dissolved Oxygen~~ (mg/L) DO	~~Conductivity~~ (~~µhmos~~) Conductivity	Redox (mV)	Comments
WP-1	3.33	—	6.29	7.38	0.355	0.90	45	
WP-2	4.71	4.68						
WP-3	3.51	—	5.95	6.67	0.0602	1.94	231	
WP-4	4.70	4.06						
WP-5	4.13	—	5.41	7.98	0.0864	0.66	295	
WP-6	3.23	—	5.30	7.33	0.0633	0.87	306	
WP-7	3.97	3.35						
WP-8	4.18	—	6.71	6.17	0.378	9.64	255	
WP-9	5.43	—	6.24	7.03	0.288	7.90	247	
WP-10	3.30	—	5.04	6.84	0.0761	0.92	319	
WP-11	3.76	—	5.6	6.1	0.1379	4.7	311	
WP-12	5.87	—	5.5	6.6	0.222	3.6	299	
WP-13	4.95	—	6.5	5.4	0.0763	10.5	250	*
WP-14	3.99	—	5.6	6.6	0.1104	2.6	321	
WP-15	4.15	—	5.9	6.0	0.0705	7.8	272	sparging
WP-16	5.60	—	6.28	5.93	0.155	3.32	279	
WP-17	8.05	—	insuffient water					
WP-18	3.98	—	5.59	7.61	0.241	3.98	318	
WP-19	3.33	—	5.98	6.79	0.228	1.75	288	
WP-20	4.19	—	6.36	4.75	0.224	5.10	256	

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wells all gauged on 12/3/96.

Water quality parameters collected 12/5/96

* water on ground around well point is bubbling

water bubbling out of ground at intersection road

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC, JAC	Date: 12/3/96 - 12/4/96	Time:
Weather:	Equipment: Solinst oil/water probe; Hydrolab Conductivity DO	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	~~Dissolved Oxygen (mg/L)~~	~~Conductivity (µhmos)~~	Redox (mV)	Comments
MW-I	5.57	—	5.88	8.51	0.0679	5.24	248	
MW-J	4.69	—	5.85	8.36	0.276	5.90	104	
MW-49	5.41	—	6.11	9.56	0.1215	3.82	119	
MW-58	5.75	—	6.09	8.89	0.0514	4.08	174	
MW-51	3.90	—	6.23	7.74	0.0855	3.40	252	
MW-54	4.71	—	5.75	9.76	0.177	4.08	254	
MW-44	2.53	—	6.07	8.22	0.0731	2.85	106	
MW-62	7.98	—	6.20	8.91	0.0962	2.66	241	
MW-56	*	—	casing bent			} wells to be		
MW-61	—	—	well damaged }				replaced	
↑ not entered								

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wells gauged 12/3/96

Water quality parameters collected 12/4/96

* water surging out of well

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC	Date: 12/19/97	Time: 1100
Weather: 40° Raining	Equipment: Solinst oil water Probe + Hydro Lab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Comments
WP-1	3.25		6.2	6.0	1.2	0.292	69	
WP-2	4.33		6.3	5.5	1.1	0.157	66	
WP-3	2.85		5.88	7.0	1.2	0.0516	177	
WP-4	3.75	3.15						
WP-5	4.17		5.7	7.0	1.2	0.0842	314	
WP-6	3.07		6.1	6.3	1.1	0.05051	315	
WP-7	2.9	PVC Bent						
WP-8	3.55		6.7	6.3	11.0	0.513	310	
WP-9	4.75		6.2	6.3	8.3	0.244	322	
WP-10	3.00		5.3	5.8	1.3	0.0777	352	
WP-11	3.66		5.8	5.5	0.9	0.1117	322	
WP-12	4.81		5.7	5.8	6.6	0.1284	333	
WP-13	3.45	~~6.7~~ *	6.7	5.5	11.0	0.060	321	
WP-14	4.15		6.0	6.0	3.0	0.0916	331	
WP-15	4.15		6.1	6.3	9.2	0.0704	322	
WP-16	5.55		6.9	5.5	7.4	0.0753	306	
WP-17	7.40		6.9	5.4	11.5	0.0562	305	
WP-18	3.85		6.0	8.4	4.6	0.180	3.54	
WP-19	3.00		6.3	7.2	0.85	0.255	333	
WP-20	3.93		6.4	5.8	4.4	0.478	324	

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* WP17 - actively sparging (this well point is normally dry)

EA Engineering, Science, and Technology

FIELD RECORD OF WATER QUALITY PARAMETER ANALYSIS

Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC	Date: 12/19/97	Time: 1100
Weather: 40° Rain	Equipment: Solinst oil/water probe & HydroLab	

Location	Depth to Water (ft)	Depth to Product (ft)	pH	Temperature (°F)	Dissolved Oxygen (mg/L)	Conductivity (μhmos)	Redox (mV)	Comments
311S	5.23		6.1	6.4	11.3	.1258	310	
MW44	2.02		6.2	6.2	1.3	.0900	78	
MW56	water	surging		out of	top			

EA 5120 0794-7

Appendix B

Field Record of Biosparging Well Point Monitoring Forms

- Baseline -

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING

Brunswick Naval Air Station Fuel Farm Biosparging System

Note: After @ 18hrs System Activation

EA Personnel: MC, BA	Date: 8/9/96	Time: 10:00
Weather: Sunny, Hazy, @ 75°F	Instrument(s): TVA-1000 FID/FID	

Location	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Other	Other	Comments
WP-1	220	0.35			
WP-2	2,700	85.0			
WP-3 ?	3.32	1.60			
WP-4	1.44%	6.62			
WP-5	587	5.33			
WP-6	55.62	0.77			
WP-7	1,275	48.66			
WP-8	5.0%	48.00			
WP-9	0.00	0.06			
WP-10	2.0%	33.28			
WP-11	2,600	146			
WP-12	67.95	115			
WP-13	20.09	155			
WP-14	7.35	1.61			
WP-15	2.7%	28.62			
WP-16	6027	85.62			
WP-17	1,795	90.66			
WP-18	833	5.60			
WP-19	2,342	116			
WP-20	5.67	0.91			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MOC		Date: 8/14/96	Time: 13:00
Weather: Sunny, Breezy, @ 80°F		Instrument(s): TVA - 1000 PID/FID	

Location	FID TVH (ppm,)	PID TVH (ppm,)	Other	Other	Comments
WP-1	2.1%	5.80			
WP-2	1.1%	405			
WP-3	1.20	2.30			
WP-4	9082	65			
WP-5	24.6	5.55			
WP-6	5.90	2.60			
WP-7	5,380	120			
WP-8	1.3%	243			
WP-9	5.40	1.70			
WP-10	1.4%	20.30			
WP-11	391	44.3			
WP-12	1.4%	82.3			
WP-13	14%	323			
WP-14	5.60	1.40			
WP-15	783	22.6			
WP-16	210	28.2			
WP-17	1.2%	293			
WP-18	ND	0			
WP-19	23.6	2.40			
WP-20	ND	0.80			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 8/20/96	Time:
Weather:	Instrument(s): TVA 1000	

Location	FID TVH (ppm,)	PID TVH (ppm,)	Other	Other	Comments
WP-1	1.1%	9.6			
WP-2	2.7%	7.1			
WP-3	8.2	.3			
WP-4	2591	50.1			
WP-5	30.4	1.7			
WP-6	—	—			
WP-7	5%	38.24			
WP-8	4.4%	340			
WP-9	—	—			
WP-10	6%	1.6			
WP-11	3744	231			
WP-12	4890	271			
WP-13	~~[illegible]~~ 8%	360			
WP-14	—	—			
WP-15	207	14.9			
WP-16	13.3	3.2			
WP-17	~~[illegible]~~	312			
WP-18	—	—			
WP-19	147	10.6			
WP-20	—	—			

6.1754

EA 5120 0794-4

08-21-1996 01:50PM EA ENG SYRACUSE 1 315 431 4280 P.05

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	CJV, SAP	Date:	8/28/96	Time:	15:30
Weather:	Cloudy, 65°F	Instrument(s):	TVA 1000 FID/FID/GA-90		

Atm Press = 29.9 in Hg

Location	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Other	Other	% CH_4	% CO_2	% O_2	Comments
WP-1	183	0			0.0	0.4	20.6	
WP-2	1210	15.43			11.5	5.1	15.5	
WP-3	4510	0			0.0	0.4	20.6	
WP-4	100	12.12			0.1	10.5	8.5	
WP-5	10.49	0.81			0.0	1.8	21.1	
WP-6	7.4	0.0			0.0	0.0	20.9	
WP-7	220	~~220~~	8.71		0.7	7.4	14.9	
WP-8	1-1%	146			46.6	10.8	11.5	
WP-9	2.5	0.0			0.0	2.5	18.8	
WP-10	5341	6.08			7.7%	34.2%	0.0%	
WP-11	960	75			1.8	4.4	17.5	
WP-12	1200	29			38.6	5.6	14.9	
WP-13	3.8%	265			>90	6.4	7.2	
WP-14	8.75	0.0			0.0	1.7	20.2	
WP-15	~~5341~~ 30.9	~~6.8~~ 2.4			0.0	1.8	19.7	
WP-16	6.43	0.11			0.0	2.6	18.5	
WP-17	2604	135			7.2	3.5	16.7	
WP-18	2.79	0.0			0.0	0.2	20.9	
WP-19 11.01	~~0.60~~	0.60			0.0	1.4	20.4	
WP-20	14.02	0.54			0.1	1.3	20.5	

EA 5120 0794-4

Background

CH_4 = 0.0

CO_2 = 0.0

O_2 = 20.9%

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC	Date: 9/3/96	Time: 830
Weather: Sunny, breezy, 80	Instrument(s): Landtech GA-90, TVA 1000	

Location	FID TVH (ppm,)	PID TVH (ppm,)	Other	Other	Comments CH_4	CO_2	O_2	
WP-1	103	.63			00.0	00.0	21.8	
WP-2	3228	263			7.6	4.8	15.3	
WP-3	80.7	15.8			00.0	00.3	21.4	
WP-4	317	90.6			00.1	15.6	4.7	
WP-5	9.5	5.41			00.0	1.2	20.7	
WP-6	71.3	7.14			00.0	00.2	21.6	
WP-7	712 ~~71.3~~	~~7.14~~ 17.3			00.7	5.9	16.1	
WP-8	1.1%	170			52.6	17.5	4.8	
WP-9	10.2	2.18			00.0	2.2	19.1	
WP-10	1.3%	18.3			7.6	27.2	4.6	
WP-11	3097	132			3.9	6.2	14.9	
WP-12	5.2%	220			7147	8.7	11.3	
WP-13	14.4%	280			7139	8.6	1.9	
WP-14	1.5	24.9			00.0	04.4	21.3	
WP-15	41.3	40.1			00.2	02.0	19.4	
WP-16	17.2	33.9			00.1	00.3	19.0	
WP-17	6525	250			6.1	2.9	17.8	
WP-18	.52	1.52			00.0	00.4	22.2	
WP-19	85.4	350			00.1	04.1	17.0	
WP-20	—	~~20.2~~ 57.3			00.0	00.8	20.6	

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 9/16/96	Time:
Weather:	Instrument(s):	

Location	FID TVH (ppm,)	PID TVH (ppm,)	Other	Other	Comments
WP-1	2.9%	1.3			
WP-2	7093	412			
WP-3	1006	—			
WP-4	1.6%	6.5			
WP-5	85.6	—			
WP-6	8479	—			
WP-7	9872	137			
WP-8	13%	84.5			
WP-9	~~[illegible]~~ 3.6	~~[illegible]~~ 3			
WP-10	119	3.8			
WP-11	7321	350			
WP-12	1.2%	231			
WP-13	9.6%	395			
WP-14	—	—			
WP-15	20.2	—			
WP-16	19.3	1.1			
WP-17	895	148			
WP-18	1.7	—			
WP-19	182	5.8			
WP-20	—	—			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 10/2/96	Time:
Weather:	Instrument(s):	

Location	FID TVH (ppm,)	PID TVH (ppm,)	Other	Other	Comments
WP-1	2565	—			
WP-2	4163	400			
WP-3	290	—			
WP-4	78.9	13.4			
WP-5	720	6.1			
WP-6	8736	—			
WP-7	2%	150			
WP-8	435	59.6			
WP-9	—	—			
WP-10	2.3%	450			
WP-11	1100	100			
WP-12	22%	450			
WP-13	28%+	400			
WP-14	2100	58			
WP-15	5.5	1.3			
WP-16	—	1.1			
WP-17	180	50			
WP-18	—	—			
WP-19	210	14.2			
WP-20	—	—			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 10/8/96	Time:
Weather:	Instrument(s):	

Location	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Other	Other	Comments
WP-1	3910	2.5			
WP-2	1.2%	550			
WP-3	532	1.1			
WP-4	305	30.5			
WP-5	140	12			
WP-6	2.5%	2.1			
WP-7	20%	520			
WP-8	16900	725			
WP-9	1.0	0.0			
WP-10	3100	620.0			
WP-11	2%	640			
WP-12	>45%	420			
WP-13	3%	900			
WP-14	1580	170			
WP-15	1.3	0.0			
WP-16	75.0	12.2			
WP-17	1000	8.6			
WP-18	0.0	0.0			
WP-19	160	9.0			
WP-20	4.2	0.0			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 10/17/96	Time:
Weather:	Instrument(s):	

Location	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Other	Other	Comments
WP-1	1%	1.7			
WP-2	2.5%	1000			
WP-3	2000	2.1			
WP-4	700	86			
WP-5	20	3.4			
WP-6	3,000	1.8			
WP-7	3.5%	1,000			
WP-8	220	18			
WP-9	14	1.2			
WP-10	300	18			
WP-11	700	50			
WP-12	>40%	870			
WP-13	15%	500			
WP-14	8.1	0.0			
WP-15	0.0	0.0			
WP-16	0.0	0.0			
WP-17	150	20			
WP-18	0.0	0.0			
WP-19	7450	~~20~~ 16.2			
WP-20	0.0	0.0			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 10/25/96	Time:
Weather:	Instrument(s): TVA 1000	

Location	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Other	Other	Comments
WP-1	4400	0			
WP-2	3%	600			hydrocarbon odor
WP-3	1400	1.0			
WP-4	unreadable too high	25			
WP-5	85	0			
WP-6	600	0			
WP-7	3%	800			
WP-8	4000	10			
WP-9	4	0			
WP-10	1100	47			
WP-11	5000	200			
WP-12	2%	800			
WP-13	unreadable too high	600			sparging - hydrocarbon odor
WP-14	219	0.0			
WP-15	32	2.0			
WP-16	7.2	0.0			
WP-17	1400	92			
WP-18	840	0			
WP-19	200	5.4			
WP-20	0.0	30			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 1/1/96	Time:
Weather:	Instrument(s):	

Location	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Other	Other	Comments
WP-1	1220	1.9			
WP-2	1320	200			
WP-3	203	4.2			
WP-4	>20%	103			
WP-5	420	11			
WP-6	30	2			
WP-7	33	1			
WP-8	60	10			
WP-9	22	4			
WP-10	240	14			
WP-11	1000	120			
WP-12	>20%	660			
WP-13	>20%	570			
WP-14	177	21			
WP-15	6.5	1.5			
WP-16	0	0			
WP-17	0	1			positive pressure
WP-18	0	0			
WP-19	170	11			
WP-20	0	0			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC MDC	Date: 11/8/96	Time:
Weather: overcast windy 60	Instrument(s): TVA-1000	

Location	FID TVH (ppm,)	PID TVH (ppm,)	Other	Other	Comments
WP-1	273	0			
WP-2	9200	320			
WP-3	428	0			
WP-4	4300	50			
WP-5	500	10			
WP-6	30	0			
WP-7	>25%	550			sparging
WP-8	17.6	0			sparging
WP-9	51	4			
WP-10	215	28			
WP-11	2.1%	625			
WP-12	7.2%	802			
WP-13	>25%	602			sparging hydrocarbon odor
WP-14	180	15			
WP-15	12	0			
WP-16	0	0			
WP-17	0	0			positive pressure
WP-18	0	0			
WP-19	102	2			
WP-20	0	0			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC MDC	Date: 11/13/96	Time:
Weather: Sunny, 35°	Instrument(s): TVA-1000	

Location	FID TVH (ppm,)	PID TVH (ppm,)	Other	Other	Comments
WP-1	5700	110			
WP-2	15%	540			
WP-3	280	6			
WP-4	3000	220			
WP-5	1270	17			
WP-6	8000	18			
WP-7	>25%	570			positive pressure sparging
WP-8	23	2			sparging
WP-9	15	2			
WP-10	159	9			
WP-11	11%	605			
WP-12	10.5%	715			
WP-13	15%	615			sparging, hydrocarbon odor
WP-14	115	8			
WP-15	8	0			
WP-16	0	0			
WP-17	0	0			positive pressure
WP-18	0	0			
WP-19	139	8			
WP-20	0	0			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 11/25/96	Time:
Weather:	Instrument(s):	

Location	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Other	Other	Comments
WP-1	2220	20			
WP-2	203	176			
WP-3	168	56			
WP-4	386	197			
WP-5	46	16			
WP-6	50	8			
WP-7	4.3%	890			
WP-8	30	11			
WP-9	2	1			
WP-10	50	28			
WP-11	57%	740			
WP-12	1.52%	986			
WP-13	1.2%	593			
WP-14	31	10			
WP-15	0	0			
WP-16	0	0			
WP-17	0	0			
WP-18	0	0			
WP-19	50	12			
WP-20	0	0			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC, JAC, MDC	Date: 6/5/96	Time:
Weather: Sunny, 35°	Instrument(s): TVA-1000	

Location	FID TVH (ppm,)	PID TVH (ppm,)	Other	Other	Comments
WP-1	610	108			
WP-2	7952	651			
WP-3	2200	360			
WP-4	2348	232			
WP-5	1008	61.5			
WP-6	2650	67.5			
WP-7	18.8%	755			positive pressure
WP-8	340	45.5			positive pressure
WP-9	2	1.6			
WP-10	85	12			
WP-11	+18%	560			
WP-12	2.4%	790			
WP-13	50	7			actively sparging
WP-14	0	6			
WP-15	0	0			
WP-16	0	0			
WP-17					
WP-18	0	0			
WP-19	11.8	8.1			
WP-20	0	0			

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING WELL POINT MONITORING
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC		Date: 12/19/98	Time:
Weather: Rain		Instrument(s): TVA - 1000	

Location	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Other	Other	Comments
WP-1					EQUIPMENT INOPERABLE
WP-2					Unable to keep FID Flame lit.
WP-3					
WP-4					
WP-5					
WP-6					
WP-7					
WP-8					
WP-9					
WP-10					
WP-11					
WP-12					
WP-13					
WP-14					
WP-15					
WP-16					
WP-17					
WP-18		10			
WP-19					
WP-20					

EA 5120 0794-4

unable to Keep FID flame lit suspect wet weather

Appendix C

Field Record of Well Gauging, Purging, and Sampling Forms

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600.35	Date: 12/4
EA Personnel: SC JC	Purge Method: hand bailing	
Weather/Temperature/Barometric Pressure:		Time: 1333

Well No. MW-44	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 2.53	D. Well Volume/ft: 0.16
B. Total Well Depth (ft): 15.74	E. Total Well Volume (gal) [C*D]: 2.1
C. Water Column Height (ft): 13.21	F. Five Well Volumes (gal): 10.5

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1334	1337	1340	1343		
Depth to Water (ft)	2.53	2.77	2.86	2.77		
Purge Rate (gpm)	<1gpm					
Volume Purged (gal)	—	2.1	4.2	6.3		
pH	6.13	6.06	6.06	6.07		
Temperature (°C)	6.98	8.00	8.36	8.22		
Conductivity (μmhos/cm)	0.0922	0.0817	0.0780	0.0831		
Dissolved Oxygen (mg/L)	3.11	2.87	2.60	2.85		
eH (mV)	121	98	105	106		

TOTAL QUANTITY OF WATER REMOVED (gal): 7 gals

COMMENTS AND OBSERVATIONS: NAS - NASB - EF-C2 - MWC05 1350

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600 35	Date: 12/4
EA Personnel: SC JC	Purge Method: hand bailing	
Weather/Temperature/Barometric Pressure: overcast		Time: 1048

Well No. MW-49	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 5.41	D. Well Volume/ft: 0.16
B. Total Well Depth (ft): 14.40	E. Total Well Volume (gal) [C*D]: 1.4
C. Water Column Height (ft): 8.99	F. Five Well Volumes (gal): 7.0

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1052	1056	1058	1100	1103	1105
Depth to Water (ft)	5.41	7.22	7.89	8.19	9.30	9.41
Purge Rate (gpm)	<1gpm					
Volume Purged (gal)		1.5	3.0	4.5	6.0	7.5
pH	5.88	5.88	5.92	5.95	6.03	6.11
Temperature (°C)	7.69	9.05	8.81	8.63	9.20	9.56
Conductivity (μmhos/cm)	0.0908	0.0999	0.0997	0.0971	0.1187	0.1215
Dissolved Oxygen (mg/L)	5.12	2.83	3.38	3.83	3.56	3.82
eH (mV)	258	174	134	120	121	119

TOTAL QUANTITY OF WATER REMOVED (gal): 7.5

COMMENTS AND OBSERVATIONS: NASB-FF-02-MW002 (1110) Duplicate
NASB-FF-02-MWX01

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600 35	Date: 12/4/96
EA Personnel: SYC	Purge Method: hand bailing	
Weather/Temperature/Barometric Pressure: overcast		Time: 934

Well No. MW-51	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.90	D. Well Volume/ft: 0.16
B. Total Well Depth (ft): 16.00	E. Total Well Volume (gal) [C*D]: 1.9
C. Water Column Height (ft): 12.10	F. Five Well Volumes (gal): 9.5

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	940	950	954	959	1003	
Depth to Water (ft)	3.90	4.25	4.92	4.71	4.40	
Purge Rate (gpm)	<1gpm					
Volume Purged (gal)	—	2	4	6	8	
pH	6.38	6.34 7.64	6.21	6.23	6.23	
Temperature (°C)	6.67	7.64	7.43	7.87	7.74	
Conductivity (μmhos/cm)	0.0856	0.0837	0.0856	0.0850	0.0855	
Dissolved Oxygen (mg/L)	4.01	2.76	3.37	3.65	3.70	
eH (mV)	322	291	259	253	252	

TOTAL QUANTITY OF WATER REMOVED (gal): 8

COMMENTS AND OBSERVATIONS: Sample NASB-FF-02-MW001 MS/MSD ID 10

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600.35	Date: 12/4/96
EA Personnel: SC JC	Purge Method: hand bailing	
Weather/Temperature/Barometric Pressure:		Time: 1436

Well No. MW-54	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 4.71	D. Well Volume/ft: 0.16
B. Total Well Depth (ft): 16.12	E. Total Well Volume (gal) [C*D]: 1.8
C. Water Column Height (ft): 11.41	F. Five Well Volumes (gal): 9

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1438	1440	1442	1444	1447	
Depth to Water (ft)	34.71	4.89	4.88	4.93	4.90	
Purge Rate (gpm)	<1gpm					
Volume Purged (gal)	—	1.8	3.6	5.4	7.2	
pH	5.53	5.30	5.38	5.51	5.75	
Temperature (°C)	7.53	8.77	9.27	9.09	9.76	
Conductivity (μmhos/cm)	0.179	0.176	0.175	0.176	0.177	
Dissolved Oxygen (mg/L)	5.33	4.76	4.40	4.22	4.08	
eH (mV)	240	261	260	261	254	

TOTAL QUANTITY OF WATER REMOVED (gal): 8

COMMENTS AND OBSERVATIONS: ~~MW~~ NASB-FF-02-MW003 1450

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date:
EA Personnel:	Purge Method:	
Weather/Temperature/Barometric Pressure:		Time:

Well No. MW-56	Well Condition: bent casing
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft):	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

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

TOTAL QUANTITY OF WATER REMOVED (gal): _____

COMMENTS AND OBSERVATIONS: Bent casing

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600 35	Date: 12/4
EA Personnel: SC JC	Purge Method: hand bailing	
Weather/Temperature/Barometric Pressure:		Time: 1120

Well No. MW-58	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 5.75	D. Well Volume/ft: 0.16
B. Total Well Depth (ft): 16.56	E. Total Well Volume (gal) [C*D]: 1.7
C. Water Column Height (ft): 10.81	F. Five Well Volumes (gal): 8.5

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1122	1125	1127	1130	1133	
Depth to Water (ft)	5.75	6.05	6.11	6.34	6.05	
Purge Rate (gpm)	<1 gpm	—	—	—	—	
Volume Purged (gal)	—	1.7	3.4	5.1	6.8	
pH	6.70	6.40	6.25	6.23	6.09	
Temperature (°C)	8.86	9.05	9.12	8.97	8.89	
Conductivity (μmhos/cm)	0.0427	0.0473	0.0505	0.0519	0.0514	
Dissolved Oxygen (mg/L)	3.68	3.40	3.80	4.12	4.08	
eH (mV)	191	153	150	164	174	

TOTAL QUANTITY OF WATER REMOVED (gal): 7

COMMENTS AND OBSERVATIONS: NASB-EF-02-MW003 1140

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600.35	Date:
EA Personnel:	Purge Method: handbailing	
Weather/Temperature/Barometric Pressure:		Time:

Well No. MW-61	Well Condition: poor
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft):	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

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

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: Well has no curb box or PVC cap.

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: NAS Fuel Farm	Project No.: 29600.35	Date: 12/4/96
EA Personnel: JC, JC	Purge Method: hand bailing	
Weather/Temperature/Barometric Pressure:		Time: 1308

Well No. MW-62	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC

Well Volume Calculations

A. Depth to Water (ft): 7.98	D. Well Volume/ft: 0.16
B. Total Well Depth (ft): 16.91	E. Total Well Volume (gal) [C*D]: 1.4
C. Water Column Height (ft): 8.93	F. Five Well Volumes (gal): 7

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1311	1314	1316	1320		
Depth to Water (ft)	7.98	8.16	8.22	8.22		
Purge Rate (gpm)	<1 gpm					
Volume Purged (gal)	—	1.4	2.8	4.2		
pH	6.00	6.08	6.15	6.20		
Temperature (°C)	8.54	8.81	9.10	8.91		
Conductivity (μmhos/cm)	0.0936	0.0942	0.0954	0.0962		
Dissolved Oxygen (mg/L)	1.74	2.71	2.63	2.66		
eH (mV)	264	262	258	241		

TOTAL QUANTITY OF WATER REMOVED (gal): 5 gal

COMMENTS AND OBSERVATIONS: NAS B-FF02-MW004 1325

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600.35	Date: 12/4
EA Personnel: SC JC	Purge Method: hand bailing	
Weather/Temperature/Barometric Pressure:		Time: 1355

Well No. MW-I	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 5.57	D. Well Volume/ft: 0.16
B. Total Well Depth (ft): 11.57	E. Total Well Volume (gal) [C*D]: 0.96
C. Water Column Height (ft): 6.00	F. Five Well Volumes (gal): 4.8

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1358	1400	1401	1403		
Depth to Water (ft)	5.57	5.68	5.73	5.71		
Purge Rate (gpm)	<1gpm					
Volume Purged (gal)	—	1	2	3		
pH	6.09	5.91	6.08	5.88		
Temperature (°C)	8.32	8.66	8.45	8.51		
Conductivity (μmhos/cm)	0.0591	0.0651	0.0694	0.0679		
Dissolved Oxygen (mg/L)	4.96	5.02	5.51	5.24		
eH (mV)	224	238	233	248		

TOTAL QUANTITY OF WATER REMOVED (gal): 4

COMMENTS AND OBSERVATIONS: NASB-FF-02-MW006 1410

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600.35	Date: 12/4/96
EA Personnel: SC JC	Purge Method: hand bailing	
Weather/Temperature/Barometric Pressure:		Time: 1414

Well No. MW-J	Well Condition: GOOD
Well Diameter: 2	Measurement Reference: TOC

Well Volume Calculations

A. Depth to Water (ft): 4.69	D. Well Volume/ft: 0.16
B. Total Well Depth (ft): 9.87	E. Total Well Volume (gal) [C*D]: 0.8
C. Water Column Height (ft): 5.18	F. Five Well Volumes (gal): 4.0

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1416	1418	1420	1422	1425	
Depth to Water (ft)	4.69	5.70	6.15	6.28	6.04	
Purge Rate (gpm)	<1 gpm					
Volume Purged (gal)	—	1	2	3	4	
pH	6.12	5.36	5.87	5.84	5.85	
Temperature (°C)	6.66	7.54	8.00	8.05	8.36	
Conductivity (μmhos/cm)	0.277	0.273	0.272	0.272	0.276	
Dissolved Oxygen (mg/L)	10.02	9.99	5.67	6.02	5.90	
eH (mV)	249	230	101	110	104	

TOTAL QUANTITY OF WATER REMOVED (gal): 5

COMMENTS AND OBSERVATIONS: NASB-FF-02-MW007 1430
actively sparging - hydrocarbon odor
slight visible sheen in bucket.

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: SC JC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 855

Well No. WP1	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.33	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	855					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	6.29					
Temperature (°C)	7.38					
Conductivity (μmhos/cm)	0.355					
Dissolved Oxygen (mg/L)	0.90					
eH (mV)	45					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP001 MS/MSD

PID 108 ppm

FID 610 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: MDC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 943

Well No. WP-2	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 4.71 dtp 4.68	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	943					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH						
Temperature (°C)						
Conductivity (μmhos/cm)						
Dissolved Oxygen (mg/L)						
eH (mV)						

TOTAL QUANTITY OF WATER REMOVED (gal):
COMMENTS AND OBSERVATIONS: NASB-FF-02-WP002

PID 651 ppm
FID 7952 ppm
Bio sample only due to 0.03 Ft of product

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 6/5/96
EA Personnel: SYC JAC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 940

Well No. WP-3	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.51	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	940					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.95					
Temperature (°C)	6.67					
Conductivity (μmhos/cm)	0.0602					
Dissolved Oxygen (mg/L)	1.94					
eH (mV)	231					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB FF-02 · WP003 940
duplicate NASB-FF-02 - WPYD1
PID 360ppm
FID 2200ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: MDC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 0958

Well No. WP-4	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 4.70 d+p 4.06	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

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

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02 - WP004

PID 232 ppm
FID 2348 ppm

Bio sample only due to 0.64 Ft product

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/9
EA Personnel: SC JC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny 35°		Time: 1125

Well No. WP-5	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 4.13	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1125					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.41					
Temperature (°C)	7.98					
Conductivity (μmhos/cm)	0.0814					
Dissolved Oxygen (mg/L)	0.66					
eH (mV)	295					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP005

PID 61.5 ppm
FID 1008 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600035	Date: 12-5-96
EA Personnel: SC JC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny 35		Time: 1110

Well No. WP6	Well Condition: good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.23	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1110					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.30					
Temperature (°C)	7.33					
Conductivity (μmhos/cm)	0.0633					
Dissolved Oxygen (mg/L)	0.87					
eH (mV)	306					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS:

NASB-FF-02-WP006

PID 67.5 ppm

FID 2650 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 6/15/96
EA Personnel: SYC, JAC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 1045

Well No. WP-7	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.35 dtp 3.97	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

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

TOTAL QUANTITY OF WATER REMOVED (gal): _____

COMMENTS AND OBSERVATIONS: _____

NASB-FF-02-WP007

PID 755 ppm

FID 18.8% ppm

Bio sample only due to 0.62 Ft of product

positive pressure - actively sparging

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: SYC JAC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 1025

Well No. WP-8	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 4.18	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1025					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	6.71					
Temperature (°C)	6.17					
Conductivity (μmhos/cm)	0.378					
Dissolved Oxygen (mg/L)	9.64					
eH (mV)	255					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP008

PID 45.5ppm

FID 340ppm positive pressure

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: JAC SYC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35		Time: 1000

Well No. WP-9	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 5.43	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1000					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	6.24					
Temperature (°C)	7.03					
Conductivity (μmhos/cm)	0.288					
Dissolved Oxygen (mg/L)	7.90					
eH (mV)	247					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP009

PID 1.6ppm

FID 2ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: SYC, MDC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 1140

Well No. WP-10	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.30	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1140					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.04					
Temperature (°C)	6.84					
Conductivity (μmhos/cm)	0.0761					
Dissolved Oxygen (mg/L)	0.92					
eH (mV)	319					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP010

PID 12ppm

FID 85 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600 35	Date: 12/5/96
EA Personnel: MDC	Purge Method: peristaltic	
Weather/Temperature/Barometric Pressure: Sunny, 35		Time: 1135

Well No. WP-11	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.76	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1135					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.6					
Temperature (°C)	6.1					
Conductivity (μmhos/cm)	0.1379					
Dissolved Oxygen (mg/L)	4.7					
eH (mV)	311					

TOTAL QUANTITY OF WATER REMOVED (gal): _____

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP011

PID 560 ppm
FID +18.0 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 29600035	Date: 12/5/96
EA Personnel: MDC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 1045

Well No. WP-12	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 5.87	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1045					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.5					
Temperature (°C)	6.6					
Conductivity (μmhos/cm)	0.222					
Dissolved Oxygen (mg/L)	3.6					
eH (mV)	299					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP012

PID 1560ppm
FID 2.4% ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: MDC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny 35°		Time: 1007

Well No. WP013	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 4.95	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1007					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	6.5					
Temperature (°C)	5.4					
Conductivity (μmhos/cm)	0.0763					
Dissolved Oxygen (mg/L)	10.5					
eH (mV)	250					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP013

PID 790 ppm well actively sparging

FID 2.6% ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: MDC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: sunny 35°		Time: 1350

Well No. WP-14	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.99	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1350					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.6					
Temperature (°C)	6.6					
Conductivity (μmhos/cm)	0.1104					
Dissolved Oxygen (mg/L)	2.6					
eH (mV)	321					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP014

PID 7 ppm

FID 50 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: MDC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 1420

Well No. WP-15	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 4.15	D. Well Volume/ft:
B, Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C, Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1420					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.9					
Temperature (°C)	6.6					
Conductivity (μmhos/cm)	0.0705					
Dissolved Oxygen (mg/L)	7.8					
eH (mV)	272					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP015

PID 0.0 ppm
FID 0.0 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: SYC, JAC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: sunny, 35°		Time: 1430

Well No. WP16	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 5.60	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1430					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	6.28					
Temperature (°C)	5.93					
Conductivity (μmhos/cm)	0.155					
Dissolved Oxygen (mg/L)	3.32					
eH (mV)	279					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP016

PID 0 ppm no bio sample

FID 0 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 6/5/96
EA Personnel: MDC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny 35°		Time:

Well No. WP-17	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 8.05	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

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

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: Sample not collected due to insufficient water

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 6/5/96
EA Personnel: SYC JAC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 1350

Well No. WP-18	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.98	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1350					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.59					
Temperature (°C)	7.61					
Conductivity (μmhos/cm)	0.241					
Dissolved Oxygen (mg/L)	3.98					
eH (mV)	318					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS:

PID 0 ppm NASB-FF02-WP018

FID 0 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/96
EA Personnel: SYC JAC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny, 35°		Time: 1400

Well No. WP-19	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 3.33	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1400					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	5.98					
Temperature (°C)	6.79					
Conductivity (μmhos/cm)	0.228					
Dissolved Oxygen (mg/L)	1.75					
eH (mV)	288					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP019

PID 8.1 ppm

FID 11.8 ppm

EA 5120 0794-2

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Project Name: Fuel Farm	Project No.: 2960035	Date: 12/5/16
EA Personnel: SYC JAC	Purge Method: peristaltic pump	
Weather/Temperature/Barometric Pressure: Sunny 35°		Time: 1415

Well No. WP-20	Well Condition: Good
Well Diameter: 2	Measurement Reference: TOC
Well Volume Calculations	
A. Depth to Water (ft): 4.19	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal) [C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min.)	1415					
Depth to Water (ft)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH	6.36					
Temperature (°C)	4.75					
Conductivity (μmhos/cm)	0.224					
Dissolved Oxygen (mg/L)	5.10					
eH (mV)	256					

TOTAL QUANTITY OF WATER REMOVED (gal):

COMMENTS AND OBSERVATIONS: NASB-FF-02-WP020 1415

PID 0

FID 0

EA 5120 0794-2

Appendix D

Ground-Water Chemical and Microbial Analytical Laboratory Reports

EA Laboratories

19 Loveton Circle
Sparks, MD 21152
Telephone: 410-771-4920
Fax: 410-771-4407

6 September 1996

Mr. Michael S. Battle
EA Engineering, Science and Technology, Inc.
3 Washington Center
Newburgh, NY 12550

RECEIVED
SEP 9 1996
EA Engineering, Science, and Technology
Newburgh, NY

Re: NAS Brunswick (29600.35)

Dear Mr. Battle:

Enclosed is our report on the analysis of 25 water samples collected for the NAS Brunswick project on 7 and 8 August 1996. The invoice is included.

Please contact me if you have any questions or require further information and refer to report 961262. Unless other arrangements are made, we reserve the right to dispose of your samples sixty (60) days from the date of this letter. We will retain the raw data for seven years from this date.

Sincerely,

FOR MEA

Mary E. Asper
Laboratory Project Manager

enclosure

LABORATORY DATA REPORT

Prepared for:

NAS Brunswick

Prepared by:

EA Laboratories
19 Loveton Circle
Sparks, Maryland 21152

September 1996

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NAS Brunswick
EA Laboratories Report No. 961262

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1. NARRATIVE

EA Laboratories
ANALYTICAL NARRATIVE

Client: **EA Engineering, Science & Tech.**
Site: **NAS Brunswick**
Project number: **29600.35**

Laboratory Project Manager: **Mary E. Asper**
EA Laboratories Report: **961262**
Date: **6 September 1996**

This report contains the results of the analysis of 25 water samples collected on 7 and 8 August 1996 in support of the referenced project.

SAMPLE RECEIPT

The samples arrived intact by Federal Express at EA Laboratories on 9 August 1996. Upon receipt, the samples were inspected and compared with the chain-of-custody records. The sample were then logged into the laboratory computer system with assigned laboratory accession numbers and released for analysis.

Client Sample Designation	EA Lab Number
NASB-FF-01-WP001	9611498
NASB-FF-01-WPRB1	9611499
NASB-FF-01-WP002	9611500
NASB-FF-01-WP003	9611501
NASB-FF-01-WP004	9611502
NASB-FF-01-WP009	9611503
NASB-FF-01-WP008	9611504
NASB-FF-01-WP006	9611505
NASB-FF-01-WP007	9611506
NASB-FF-01-WP005	9611507
NASB-FF-01-WP010	9611508
NASB-FF-01-WP011	9611509
NASB-FF-01-WPXD1	9611510
NASB-FF-01-WPXD2	9611511
NASB-FF-01-WP013	9611512
NASB-FF-01-WP015	9611513
NASB-FF-01-WP014	9611514
NASB-FF-01-WP018	9611515
NASB-FF-01-WP019	9611516
NASB-FF-01-WP020	9611517
NASB-FF-01-MW001	9611518
NASB-FF-01-MW002	9611519

EA Laboratories
ANALYTICAL NARRATIVE

Client: **EA Engineering, Science & Tech.** Laboratory Project Manager: **Mary E. Asper**
Site: **NAS Brunswick** EA Laboratories Report: **961262**
Project number: **29600.35** Date: **6 September 1996**

NASB-FF-01-MW003	9611520
NASB-FF-01-MWRB1	9611521
NASB-FF-01-MWXD1	9611522

Following this narrative section are data qualifiers (Table 1) and the original chain-of-custody records. Analytical results and quality control deliverable requirements of this project.

QUALITY CONTROL

The following sections are ordered as the data appears in this report. They contain observations made during sample analysis, summarize the results of quality control measurements, and address the impact on data usability based upon project Data Quality Objectives. For each fractional analysis the narrative includes:

- Sample chronology: This section summarizes the sample history by fraction including the sample preparation method and date, analytical method, and analysis date. Anything unusual about the samples, digestates, or extracts is identified. Holding time compliance is evaluated in this section.

- Laboratory method performance: All quality control criteria for method performance must be met for all target analytes for data to be reported. These criteria generally apply to instrument tune, calibration, method blanks, and Laboratory Control Samples (LCS). In some instances where method criteria fail, useable data can be obtained and are reported with client approval. The narrative will then include a thorough discussion of the impact on data quality.

- Sample performance: Quality control field samples are analyzed to determine any measurement bias due to the sample matrix based on evaluation of matrix spikes (MS), matrix spike duplicates (MSD), and laboratory duplicates (D). If acceptance criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the LCS results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.

AROMATIC VOLATILES BY GC - WATER (EA9611498-EA9611522)

Sample Chronology: The samples and associated quality control were analyzed on 15-16 and 19 August

1996 for methyl tert-butyl ether (MTBE), benzene, toluene, ethylbenzene and xylenes by USEPA Method 602. All holding times were met.

Samples NASB-FF-01-WP005 (5X), NASB-FF-01-WP011 (10X) and NASB-FF-01-WPXD2 (10X) were reanalyzed at a dilution to bring the concentrations of target analytes within calibration range. The results of both the undiluted and diluted analyses are included in this report.

Laboratory Method Performance: All laboratory method performance criteria were met for the reported samples.

Sample Performance: The recovery of the surrogate, 4-bromofluorobenzene, in sample NASB-FF-01-WP005 was high for the primary column analysis at 178%. This high recovery appears to be due to coelution interferences because the recovery on the confirmation column was only 117%. Data usability should not be impacted.

All other quality control criteria were met for the reported samples.

PURGEABLE TPH BY GC - WATER (EA9611498-EA9611522)

Sample Chronology: The samples and associated quality control were analyzed on 19-20 and 21-22 August 1996 for gasoline range organics (GRO) by the Maine Method 4.2.17. All holding times were met.

Samples NASB-FF-01-WP005, NASB-FF-01-WP011 and NASB-FF-01-WPXD2 were analyzed at a 5X dilution to bring the concentrations of GRO within calibration range.

Laboratory Method Performance: All laboratory method performance criteria were met for the reported samples.

Sample Performance: The recovery of the surrogate, 4-bromofluorobenzene, in sample NASB-FF-01-WP002 was high at 181%. The MS/MSD performed on this sample also had the surrogate recovery high at 191%/190%. These high recoveries appears to be due to coelution interferences from the high GRO detected in this sample. This is supported by the MS/MSD recoveries which were within QC limits at

determined because of the high native concentration of DRO in the sample relative to the amount spiked into the MS/MSD (over 30 times higher).

All other quality control criteria were met for the reported samples.

EXTRACTABLE TPH BY GC - WATER (EA9611512-EA9611522)

Sample Chronology: The samples were extracted on 15 August 1996 by the Maine Method 4.1.25. The extracts and associated quality control were analyzed on 29 August 1996 for diesel range organics (DRO) by the Maine Method 4.1.25. All holding times were met.

Laboratory Method Performance: The LCS duplicate recovery was just below the lower method QC limit of 60% at 59%. The LCS recovery was within QC limits at 62%. The low recovery may be indicative of a slight negative bias.

All other laboratory method performance criteria were met for the reported samples.

Sample Performance: The recoveries of the surrogate, ortho-terphenyl (OTP), in sample NASB-FF-01-WM002 (45%) and NASB-FF-01-MW003 (43%) were below the lower method QC limit of 50%. These recoveries may be indicative of a slight negative bias for these samples. The method requires that samples with surrogate recoveries less than 50% be re-extracted and reanalyzed to demonstrate matrix interferences. However, due to insufficient sample volume, the samples could not be re-extracted by this method. All surrogate recoveries were within QC limits for the method blank, LCS and LCS duplicate indicating acceptable method performance.

The MSD recovery (performed on sample NASB-FF-01-MW002) was just below the lower method QC limit of 60% at 57%. The MS recovery was within QC limits at 61%. The low recovery may be indicative of a slight negative bias.

All other quality control criteria were met for the reported samples.

111%/117%. Data usability should not be impacted.

All other quality control criteria were met for the reported samples.

EXTRACTABLE TPH BY GC - WATER (EA9611498-EA9611511)

Sample Chronology: The samples were extracted on 14 August 1996 by the Maine Method 4.1.25. The extracts and associated quality control were analyzed on 28-29 August 1996 for diesel range organics (DRO) by the Maine Method 4.1.25. All holding times were met.

Sample NASB-FF-01-WP002 (and the MS/MSD performed on it) was analyzed at a 5X dilution to bring the extract concentration of DRO within calibration range.

Laboratory Method Performance: The LCS recovery was just below the lower method QC limit of 60% at 59%. The LCS duplicate recovery was within QC limits at 66%. The low recovery may be indicative of a slight negative bias.

All other laboratory method performance criteria were met for the reported samples.

Sample Performance: The recoveries of the surrogate, ortho-terphenyl (OTP), in sample NASB-FF-01-WP002 and the MS/MSD performed on it were below the lower method QC limit of 50% at 45% and 25%/6%. These low recoveries are likely inaccurate becauce of the very high concentration of DRO in this sample which masked the surrogate peak and made integration and quantitation of the surrogate unreliable. The recoveries of the surrogate in samples NASB-FF-01-WP003 (26%), NASB-FF-01-WP004 (42%), NASB-FF-01-WP010 (44%) and NASB-FF-01-WPXD2 (35%) were below the lower method QC limit of 50%. These recoveries may be indicative of a negative bias for these samples. The method requires that samples with surrogate recoveries less than 50% be re-extracted and reanalyzed to demonstrate matrix interferences. However, due to insufficient sample volume, the samples could not be re-extracted by this method. All surrogate recoveries were within QC limits for the method blank, LCS and LCS duplicate indicating acceptable method performance.

The MS/MSD recoveries (performed on sample NASB-FF-01-WP002) could not be reliably

EA Laboratories
ANALYTICAL NARRATIVE

Client: **EA Engineering, Science & Tech.**
Site: **NAS Brunswick**
Project number: **29600.35**

Laboratory Project Manager: **Mary E. Asper**
EA Laboratories Report: **961262**
Date: **6 September 1996**

CERTIFICATION OF RESULTS

The Laboratory certifies that this report meets the project requirements for analytical data as stated in the Analytical Task Order (ATO) and the chain-of-custody. In addition, the Laboratory certifies that the data as reported meet the Data Quality Objectives for precision, accuracy, and completeness specified for this project or as stated in EA Laboratories Quality Assurance program for other than the conditions detailed Release of the data contained in this report has been authorized by the appropriate Laboratory Manager as verified by the following signature.

_____ 6 September 1996
Phyllis Christopher, Production Manager

2. CHAIN-OF-CUSTODY

Company Name:	Project Manager or Contact:
EA	Mike Battle
	Phone (914) 565-8100
Project No.	Project Name: Brunswick
29600.35, 3628	NAVY FUEL FARM
Sample Storage Location: B6-B9	ATO Number:
Page 1 of 1	Job ID: 9612162

Chain of Custody Record

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

Report/Deliverables: Level IE
Date Due 8/30/96
No EDDS Required

Parameters/Method Numbers for Analysis*: BTEX/MTBE EPA 602; TPH as Gasoline MEDEP LOP 4.1.2.7; TPH as Fuel Oil MEDEP LOP 4.1.2.5

Date	Time	Water	Soil	Sample Identification 19 Characters	No. of Containers	BTEX/MTBE EPA 602	TPH as Gasoline MEDEP LOP 4.1.2.7	TPH as Fuel Oil MEDEP LOP 4.1.2.5	EA Labs Accession Number	Remarks
8/7/96	1030	X		NAISB-FF-01-WA0011	6	X	X	X	9611498	LPM: MEA
8/7/96	1100	X		NAISB-FF-01-WAR011	6	X	X	X	9611499	
8/7/96	1110	X		NAISB-FF-01-WA0012	9	X	X	X	9611500	MS/MSD 3 amber liters 6 voc
8/7/96	1145	X		NAISB-FF-01-WA0013	6	X	X	X	9611501	2 Amber liters 4 voc
8/7/96	1345	X		NAISB-FF-01-WA0014	6	X	X	X	9611502	
8/7/96	1400	X		NAISB-FF-01-WA0019	6	X	X	X	9611503	
8/7/96	1430	X		NAISB-FF-01-WA0018	6	X	X	X	9611504	
8/7/96	1450	X		NAISB-FF-01-WA0016	6	X	X	X	9611505	
8/7/96	1535	X		NAISB-FF-01-WA0017	6	X	X	X	9611506	broken amber liter 1 Remains * 1 amber liter 4 VOC
8/7/96	1600	X		NAISB-FF-01-WA0015	6	X	X	X	9611507	2 amber liter 4 VOC
~~—~~	~~1615~~	~~X~~		~~NAISB-FF-01-WA0010~~	~~6~~					
8/7/96	1615	X		NAISB-FF-01-WA0119	6	X	X	X	9611508	broken amber liter 1 Remains * 1 amber liter 4 VOC
8/7/96	1640	X		NAISB-FF-01-WA0111	6	X	X	X	9611509	2 amber liters 4 VOC
8/7/96	—	X		NAISB-FF-01-WAXD11	6	X	X	X	9611510	
8/7/96	—	X		NAISB-FF-01-WAXD12	6	X	X	X	9611511	

L 9846

NEW MAINE Method Please follow New Method Requirements.

Sampled by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Sherri A Pullar	8/7/96 1700				
Relinquished by: (Signature)	**Date/Time**	**Received by: (Signature)**	**Date/Time**	**Airbill Number:**	**Sample Shipped by: (Circle)**
Sherri A Pullar	8/8/96 1500	Michael McCloud	8/09/96 0900	3635573594	Fed Ex. Puro. UPS Hand Carried Other:

Cooler Temp: 1.7 C pH: ☐ Yes ☒ No Comments: Cool 1.7, 2.2, 3.4, 2.2 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*

Company Name:	Project Manager or Contact:
EA Eng	Mike Battle Phone: (914) 565-8100
Project No. 29600.35 3628	Project Name: Brunswick Navy Fuel Farm
Sample Storage Location: B6-B9	ATO Number:
Page 1 of 1	Job ID: 9611262

Batched.

Chain of Custody Record

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

Report/Deliverables: Level 1 E
no EPD's
Date Due 8/30/96

Parameters/Method Numbers for Analysis*

Date	Time	Water	Soil	Sample Identification 19 Characters	No. of Containers	BTEX/MTBE EPA 602	TPH as Gas MEDEP LOP 4.8.1.7	TPH as Fuel Oil MEDEP LOP 4.1.2.5	EA Labs Accession Number	Remarks
8/8/96	8:00	X		MAISB-FF-01-MP0113	6	X	X	X	9611512	LPM: MEA
8/8/96	915	X		MAISB-FF-01-MP0115	6	X	X	X	9611513	
8/8/96	940	X		MAISB-FF-01-MP0114	6	X	X	X	9611514	
8/8/96	1000	X		MAISB-FF-01-MP0118	6	X	X	X	9611515	
8/8/96	1040	X		MAISB-FF-01-MP0119	6	X	X	X	9611516	
8/8/96	1100	X		MAISB-FF-01-MP0120	6	X	X	X	9611517	
8/8/96	1300	X		MAISB-FF-01-MW0011	6	X	X	X	9611518	
8/8/96	1320	X		MAISB-FF-01-MW0012	9	X	X	X	9611519	MS/MSD 3 Amberlites VOC
8/8/96	1400	X		MAISB-FF-01-MW0013	6	X	X	X	9611520	
8/8/96	1430	X		MAISB-FF-01-MW0018	6	X	X	X	9611521	
8/8/96	—	X		MAISB-FF-01-MWXD01	6	X	X	X	9611522	
										L9896

New Maine Methods Please follow New Method Requirements.

Sampled by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Sherri A. Pullar	8/8/96 300A				
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Airbill Number:	Sample Shipped by: (Circle)
Sherri A. Pullar	8/8/96 1500	Jonal McCloud	8/09/96 0900	3635573394	Fed Ex Puro. UPS Hand Carried Other:

Cooler Temp: 1.7 C pH: ☐ Yes ☒ No Comments: Temp 1.7, 2.2, 3.4, 2.3 Custody Seals Intact ☒ Yes ☐ No

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

WH[redacted]A Lab[redacted]s [redacted] [redacted] [redacted] [redacted] [redacted]V - EA[redacted]tories [redacted] [redacted]K - Pr[redacted]anag[redacted] [redacted] [redacted] Shaded Areas for Lab Use Only

3. ORGANIC DATA

A. Aromatic Volatiles-GC

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP001

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611498F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L463F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	16	
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	2.1	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	9.4	
95-47-6	ORTHO XYLENE	2.6	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP002

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611500F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L464F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	34	
71-43-2	BENZENE	5.6	
108-88-3	TOLUENE	34	
100-41-4	ETHYLBENZENE	94	
108-38-3/106-42-3	META & PARA XYLENES	360	
95-47-6	ORTHO XYLENE	130	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP003

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611501F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L485F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.3	
71-43-2	BENZENE	17	
108-88-3	TOLUENE	72	
100-41-4	ETHYLBENZENE	1.3	
108-38-3/106-42-3	META & PARA XYLENES	3.1	
95-47-6	ORTHO XYLENE	1.0	U

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP004

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611502F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L466F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	31	
71-43-2	BENZENE	1.6	
108-88-3	TOLUENE	3.8	
100-41-4	ETHYLBENZENE	7.5	
108-38-3/106-42-3	META & PARA XYLENES	8.5	
95-47-6	ORTHO XYLENE	7.0	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP005

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611507F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L481F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	14	
71-43-2	BENZENE	12	
108-88-3	TOLUENE	740	E
100-41-4	ETHYLBENZENE	700	E
108-38-3/106-42-3	META & PARA XYLENES	2800	E
95-47-6	ORTHO XYLENE	1500	E

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP005DL

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611507D

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L523F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 5

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	19	
71-43-2	BENZENE	10	
108-88-3	TOLUENE	640	
100-41-4	ETHYLBENZENE	580	
108-38-3/106-42-3	META & PARA XYLENES	2600	
95-47-6	ORTHO XYLENE	1400	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP006

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611505F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L470F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	32	
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	3.8	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	2.5	
95-47-6	ORTHO XYLENE	1.2	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP007

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611506F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L471F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	9.9	
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	12	
100-41-4	ETHYLBENZENE	6.0	
108-38-3/106-42-3	META & PARA XYLENES	40	
95-47-6	ORTHO XYLENE	9.2	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP008

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611504F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L469F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	29	
71-43-2	BENZENE	15	
108-88-3	TOLUENE	6.4	
100-41-4	ETHYLBENZENE	1.5	
108-38-3/106-42-3	META & PARA XYLENES	4.6	
95-47-6	ORTHO XYLENE	1.5	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP009

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611503F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L467F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	130	
71-43-2	BENZENE	1.0	
108-88-3	TOLUENE	5.4	
100-41-4	ETHYLBENZENE	1.3	
108-38-3/106-42-3	META & PARA XYLENES	4.6	
95-47-6	ORTHO XYLENE	4.1	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP010

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611508F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L472F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	49	
71-43-2	BENZENE	31	
108-88-3	TOLUENE	46	
100-41-4	ETHYLBENZENE	17	
108-38-3/106-42-3	META & PARA XYLENES	46	
95-47-6	ORTHO XYLENE	26	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP011

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611509F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L476F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	51	
71-43-2	BENZENE	78	
108-88-3	TOLUENE	3000	E
100-41-4	ETHYLBENZENE	170	
108-38-3/106-42-3	META & PARA XYLENES	630	
95-47-6	ORTHO XYLENE	120	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP011DL

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611509D

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L483F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 10

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	48	
71-43-2	BENZENE	74	
108-88-3	TOLUENE	3400	
100-41-4	ETHYLBENZENE	160	
108-38-3/106-42-3	META & PARA XYLENES	640	
95-47-6	ORTHO XYLENE	120	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP013

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611512F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F101F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	89	
71-43-2	BENZENE	15	
108-88-3	TOLUENE	380	
100-41-4	ETHYLBENZENE	56	
108-38-3/106-42-3	META & PARA XYLENES	220	
95-47-6	ORTHO XYLENE	95	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP014

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611514F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F103F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.6	
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	10	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	3.1	
95-47-6	ORTHO XYLENE	1.4	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP015

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611513F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F102F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	2.0	
71-43-2	BENZENE	5.5	
108-88-3	TOLUENE	19	
100-41-4	ETHYLBENZENE	1.7	
108-38-3/106-42-3	META & PARA XYLENES	5.2	
95-47-6	ORTHO XYLENE	2.4	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP018

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611515F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F104F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	7.8	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	2.6	
95-47-6	ORTHO XYLENE	1.2	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP019

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611516F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F105F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	3.9	
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	3.4	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.2	
95-47-6	ORTHO XYLENE	1.0	U

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP020

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611517F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F111F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	36	
71-43-2	BENZENE	1.0	
108-88-3	TOLUENE	7.2	
100-41-4	ETHYLBENZENE	1.0	
108-38-3/106-42-3	META & PARA XYLENES	4.0	
95-47-6	ORTHO XYLENE	2.3	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MW001

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611518F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F112F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	2.5	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.1	
95-47-6	ORTHO XYLENE	1.0	U

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MW002

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611519F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F106F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.8	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	
95-47-6	ORTHO XYLENE	1.0	U

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MW003

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611520F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F113F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	4.8	
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.2	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WPXD1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611510F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L486F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	12	
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	2.1	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	13	
95-47-6	ORTHO XYLENE	3.1	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WPXD2

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611511F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L478F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	32	
71-43-2	BENZENE	75	
108-88-3	TOLUENE	3000	E
100-41-4	ETHYLBENZENE	220	
108-38-3/106-42-3	META & PARA XYLENES	840	
95-47-6	ORTHO XYLENE	140	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WPXD2DL

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611511D

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L484F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 10

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	29	
71-43-2	BENZENE	59	
108-88-3	TOLUENE	3500	
100-41-4	ETHYLBENZENE	210	
108-38-3/106-42-3	META & PARA XYLENES	780	
95-47-6	ORTHO XYLENE	140	

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VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MWXD1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611522F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F115F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	2.7	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.8	
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WPRB1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611499F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L462F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MWRB1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9611521F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F114F

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/16/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: VB608153

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG7F098F

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK2

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: VB608152

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L461F

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 08/15/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK3

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: VB608194

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6L506F

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

B. TPH-Gas

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP001

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611498

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G577

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	77	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP002

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611500

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G599

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	4200	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP003

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611501

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G578

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	140	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP004

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611502

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G579

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	890	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP005

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611507

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G584

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 5

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
----------	TPH	9000	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP006

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611505

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G582

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	31	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP007

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611506

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G583

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	2500	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP008

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611504

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G581

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	220	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP009

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611503

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G580

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	93	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP010

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611508

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G585

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	550	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP011

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611509

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G586

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 5

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	5500	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP013

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611512

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G594

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	2200	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP014

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611514

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G596

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	34	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP015

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611513

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G595

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	47	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP018

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611515

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G597

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	22	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP019

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611516

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G598

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	260	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WP020

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611517

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G626

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/21/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	320	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MW001

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611518

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G627

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/21/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
----------	TPH	16	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MW002

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611519

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G628

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/21/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	44	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MW003

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611520

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G631

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/21/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	14	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WPXD1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611510

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G592

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/20/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	54	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WPXD2

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611511

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G625

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/21/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 5

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	10000	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MWXD1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611522

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G634

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/22/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01WPRB1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611499

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G576

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF01MWRB1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: 9611521

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G633

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: not dec. _____ Date Analyzed: 08/21/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: VB608195

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G575

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 08/19/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK2

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No:

Matrix: (soil/water) WATER Lab Sample ID: VB608214

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4G623

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 08/21/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

C. TPH-Fuel

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP001

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611498

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/28/96

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	1000	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP002

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611500

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 5

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	16000	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP003

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611501

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/28/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	410	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP004

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611502

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/28/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	1300	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP005

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611507

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	1000	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP006

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611505

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	150	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP007

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611506

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	680	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP008

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611504

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	480	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP009

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611503

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/28/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	89	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP010

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611508

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	420	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP011

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611509

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	3600	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP013

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611512

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	580	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP014

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611514

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	140	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP015

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611513

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	500	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP018

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611515

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	75	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP019

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611516

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	100	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WP020

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611517

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	73	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-MW001

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611518

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	50	U

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-MW002

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611519

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	56	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-MW003

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611520

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	50	U

U Concentration below detection limit

1

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WPXD1

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611510

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	1100	

U Concentration below detection limit

FORM I TPH 1/92 Rev.

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WPXD2

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611511

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	3000	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-MWXD1

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611522

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	50	U

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-WPRB1

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611499

Sample wt/vol: 1 L Date Sampled: 08/07/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/28/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	57	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-01-MWRB1

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9611521

Sample wt/vol: 1 L Date Sampled: 08/08/96

Level: (low/med) LOW Date Received: 08/09/96

% Moisture: N/A Date Extracted: 08/15/96

Method: 4.1.25 Date Analyzed: 08/29/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	74	

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

TB608143

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: TB608143

Sample wt/vol: 1 L Date Sampled: N/A

Level: (low/med) LOW Date Received: N/A

% Moisture: N/A Date Extracted: 08/14/96

Method: 4.1.25 Date Analyzed: 08/28/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS DRO	50	U

U Concentration below detection limit

EA Laboratories

19 Loveton Circle
Sparks, MD 21152
Telephone: 410-771-4920
Fax: 410-771-4407

8 January 1997

Mr. Mike Battle
EA Engineering, Science, and Technology , Inc.
3 Washington Center
Newburgh, NY 12550

RECEIVED
JAN 0 9 1997
EA Engineering, Science, & Technology, Inc.
Newburgh, NY 12550

Re: NAS Brunswick BRAC-Navy Fuel Farm (29600.35)

Dear Mr. Battle:

Enclosed is our report on the analysis of ten water samples collected for the NAS Brunswick BRAC-Navy Fuel Farm project on 04 December 1996. The invoice is included.

Please contact me if you have any questions or require further information and refer to report 962063. Unless other arrangements are made, we reserve the right to dispose of your samples sixty (60) days from the date of this letter. We will retain the raw data for seven years from this date.

Sincerely,

Mary E. Asper
Laboratory Project Manager

enclosure

LABORATORY DATA REPORT

Prepared for:

NAS Brunswick Brac
Navy Fuel Farm
29600.35

Prepared by:

EA Laboratories
19 Loveton Circle
Sparks, Maryland 21152

Report 962063

January 1997

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Navy Fuel Farm
EA Laboratories Report # 962063

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   A. BTEX
   B. TPH-GRO
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1. NARRATIVE

EA Laboratories
ANALYTICAL NARRATIVE

Client: **EA Eng., Sci., and Tech. Inc.**
Site: **Navy Fuel Farm**
Project number: **29600.35**

EA Laboratories Report: **962063**
Laboratory Project Manager: **Mary E. Asper**
Report Date: **8 January 1997**

This report contains the results of the analysis of ten water samples on 4 December 1996 in support of the referenced project.

SAMPLE RECEIPT

The samples and one trip blank arrived by Federal Express at EA Laboratories on 06 December 1996. Upon receipt, the samples and blank were inspected and compared with the chain-of-custody record. The samples and blank were then logged into the laboratory computer system with assigned laboratory accession numbers and released for analysis.

Client Sample Designation	EA Lab Number
NASB-FF-02-MW001	9618881
NASB-FF-02-MW002	9618882
NASB-FF-02-MW003	9618883
NASB-FF-02-MW004	9618884
NASB-FF-02-MW005	9618885
NASB-FF-02-MW006	9618886
NASB-FF-02-MW007	9618887
NASB-FF-02-MW008	9618888
NASB-FF-02-MWXD1	9618889
TRIPBLANK	9618890
NASB-FF-02-MWRB1	9618891

Following this narrative section are a description of analytical methods (Table 1), a glossary of data qualifiers used in this report(Table 2), and the original chain-of-custody record. Analytical results and quality control information are summarized in the appended data package which has been formatted to be consistent with the deliverable requirements of this project.

QUALITY CONTROL

The following sections are ordered as the data appears in this report. They contain observations made during sample analysis, summarize the results of quality control measurements, and address the impact on data usability based upon project Data Quality Objectives. For each fractional analysis the narrative includes:

- Sample chronology: This section summarizes the sample history by fraction including the

sample preparation method and date, analytical method, and analysis date. Anything unusual about the samples, digestates, or extracts is identified. Holding time compliance is evaluated in this section.

- Laboratory method performance: All quality control criteria for method performance must be met for all target analytes for data to be reported. These criteria generally apply to instrument tune, calibration, method blanks, and Laboratory Control Samples (LCS). In some instances where method criteria fail, useable data can be obtained and are reported with client approval. The narrative will then include a thorough discussion of the impact on data quality.

- Sample performance: Quality control field samples are analyzed to determine any measurement bias due to the sample matrix based on evaluation of matrix spikes (MS), matrix spike duplicates (MSD), and laboratory duplicates (D). If acceptance criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the LCS results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.

AROMATIC VOLATILES BY GC - WATER (EA9618881-EA9618891)

Sample Chronology: The samples and associated quality control were analyzed on 10-11 and 11-12 December 1996 for methyl tert-butyl ether (MTBE), benzene, toluene, ethylbenzene and xylenes by USEPA 40CFR, Part 136, Appendix A, Method 602. All holding times were met.

The batch MS for the 11-12 December 1996 analytical sequence was performed on another NAS Brunswick sample (NASB FF-02-WP020)..

Sample NASB FF-02-MW007 was reanalyzed at a 100X dilution to bring the concentration of target analytes within calibration range. The results of both the undiluted and diluted analyses are included in this report.

Laboratory Method Performance: All laboratory method performance criteria were met for the reported samples.

Sample Performance: All quality control criteria were met for the reported samples.

EA Laboratories
ANALYTICAL NARRATIVE

Client: **EA Eng., Sci., and Tech. Inc.**
Site: **Navy Fuel Farm**
Project number: **29600.35**

EA Laboratories Report: **962063**
Laboratory Project Manager: **Mary E. Asper**
Report Date: **8 January 1997**

PURGEABLE TPH BY GC - WATER (EA9618881-EA9618889, EA9618891)

Sample Chronology: The samples and associated quality control were analyzed on 11-12 December 1996 for gasoline range organics (GRO) by Maine Method 4.2.17. All holding times were met.

Sample NASB FF-02-MW007 was analyzed at a 20X dilution to bring the concentration of GRO within calibration range.

Laboratory Method Performance: All laboratory method performance criteria were met for the reported samples.

Sample Performance: All quality control criteria were met for the reported samples.

EXTRACTABLE TPH - WATER (EA9618881-EA9618889, EA9618891)

Sample Chronology: The samples and associated quality control were extracted on 10 December 1996 by the Maine Method 4.1.25. The sample extracts and the associated quality control were analyzed by the same method on 4-5 January 1997 for diesel range organics (DRO). All holding times were met.

Samples NASB FF-02-MW001, NASB FF-02-MW003 and NASB FF-02-MWXD1 were not preserved to a pH less than 2 as required by the method. The samples were preserved to a pH less than 2 prior to extraction.

Laboratory Method Performance: The LCS and LCS duplicate recoveries for DRO were below the lower method QC limit of 60% at 12% and 19%, respectively. These low recoveries may be indicative of a negative bias, however, the MS/MSD recoveries for DRO (performed on sample NASB FF-02-MW001) were within QC limits at 70%/63%.

All other laboratory method performance criteria were met for the reported samples.

Sample Performance: All quality control criteria were met for the reported samples.

The chromatographic patterns for samples NASB FF-02-MW001, NASB FF-02-MW002, NASB FF-02-MW003, NASB FF-02-MW006, NASB FF-02-MW008 and NASB FF-02-MWXD1

indicated the presence of a heavy petroleum product, much of which eluted beyond the DRO retention time range. The chromatographic pattern for sample NASB FF-02-MW007 indicated the presence of more than one petroleum product. This sample had responses which eluted before and after the DRO retention time range.

CERTIFICATION OF RESULTS

The Laboratory certifies that this report meets the project requirements for analytical data as stated in the Analytical Task Order (ATO) and the chain-of-custody. In addition, the Laboratory certifies that the data as reported meet the Data Quality Objectives for precision, accuracy, and completeness specified for this project or as stated in EA Laboratories Quality Assurance program for other than the conditions detailed above. Release of the data contained in this report has been authorized by the appropriate Laboratory Manager as verified by the following signature.

_____ 8 January 1997
Phyllis A. Christopher, Production Manager

TABLE 1. ANALYTICAL METHODS

Parameter	Method	Method Number	Matrix	Reference
ORGANICS				
Purgeable Aromatics	Gas Chromatography - PID	602	W	(1)
Total Petroleum Hydrocarbons	Gas Chromatography - FID Maine method - Gas	4.1.17	W	(2)
Total Petroleum Hydrocarbons	Gas Chromatography - FID Maine method - Diesel	4.1.25	W	(2)

Matrix codes:

W - Estuarine water, ground water, leachates, ocean water, surface water, and wastewater

References:

1. United States Environmental Protection Agency. 1987. Methods for the organic chemical analysis of municipal and industrial wastes. 40 CFR Part 136, Appendix A.

2. Maine Health and Environmental Testing Laboratory. 1991. Fuel Oil in Water. Augusta, Maine.

TABLE 2. ORGANIC ANALYSIS DATA QUALIFIERS

ND or U Indicates a compound on the target compound list (TCL) was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and, if a soil sample, for percent moisture. For example, 10 U is used for phenol in water if the sample final volume is the protocol-specified final volume. If a 1-to-10 dilution of the extract was necessary, the reported limit is (10 x 10 U) or 100 U. For a soil sample, the value is also adjusted for percent moisture. For example, if the sample had 24% moisture and a 1-to-10 dilution factor, the soil sample quantitation limit for phenol (330 U) would be corrected as follows:

Reported limit = (330 U) x df / D

where: df = dilution factor = 10

D = (100 - % moisture) / 100 (At 24% moisture, D = (100-24) / 100 = 0.76)

Reported limit = (330 U) x 10 / 0.76 = 4300 U (rounded to two significant figures)

For soil samples subjected to gel permeation chromatography (GPC) cleanup procedures, the contract required quantitation limit (CRQL) is also multiplied by 2 to account for the fact that only half of the extract is recovered. Note: If GPC procedures are employed, the factor of 2 is not included in the dilution factor reported; a "Y" is entered for GPC (Y/N).

TR or J Indicates an estimated value. This flag is used under the following circumstances: 1) when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, 2) when the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the CRQL but greater than zero, 3) when the retention time data indicate the presence of a compound that meets the pesticide/Aroclor identification criteria and the result is less than the CRQL but greater than zero. Note: the "J" code is not used and the compound is not reported as being identified for pesticide/Aroclor results less than the CRQL, if the technical judgement of the pesticide residue analysis expert determines that the peaks used for compound identification resulted from instrument noise or other interferences (column bleed, solvent contamination, etc.). For example, if the sample quantitation limit is 10 ug/L but a concentration of 3 ug/L is calculated, report it as 3 J. The sample quantitation limit must be adjusted for dilution as discussed for the U flag

C This flag applies to pesticide results where the identification has been confirmed by GC/MS. Single component pesticides with concentration equal to or greater than 10 ng/uL in the final extract must be confirmed by GC/MS.

B This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified TCL compound.

E This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis. This flag does not apply to pesticides/PCBs analyzed by GC/EC methods. If one or more compounds have a response greater that full scale, the sample or extract must be diluted and reanalyzed according to the specifications listed in the SOW. All such compounds with a response greater than full scale should have a concentration flagged with an "E" on Form I for the original analysis. If the dilution of the extract causes any compounds identified in the first analysis to be below the calibration range in the second analysis, then the results of both analyses are reported on separate Forms I. The Form I for the diluted sample will have the "DL" suffix appended to the sample number. NOTE: For total xylenes, where three isomers are quantified as two peaks, the calibration range of each peak is considered separately; e.g., a diluted analysis is not required for total xylenes unless the concentration of either peak separately exceeds 200 ug/L.

D This flag identifies all compounds identified in the analysis at a secondary dilution factor. If a sample or extract is reanalyzed at a higher dilution factor, as in the "E" flag above, the "DL" suffix is appended to the sample number on the Form I for the diluted sample, and all concentration values reported on that Form I are flagged with the "D" flag.

A This flag indicates that a TIC is a suspected aldol-condensation product.

X Other specific flags may be required to properly define the results. If used, they are fully described and such description attached to the Sample Data Summary Package and the Case Narrative. The flags begin by using "X". If more that one flag is required, "Y" and "Z" are used, as needed. For instance, the "X" flag might combine the "A", "B", and "D" flags for some sample.

N Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds, where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic characterization of a TIC, such as chlorinated hydrocarbon, the N code is not used.

P This flag is used for GC analyses when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on Form 1 and flagged with a "P".

2. CHAIN OF CUSTODY

Company Name:	Project Manager or Contact:
EA Brunswick	Mike Battle
Project No. 29600035	Phone: 914-565-8100
Dept.: 6125 Task: 3696	Project Name: Brunswick Fuel Farm
Sample Storage Location: N7	ATO Number: 5049

Page 1 of 1 | Report #: ~~9600~~ 962063

12/6/96

Parameters/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: 12/28/96

Date	Time	Water	Soil	Sample Identification 19 Characters	No. of Containers	BTEX/MTBE SPA602	TPH Gas MEDEP LOP 4.2.17	TPH Fuel 10.1 MEDEP LOP 4.1.25	EA Labs Accession Number	Remarks
12/4/96	1010	X		NASB-FF-02-MW0011	18	X	X	X	9618881	LPM: MEA MS/MSD
12/4/96	1110	X		NASB-FF-02-MW0012	6	X	X	X	9618882	
12/4/96	1140	X		NASB-FF-02-MW0013	6	X	X	X	9618883	
12/4/96	1325	X		NASB-FF-02-MW0014	6	X	X	X	9618884	
12/4/96	1350	X		NASB-FF-02-MW0015	6	X	X	X	9618885	* one broken VOA 3 left
12/4/96	1410	X		NASB-FF-02-MW0016	6	X	X	X	9618886	
12/4/96	1430	X		NASB-FF-02-MW0017	6	X	X	X	9618887	
12/4/96	1450	X		NASB-FF-02-MW0018	6	X	X	X	9618888	
12/4/96	—	X		NASB-FF-02-MWXD1	6	X	X	X	9618889	
		X		TRIP BLANK	2	X			9618890	
12/4/96	1008	X		NASB-FF-02-MWRB1	6	X	X	X	9618891	Follow project guidelines

Samples begin and end SDG-NASB-FF-02 MW-001 L10760

Samples by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Suzanne Chase	12/4/96 1455	Suzanne Chase	12/5/96 1300		

Relinquished by: (Signature)	Date/Time	Received by Laboratory: (Signature)	Date/Time	Airbill Number:	Sample Shipped by: (Circle)
			12/6/96 0915	9562641557	Fed Ex. Puro. UPS Hand Carried Other:

Cooler Temp. 2.1 °C pH: X Yes No Comments: 2 on Rest Custody Seals Intact Yes X No None

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*

3. ORGANIC DATA

A. BTEX

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW001

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618881F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M924F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/10/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW002

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618882F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M925F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/10/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW003

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618883F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M926F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW004

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618884F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M927F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW005

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618885F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M928F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW006

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618886F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M929F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	2.0	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW007

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618887F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M930F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	120	
71-43-2	BENZENE	1300	E
108-88-3	TOLUENE	12000	E
100-41-4	ETHYLBENZENE	250	
108-38-3/106-42-3	META & PARA XYLENES	2300	E
95-47-6	ORTHO XYLENE	470	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW007DL

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618887D

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M964F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 100

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	120	
71-43-2	BENZENE	1100	
108-88-3	TOLUENE	27000	
100-41-4	ETHYLBENZENE	210	
108-38-3/106-42-3	META & PARA XYLENES	2100	
95-47-6	ORTHO XYLENE	420	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW008

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618888F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M944F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.2	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MWXD1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618889F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M932F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.6	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

TRIPBLANK

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618890F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M923F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/10/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MWRB1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618891F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M922F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/10/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: VB612105

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M918F

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 12/10/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK2

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: VB612114

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M942F

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

B. TPH-GRO

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW001

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618881

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H714

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW002

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618882

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H715

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW003

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618883

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H716

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW004

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618884

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H717

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	11	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW005

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618885

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H718

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	110	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW006

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618886

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H719

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
----------	TPH	100	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW007

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618887

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H735

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 20

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	30000	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MW008

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618888

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H720

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	15	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MWXD1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618889

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H721

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02MWRB1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618891

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H713

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: VB612112

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H711

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

C. TPH-FUEL OIL

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MW001

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618881

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/04/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MW002

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618882

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/04/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	110	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MW003

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618883

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/04/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	230	

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MW004

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618884

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/04/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	52	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MW005

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618885

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/04/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	290	

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MW006

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618886

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/04/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	66	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MW007

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618887

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/05/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	6700	

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MW008

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618888

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/05/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	260	

U Concentration below detection limit

1

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MWXD1

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618889

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/05/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	150	

Concentration below detection limit

FORM I TPH 1/92 Rev.

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-MWRB1

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618891

Sample wt/vol: 1 L Date Sampled: 12/04/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/05/96

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

TB612103

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: TB612103

Sample wt/vol: 1 L Date Sampled: N/A

Level: (low/med) LOW Date Received: N/A

Moisture: N/A Date Extracted: 12/10/96

Method: ME4.1.25 Date Analyzed: 01/04/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

U Concentration below detection limit

EA Laboratories

19 Loveton Circle
Sparks, MD 21152
Telephone: 410-771-4920
Fax: 410-771-4407

9 January 1997

RECEIVED
JAN 1 0 1997
EA Engineering, Science, & Technology, Inc.
Newburgh, NY 12550

Mr. Mike Battle
EA Engineering, Science, and Technology , Inc.
3 Washington Center
Newburgh, NY 12550

Re: NAS Brunswick BRAC-Navy Fuel Farm (29600.35)

Dear Mr. Battle:

Enclosed is our report on the analysis of eighteen water samples collected for the NAS Brunswick BRAC-Navy Fuel Farm project on 05 December 1996. The invoice is included.

Please contact me if you have any questions or require further information and refer to report 962064. Unless other arrangements are made, we reserve the right to dispose of your samples sixty (60) days from the date of this letter. We will retain the raw data for seven years from this date.

Sincerely,

FOR MEA

Mary E. Asper
Laboratory Project Manager

enclosure

LABORATORY DATA REPORT

Prepared for:

NAS Brunswick Brac
Navy Fuel Farm
29600.35

Prepared by:

EA Laboratories
19 Loveton Circle
Sparks, Maryland 21152

Report 962064

January 1997

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Navy Fuel Farm
EA Laboratories Report # 962064

1. NARRATIVE

2. CHAIN OF CUSTODY

3. ORGANIC DATA

   A. BTEX
   B. TPH-GRO
   C. TPH-FUEL OIL

1. NARRATIVE

EA Laboratories
ANALYTICAL NARRATIVE

Client: **EA Eng., Sci., and Tech. Inc.**
Site: **Navy Fuel Farm**
Project number: **29600.35**

EA Laboratories Report: **962064**
Laboratory Project Manager: **Mary E. Asper**
Report Date: **9 January 1997**

This report contains the results of the analysis of eighteen water samples on 05 December 1996 in support of the referenced project.

SAMPLE RECEIPT

The samples and one trip blank arrived by Federal Express at EA Laboratories on 06 December 1996. Upon receipt, the samples and blank were inspected and compared with the chain-of-custody record. The samples and blank were then logged into the laboratory computer system with an assigned laboratory accession numbers and released for analysis.

Client Sample Designation	EA Lab Number
NASB-FF-02-NP001	9618892
NASB-FF-02-WP003	9618893
NASB-FF-02-WP005	9618894
NASB-FF-02-WP006	9618895
NASB-FF-02-WP010	9618896
NASB-FF-02-WP008	9618897
NASB-FF-02-WP009	9618898
NASB-FF-02-WPXD1	9618899
NASB-FF-02-WP011	9618900
NASB-FF-02-WP012	9618901
NASB-FF-02-WP013	9618902
NASB-FF-02-WP014	9618903
NASB-FF-02-WP015	9618904
NASB-FF-02-WP016	9618905
NASB-FF-02-WP018	9618906
NASB-FF-02-WP019	9618907
NASB-FF-02-WP020	9618908
TRIPLANK	9618909
NASB-FF-02-WPRB1	9618910

Following this narrative section are a description of analytical methods (Table 1), a glossary of data qualifiers used in this report(Table 2), and the original chain-of-custody record. Analytical results and quality control information are summarized in the appended data package which has been formatted to be consistent with the deliverable requirements of this project.

EA Laboratories
ANALYTICAL NARRATIVE

Client: **EA Eng., Sci., and Tech. Inc.**
Site: **Navy Fuel Farm**
Project number: **29600.35**

EA Laboratories Report: **962064**
Laboratory Project Manager: **Mary E. Asper**
Report Date: **9 January 1997**

QUALITY CONTROL

The following sections are ordered as the data appears in this report. They contain observations made during sample analysis, summarize the results of quality control measurements, and address the impact on data usability based upon project Data Quality Objectives. For each fractional analysis the narrative includes:

- Sample chronology: This section summarizes the sample history by fraction including the sample preparation method and date, analytical method, and analysis date. Anything unusual about the samples, digestates, or extracts is identified. Holding time compliance is evaluated in this section.

- Laboratory method performance: All quality control criteria for method performance must be met for all target analytes for data to be reported. These criteria generally apply to instrument tune, calibration, method blanks, and Laboratory Control Samples (LCS). In some instances where method criteria fail, useable data can be obtained and are reported with client approval. The narrative will then include a thorough discussion of the impact on data quality.

- Sample performance: Quality control field samples are analyzed to determine any measurement bias due to the sample matrix based on evaluation of matrix spikes (MS), matrix spike duplicates (MSD), and laboratory duplicates (D). If acceptance criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the LCS results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.

AROMATIC VOLATILES BY GC - WATER (EA9618892-EA9618910)

Sample Chronology: The samples and associated quality control were analyzed on 10-11 and 11-12 December 1996 for methyl tert-butyl ether (MTBE), benzene, toluene, ethylbenzene and xylenes by USEPA 40CFR, Part 136, Appendix A, Method 602. All holding times were met.

The batch MS for the 10-11 December 1996 analytical sequence was performed on another NAS Brunswick sample (NASB FF-02-MW001).

Sample NASB FF-02-WP005 was initially analyzed at a 2X dilution to bring the concentration of target analytes within calibration range. All target analytes were detected in this dilution analysis.

EA Laboratories
ANALYTICAL NARRATIVE

Client: **EA Eng., Sci., and Tech. Inc.**
Site: **Navy Fuel Farm**
Project number: **29600.35**

EA Laboratories Report: **962064**
Laboratory Project Manager: **Mary E. Asper**
Report Date: **9 January 1997**

Laboratory Method Performance: All laboratory method performance criteria were met for the reported samples.

Sample Performance: All quality control criteria were met for the reported samples.

PURGEABLE TPH BY GC - WATER (EA9618892-EA9618908, EA9618910)

Sample Chronology: The samples and associated quality control were analyzed on 11-12, 12 and 13 December 1996 for gasoline range organics (GRO) by Maine Method 4.2.17. All holding times were met.

The batch MS/MSD for the 11-12 December 1996 analytical sequence was performed on another NAS Brunswick sample (NASB FF-02-MWXD1).

Laboratory Method Performance: All laboratory method performance criteria were met for the reported samples.

Sample Performance: All quality control criteria were met for the reported samples.

EXTRACTABLE TPH - WATER (EA9618892-EA9618908, EA9618910)

Sample Chronology: The samples and associated quality control were extracted on 12 December 1996 by the Maine Method 4.1.25. The sample extracts and the associated quality control were analyzed by the same method on 6-7 January 1997 for diesel range organics (DRO). All holding times were met.

Laboratory Method Performance: The surrogate recoveries for all QC and field samples were less than the lower QC limit of 50% with recoveries ranging from 0% to 14%. Also, the LCS recovery for DRO was below the lower method QC limit of 60% at 5%. The MS/MSD results for DRO were less than the result detected in the unspiked sample, therefore, there was no recovery. These low recoveries are indicative of a negative bias for these samples.

All other laboratory method performance criteria were met for the reported samples.

Sample Performance: See above comment concerning sample performance.

EA Laboratories
ANALYTICAL NARRATIVE

Client: **EA Eng., Sci., and Tech. Inc.**
Site: **Navy Fuel Farm**
Project number: **29600.35**

EA Laboratories Report: **962064**
Laboratory Project Manager: **Mary E. Asper**
Report Date: **9 January 1997**

All other quality control criteria were met for the reported samples.

CERTIFICATION OF RESULTS

The Laboratory certifies that this report meets the project requirements for analytical data as stated in the Analytical Task Order (ATO) and the chain-of-custody. In addition, the Laboratory certifies that the data as reported meet the Data Quality Objectives for precision, accuracy, and completeness specified for this project or as stated in EA Laboratories Quality Assurance program for other than the conditions detailed above. Release of the data contained in this report has been authorized by the appropriate Laboratory Manager as verified by the following signature.

_____ 9 January 1997
Phyllis A. Christopher, Production Manager

TABLE 1. ANALYTICAL METHODS

Parameter	Method	Method Number	Matrix	Reference
ORGANICS				
Purgeable Aromatics	Gas Chromatography - PID	602	W	(1)
Total Petroleum Hydrocarbons	Gas Chromatography - FID Maine method - Gas	4.1.17	W	(2)
Total Petroleum Hydrocarbons	Gas Chromatography - FID Maine method - Diesel	4.1.25	W	(2)

Matrix codes:

W - Estuarine water, ground water, leachates, ocean water, surface water, and wastewater

References:

1. United States Environmental Protection Agency. 1987. Methods for the organic chemical analysis of municipal and industrial wastes. 40 CFR Part 136, Appendix A.

2. Maine Health and Environmental Testing Laboratory. 1991. Fuel Oil in Water. Augusta, Maine.

TABLE 2. ORGANIC ANALYSIS DATA QUALIFIERS

ND or U	Indicates a compound on the target compound list (TCL) was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and, if a soil sample, for percent moisture. For example, 10 U is used for phenol in water if the sample final volume is the protocol-specified final volume. If a 1-to-10 dilution of the extract was necessary, the reported limit is (10 x 10 U) or 100 U. For a soil sample, the value is also adjusted for percent moisture. For example, if the sample had 24% moisture and a 1-to-10 dilution factor, the soil sample quantitation limit for phenol (330 U) would be corrected as follows: Reported limit = (330 U) x df / D where: df = dilution factor = 10 D = (100 - % moisture) / 100 (At 24% moisture, D = (100-24) / 100 = 0.76) Reported limit = (330 U) x 10 / 0.76 = 4300 U (rounded to two significant figures) For soil samples subjected to gel permeation chromatography (GPC) cleanup procedures, the contract required quantitation limit (CRQL) is also multiplied by 2 to account for the fact that only half of the extract is recovered. Note: If GPC procedures are employed, the factor of 2 is not included in the dilution factor reported; a "Y" is entered for GPC (Y/N).
TR or J	Indicates an estimated value. This flag is used under the following circumstances: 1) when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, 2) when the mass spectral and retention time data indicate the presence of a compound that meets the volatile and semivolatile GC/MS identification criteria, and the result is less than the CRQL but greater than zero, 3) when the retention time data indicate the presence of a compound that meets the pesticide/Aroclor identification criteria and the result is less than the CRQL but greater than zero. Note: the "J" code is not used and the compound is not reported as being identified for pesticide/Aroclor results less than the CRQL, if the technical judgement of the pesticide residue analysis expert determines that the peaks used for compound identification resulted from instrument noise or other interferences (column bleed, solvent contamination, etc.). For example, if the sample quantitation limit is 10 ug/L but a concentration of 3 ug/L is calculated, report it as 3 J. The sample quantitation limit must be adjusted for dilution as discussed for the U flag
C	This flag applies to pesticide results where the identification has been confirmed by GC/MS. Single component pesticides with concentration equal to or greater than 10 ng/uL in the final extract must be confirmed by GC/MS.
B	This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action. This flag is used for a TIC as well as for a positively identified TCL compound.
E	This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis. This flag does not apply to pesticides/PCBs analyzed by GC/EC methods. If one or more compounds have a response greater that full scale, the sample or extract must be diluted and reanalyzed according to the specifications listed in the SOW. All such compounds with a response greater than full scale should have a concentration flagged with an "E" on Form I for the original analysis. If the dilution of the extract causes any compounds identified in the first analysis to be below the calibration range in the second analysis, then the results of both analyses are reported on separate Forms I. The Form I for the diluted sample will have the "DL" suffix appended to the sample number. NOTE: For total xylenes, where three isomers are quantified as two peaks, the calibration range of each peak is considered separately; e.g., a diluted analysis is not required for total xylenes unless the concentration of either peak separately exceeds 200 ug/L.
D	This flag identifies all compounds identified in the analysis at a secondary dilution factor. If a sample or extract is reanalyzed at a higher dilution factor, as in the "E" flag above, the "DL" suffix is appended to the sample number on the Form I for the diluted sample, and all concentration values reported on that Form I are flagged with the "D" flag.
A	This flag indicates that a TIC is a suspected aldol-condensation product.
X	Other specific flags may be required to properly define the results. If used, they are fully described and such description attached to the Sample Data Summary Package and the Case Narrative. The flags begin by using "X". If more that one flag is required, "Y" and "Z" are used, as needed. For instance, the "X" flag might combine the "A", "B", and "D" flags for some sample.
N	Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds, where the identification is based on a mass spectral library search. It is applied to all TIC results. For generic characterization of a TIC, such as chlorinated hydrocarbon, the N code is not used.
P	This flag is used for GC analyses when there is greater than 25% difference for detected concentrations between the two GC columns. The lower of the two values is reported on Form I and flagged with a "P".

2. CHAIN OF CUSTODY

Company Name: EA Brunswick	Project Manager or Contact: Mike Battle
Project No. 2960035	Phone: 914-565-8100
Dept.: 6125 Task: 3696	Project Name: Brunswick Fuel Farm
Sample Storage Location: N8 - N9	ATO Number: 5049
Page of	Report #: 962063

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: 12/28/96

Date	Time	Water	Soil	Sample Identification 19 Characters	No. of Containers	BTEX/MTBE EPA 602	TPH Gas MEDEP 4.1.17	TPH Fuel 10.1 MEDEP 4.1.25									EA Labs Accession Number	Remarks
12/5/96	855	X		NASB-FF-02-WP001	18	X	X	X								*	9618892	LPM: MEA 11/5/1150 one broken vom 11 left for analysis
12/5/96	940	X		NASB-FF-02-WP003	6	X	X	X									9618893	
12/5/96	1125	X		NASB-FF-02-WP005	6	X	X	X									9618894	
12/5/96	1110	X		NASB-FF-02-WP006	6	X	X	X									9618895	
12/5/96	1140	X		NASB-FF-02-WP007	6	X	X	X									9618896	
12/5/96	1025	X		NASB-FF-02-WP008	6	X	X	X								*	9618897	* one broken Amber one left
12/5/96	1000	X		NASB-FF-02-WP009	6	X	X	X									9618898	
12/5/96	—	X		NASB-FF-02-WP010	6	X	X	X									9618899	* one broken vom three left for analysis
12/5/96	1135	X		NASB-FF-02-WP011	6	X	X	X							9618900		9618900	
12/5/96	1045	X		NASB-FF-02-WP012	6	X	X	X									9618901	
12/5/96	1007	X		NASB-FF-02-WP013	6	X	X	X									9618902	
12/5/96	1350	X		NASB-FF-02-WP014	6	X	X	X									9618903	* one broken Amber one left for analysis
12/5/96	1420	X		NASB-FF-02-WP015	6	X	X	X									9618904	
12/5/96	1430	X		NASB-FF-02-WP016	6	X	X	X									9618905	
12/5/96	1350	X		NASB-FF-02-WP018	6	X	X	X									9618906	
12/5/96	1400	X		NASB-FF-02-WP019	6	X	X	X								*	9618907	begin SDG and end one broken amber one left
12/5/96	1415	X		NASB-FF-02-WP020	6	X	X	X								*	9618908	NASB-FF-02-WP001 one broken amber, one left
		X		TRIPBlank	2	X											9618909	
12/5/96	0830	X		NASB-FF-02-WPRB1	6	X	X	X									9618910	Follow Project Summary
																	—	110759

Samples by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
Suzanne Chase	12/5/96 1500	Suzanne Chase	12/5/96 1530		

Relinquished by: (Signature)	Date/Time	Received by Laboratory: (Signature)	Date/Time	Airbill Number:	Sample Shipped by: (Circle)
2.1/2.1/2.1/2.2		[signature]	12/6/96 0915	3161399651	Fed Ex. Puro. UPS

Cooler Temp. ____ C pH: ☒ Yes ☐ No Comments: Ambers ph 2 Custody Seals Intact: ☒ Yes ☒ No no seals

Hand Carried

Other:

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*

3. ORGANIC DATA

A. BTEX

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP001

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618892F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M945F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	2.2	
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP003

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618893F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M934F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	2.6	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	5.1	
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP005

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618894F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M957F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 2

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	8.7	
71-43-2	BENZENE	17	
108-88-3	TOLUENE	240	
100-41-4	ETHYLBENZENE	350	
108-38-3/106-42-3	META & PARA XYLENES	1500	
95-47-6	ORTHO XYLENE	920	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP006

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618895F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M946F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	2.9	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.4	
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP010

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618896F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M948F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	4.0	
100-41-4	ETHYLBENZENE	2.0	
108-38-3/106-42-3	META & PARA XYLENES	8.2	
95-47-6	ORTHO XYLENE	5.4	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP008

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618897F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M947F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.3	
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP009

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618898F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M937F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WPXD1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618899F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M958F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.2	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	4.7	
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP011

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618900F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M949F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	9.9	
108-88-3	TOLUENE	220	
100-41-4	ETHYLBENZENE	1.7	
108-38-3/106-42-3	META & PARA XYLENES	27	
95-47-6	ORTHO XYLENE	11	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP012

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618901F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M956F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	190	
100-41-4	ETHYLBENZENE	9.1	
108-38-3/106-42-3	META & PARA XYLENES	310	
95-47-6	ORTHO XYLENE	82	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP013

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618902F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M954F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	23	
95-47-6	ORTHO XYLENE	34	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP014

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618903F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M950F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP015

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618904F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M951F

Level: (low/med) LOW Date Received: 12/06/96

%.Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP016

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618905F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M952F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.2	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.3	
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP018

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618906F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M953F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.6	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.5	
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP019

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618907F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M955F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.2	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.6	
95-47-6	ORTHO XYLENE	1.0	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP020

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618908F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M963F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

Gc Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.2	
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	2.2	
95-47-6	ORTHO XYLENE	1.4	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

TRIPBLANK

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618909F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M919F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/10/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WPRB1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: 9618910F

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M921F

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/10/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: VB612105

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M918F

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 12/10/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK2

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: 602

Matrix: (soil/water) WATER Lab Sample ID: VB612114

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VF6M942F

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: DBVRX ID: 0.53 (mm) Dilution Factor: 1

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	1.0	U
71-43-2	BENZENE	1.0	U
108-88-3	TOLUENE	1.0	U
100-41-4	ETHYLBENZENE	1.0	U
108-38-3/106-42-3	META & PARA XYLENES	1.0	U
95-47-6	ORTHO XYLENE	1.0	U

B. TPH-GRO

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP001

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618892

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H727

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	3300	

1A

VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP003

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618893

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H728

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	4100	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP005

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618894

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H763

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/13/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
----------	TPH	4800	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP006

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618895

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H744

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	20	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP010

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618896

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H732

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
----------	TPH	130	

1A

VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP008

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618897

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H730

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
----------	TPH	270	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP009

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618898

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H731

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	730	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WPXD1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618899

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H762

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/13/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
----------	TPH	160	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP011

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618900

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H734

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	3400	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP012

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618901

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H760

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/13/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	870	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP013

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618902

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H764

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/13/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	950	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP014

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618903

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H740

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	15	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP015

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618904

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H741

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP016

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618905

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H742

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	11	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP018

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618906

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H743

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
----------	TPH	35	

1A

VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP019

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618907

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H747

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	1100	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WP020

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618908

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H745

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
----------	TPH	14	

1A

VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

FF02WPRB1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: 9618910

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H726

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	12	

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK1

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: VB612112

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H711

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 12/11/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK2

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: VB612121

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H739

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 12/12/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	TPH	10	U

1A
VOLATILE COMPOUNDS ORGANICS ANALYSIS SHEET

EPA SAMPLE NO.

VBLK3

Lab Name: EA LABS Contract:

Lab Code: EAENG Case No: SAS No: _____ SDG No: MAINE4217

Matrix: (soil/water) WATER Lab Sample ID: VB612132

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VD4H755

Level: (low/med) LOW Date Received: / /

% Moisture: not dec. _____ Date Analyzed: 12/13/96

GC Column: RTX1 ID: 0.53 (mm) Dilution Factor: 1

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

CAS NO.	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) ug/L	Q
	----------TPH	10	U

C. TPH-FUEL OIL

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP001

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618892

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/06/97

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	750	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
NASB-FF-02-WP003

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618893

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/06/97

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	670	

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP005

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618894

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

od: ME4.1.25 Date Analyzed: 01/06/97

PC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP006

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618895

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/06/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP010

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618896

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/06/97

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP008

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618897

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/06/97

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	150	

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP009

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618898

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/06/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WPXD1

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618899

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/06/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	400	

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP011

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618900

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/06/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	220	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP012

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618901

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/07/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	390	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP013

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618902

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/07/97

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	3100	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP014

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618903

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/07/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	62	

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP015

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618904

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/07/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	66	

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP016

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618905

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/07/97

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP018

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618906

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/07/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

U Concentration below detection limit

1

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP019

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618907

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/07/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	210	

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WP020

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618908

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/07/97

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

U Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS
ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

NASB-FF-02-WPRB1

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: 9618910

Sample wt/vol: 1 L Date Sampled: 12/05/96

Level: (low/med) LOW Date Received: 12/06/96

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/07/97

GPC Cleanup: N pH: ____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

Concentration below detection limit

TOTAL PETROLEUM HYDROCARBONS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

TB612121

Lab Name: EA LABORATORIES

Lab Code: EAENG Contract: BRUNSWICK

Matrix: (soil/water) WATER Lab Sample ID: TB612121

Sample wt/vol: 1 L Date Sampled: N/A

Level: (low/med) LOW Date Received: N/A

% Moisture: N/A Date Extracted: 12/12/96

Method: ME4.1.25 Date Analyzed: 01/06/97

GPC Cleanup: N pH: _____ Dilution Factor: 1

ANALYTE	CONCENTRATION (ug/L)	Qualifier
TPH AS ME DRO	50	U

U Concentration below detection limit

BioRenewal

Facsimile Cover Sheet

Technologies, Inc.

To:	**Curt Varner**
Company:	**EA Engineering**
Phone:	**914/565-8100**
Fax:	**914/565-8203**

NOTICE: This facsimile is intended only for the addressee shown below and may contain confidential or privileged information. If the recipient of this material is not the intended recipient or if you have received this transmission in error, please notify us immediately by telephone and return the original material to BioRenewal Technologies at the below address via U.S. Postal Service. Thank you for your cooperation.

From:	**Allen Price**
Company:	**BioRenewal Technologies, Inc.**
Phone:	**608/ 276-8980**
Fax:	**608/ 273-6989**

If there is a problem with this transmission, please call (608) 276-8980

Date:	**September 10, 1996**
Pages (incl cover):	**10**

RECEIVED
SEP 16 1996
EA Engineering, Science, and Technology
Newburgh, NY

FAXED 9.10.96

Comments:

re: BioRenewal Job Code: AUN

Dear Mr. Varner:

This report presents the results from Comparative Enumeration Assays and chemical/nutrient analyses performed on 18 soil samples we received on 8/11/96 and 8/12/96 in connection with the NASB, Maine site (project number 29600.35.3628). The invoice and chain-of-custody for this project will accompany a confirmation copy sent via mail.

The analytical results requested are presented in the following sections:

- Site suitability for passive bioremediation in relation to suggested guidelines
- Microbial data summary
- Nutrient conditions

These samples were analyzed by BioRenewal using kerosene as the sole carbon source for enumerating the "degrader" microbial populations. Samples were received on ice.

Please give me a call if you have any questions or wish to discuss these results further. We look forward to working with you in the future.

Sincerely,

WAPrice II

Wm. Allen Price II
Manager, Laboratory Services

Enclosures: Analytical results
Invoice
Chain-of-custody

Note: BioRenewal is instituting a new reporting format based on changes in the Standard Nutrient Panel, requests for more natural attenuation data, as well as comments from our clients. We appreciate your suggestions and are always willing to implement them whenever possible. Please call either myself or Lori Graham with any questions about the new reporting format.

The Faraday Center ♦ 2800 South Fish Hatchery Rd ♦ Madison, WI 53711 ♦ (608) 276-8980 ♦ Fax: (608) 273-6989

BioRenewal Technologies, Inc.
Bio-Analytical Summary Report

Job Code: **AUN**

Site Information

Site Name	NASB Fuel Farm	Date received	9-Aug-96
Location	NASB, ME	Date of this report	9-Sep-96
Consultant	EA Engineering	BioRenewal Job Code	AUN (1 of 3)
Proj. Contact	Curt Varner		
Project Ref ID	#29600.35.3628	Number of soil samples	0
Contaminant	kerosene	Number of gw samples	18

Section I - Summary of Bioremediation Data

Nutrient/physical factors are as suggested by Wisconsin DNR guidelines for site characterization requirements for natural biodegradation. Microbial factors are shown according to bio-engineering norms.

Sample ID	Soil microbial populations: Exceeds norm for: Passive	Active	pH	% TON / % OM	C:N	C:P	% moisture / SWHC	% Air-filled pore space
	>1E+06	>1E+03	5.5-8.5	>1.5%	<40	<120	25-85%	>10%
Guideline note reference:	1	2	3	4	5	6	7	8
WP-001	Guidelines not applicable for groundwater at this time.							
WP-002	Guidelines not applicable for groundwater at this time.							
WP-003	Guidelines not applicable for groundwater at this time.							
WP-004	Guidelines not applicable for groundwater at this time.							
WP-005	Guidelines not applicable for groundwater at this time.							
WP-006	Guidelines not applicable for groundwater at this time.							
WP-008	Guidelines not applicable for groundwater at this time.							
WP-009	Guidelines not applicable for groundwater at this time.							

The nutrient/physical parameters summarized abovefor unsaturated zone soils, reflect suggested minimum Wisconsin DNR " site characterization requirements for natural biodegradation projects" as presented on pp. 6-10 in Naturally Occurring Biodegradation as a Remedial Action Option for *Soil Contamination: Interim Guidance (Revised)* dated August 26, 1994. **BioRenewal stresses that these "suggested guidelines" are only intended to provide a working frame of reference for evaluation.** Each site is unique and requires professional judgement in order to select an appropriate remedial design. We provide this information in recognition that our clients need to work within the guidelines suggested by the state. Further, we hope this will facilitate continued evolution of a working framework for evaluating sites as to the potential for bioremediation whether through site augmentation or natural attenuation.

✓ = **Sample meets guideline.**

× = **Sample does not meet guideline.**

Blank = Below detection limit, not applicable, or not available for that sample.

NOTES:
1) Microbial population levels in soils generally accepted as potentially adequate to support natural biodegradation. These levels are based on bio-engineering norms and not WDNR guidelines.
2) Microbial population levels in soils generally accepted as minimum to serve as an "inoculum" for implementing active bioremediation strategies.
3) See page 7 and 10, WDNR.
4) See pages 8 and 10, WDNR. Total Organic Nitrogen (calculated from TKN minus ammonium nitrogen) divided by % organic matter.
5) See pages 8 and 10, WDNR.
6) See pages 8 and 10, WDNR.
7) See page 6 and 10, WDNR. The suggested optimum range is 50-80% (p. 6).
8) See page 8 and 10, WDNR. WDNR suggests a minimum air-filled porosity in soil of 10% is necessary for adequate oxygen diffusion in the soil gas to support biodegradation.

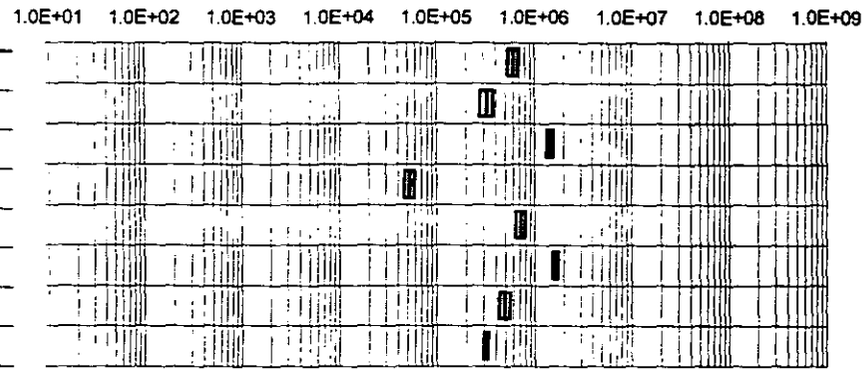
Section II - Microbial Data Summary

All values in cfu/ml*

Groundwater Samples
Total populations

Low and high indicate 95% confidence range

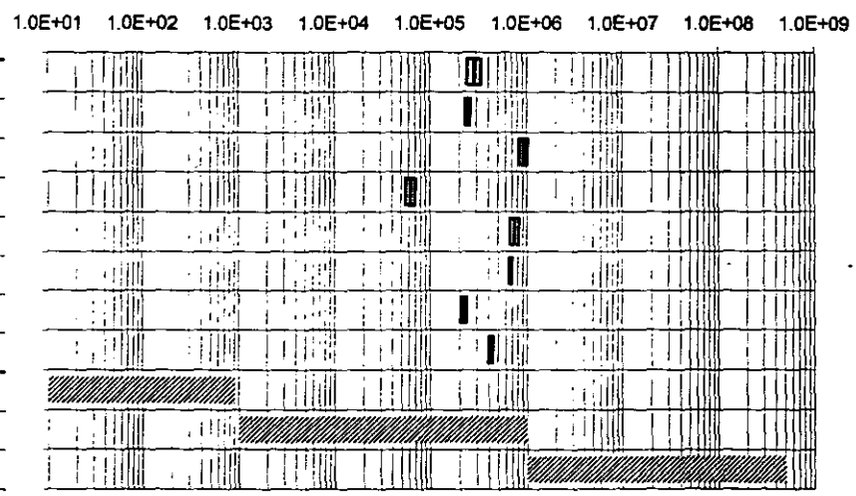
Sample ID	Mean	Low	High
WP-001	6.0E+05	5.3E+05	6.8E+05
WP-002	3.2E+05	2.7E+05	3.8E+05
WP-003	1.5E+06	1.3E+06	1.6E+06
WP-004	5.3E+04	4.6E+04	5.9E+04
WP-005	7.1E+05	6.4E+05	8.0E+05
WP-006	1.6E+06	1.5E+06	1.8E+06
WP-008	4.9E+05	4.3E+05	5.6E+05
WP-009	3.2E+05	3.0E+05	3.3E+05



Groundwater Samples
Degrader populations

Low and high indicate 95% confidence range

Sample ID	Mean	Low	High
WP-001	2.9E+05	2.4E+05	3.4E+05
WP-002	2.5E+05	2.3E+05	2.6E+05
WP-003	9.2E+05	8.4E+05	1.0E+06
WP-004	6.3E+04	5.6E+04	7.0E+04
WP-005	7.5E+05	6.7E+05	8.3E+05
WP-006	6.8E+05	6.5E+05	7.0E+05
WP-008	2.2E+05	2.1E+05	2.4E+05
WP-009	4.2E+05	4.0E+05	4.5E+05
Marginal inoculum			
Inoculum levels			
Active degradation levels			



Marginal inoculum = Degrader populations below 1.0E+03 are indicative of severe limitations. Substantial augmentation of site conditions will likely be required to attain adequate cell mass to attain measurable biotransformation rates.
Inoculum levels = Degrader populations between 1.0E+03 and 1.0E+06 are amenable to site augmentation, but are generally insufficient to attain adequate biotransformation without site augmentation.
Active degradation levels = Degrader populations greater than 1.0E+06 are generally of sufficient magnitude to support measurable biotransformation without site augmentation. However, site augmentation may still be required to attain desireable rates of transformation due to specific site conditions.

Assay conditions

	Degrader Media		Temp.	Growth	DOF **		Percent
Sample ID	Carbon source	% Carbon (v/v)	(Celcius)	Conditions	Total	Degrader	Degraders
WP-001	kerosene	1.0	22	Aerobic	4	4	48%
WP-002	kerosene	1.0	22	Aerobic	4	4	77%
WP-003	kerosene	1.0	22	Aerobic	9	9	63%
WP-004	kerosene	1.0	22	Aerobic	4	4	119%
WP-005	kerosene	1.0	22	Aerobic	9	4	105%
WP-006	kerosene	1.0	22	Aerobic	4	4	41%
WP-008	kerosene	1.0	22	Aerobic	4	4	46%
WP-009	kerosene	1.0	22	Aerobic	4	4	134%

* cfu/ml = colony forming units per ml of groundwater

** DOF = Degrees of freedom is number of replicates minus one. This parameter is used in calculation of 95% confidence intervals.

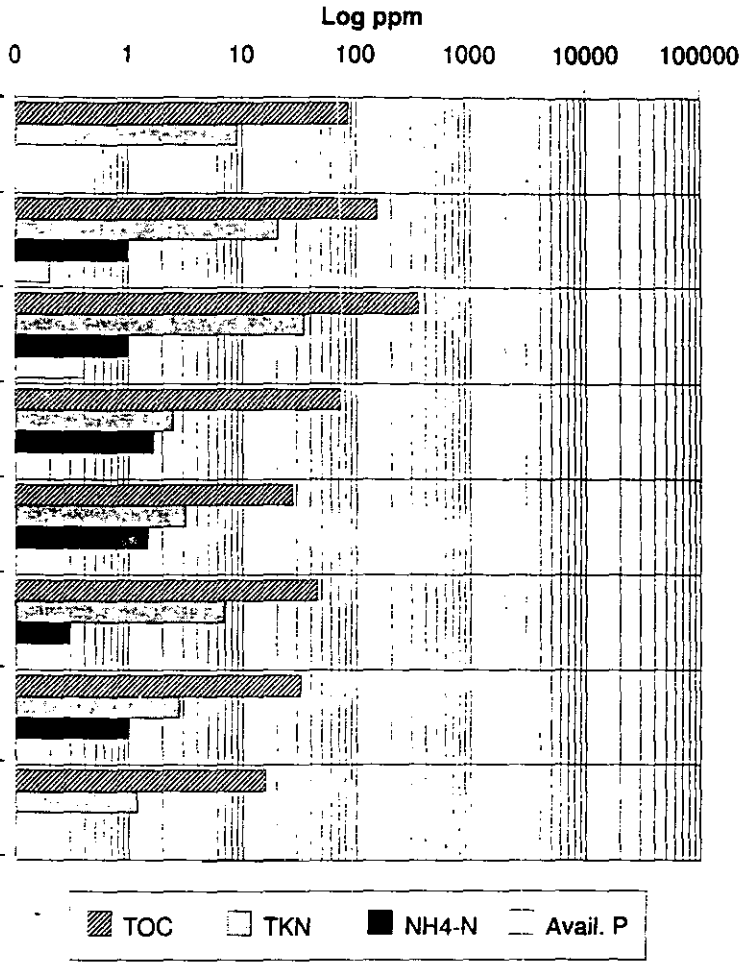
Section III - Nutrient Conditions

All results reported as parts per million (ppm) unless otherwise indicated.

Standard Nutrient Panel

Sample ID	TOC*	TKN	NH4-N	Avail. P
WP-001	85	9.1	<0.1	<0.1
WP-002	150	20.9	1.0	0.2
WP-003	350	35.4	1.0	0.4
WP-004	73	2.5	1.7	<0.1
WP-005	28	3.2	1.5	<0.1
WP-006	46	6.9	0.3	<0.1
WP-008	33	2.8	1.0	<0.1
WP-009	16	1.2	<0.1	<0.1

* Total Organic Carbon



Other Analyses and Calculations

Guideline Published Threshholds*		C:N	C:P
Wis Dept. Natural Resources	Below:	40	120
Nat'l Academy of Sciences	Below:	6	30

Sample ID	% Organic* Matter	TON**	Calculated Ratios C:N	Calculated Ratios C:P	pH	SO4-S	NO3-N	Avail. K	Total Fe	CEC meq/100g
WP-001	n/a	9.1	9	n/a	6.2	38.0	<0.1	NR	NR	NR
WP-002	n/a	19.9	8	750	5.7	60.0	2.2	NR	NR	NR
WP-003	n/a	34.4	10	875	5.1	10.0	2.2	NR	NR	NR
WP-004	n/a	0.8	91	n/a	5.4	<1.0	3.3	NR	NR	NR
WP-005	n/a	1.7	16	n/a	5.6	33.0	<0.1	NR	NR	NR
WP-006	n/a	6.6	7	n/a	5.6	7.5	<0.1	NR	NR	NR
WP-008	n/a	1.8	18	n/a	6.3	120.0	<0.1	NR	NR	NR
WP-009	n/a	1.2	13	n/a	6.3	80.0	29.0	NR	NR	NR

Sources: Naturally Occuring Biodegradation as a Remedial Action Option for Soil Contamination: Interim Guidance (Revised), 1994.
In-situ Bioremediation: When Does it Work?, B. Rittman, Ed., National Academy of Sciences, 1993. p 117.

* = Estimated % organic matter - See Methods.

** = Total Organic Nitrogen (Calculated as Total Kjeldahl Nitrogen (TKN) minus ammonium nitrogen).

NR = Not requested.

n/a = Not applicable.

BioRenewal Technologies, Inc.
Bio-Analytical Summary Report

Job Code: **AUN**

Site Information

Site Name	NASB Fuel Farm	Date received	9-Aug-96
Location	NASB, ME	Date of this report	9-Sep-96
Consultant	EA Engineering	BioRenewal Job Code	AUN (2 of 3)
Proj. Contact	Curt Varner		
Project Ref ID	#29600.35.3628	Number of soil samples	0
Contaminant	kerosene	Number of gw samples	18

Section I - Summary of Bioremediation Data

Nutrient/physical factors are as suggested by Wisconsin DNR guidelines for site characterization requirements for natural biodegradation. Microbial factors are shown according to bio-engineering norms.

Sample ID	Soil microbial populations: Exceeds norm for: Passive	Active	pH	% TON / % OM	C:N	C:P	% moisture / SWHC	% Air-filled pore space
	>1E+06	>1E+03	5.5-8.5	>1.5%	<40	<120	25-85%	>10%
Guideline note reference:	1	2	3	4	5	6	7	8
WP-007	Guidelines not applicable for groundwater at this time.							
WP-010	Guidelines not applicable for groundwater at this time.							
WP-011	Guidelines not applicable for groundwater at this time.							
WP-012	Guidelines not applicable for groundwater at this time.							
WP-013	Guidelines not applicable for groundwater at this time.							
WP-015	Guidelines not applicable for groundwater at this time.							
WP-018	Guidelines not applicable for groundwater at this time.							
WP-14	Guidelines not applicable for groundwater at this time.							

The nutrient/physical parameters summarized abovefor unsaturated zone soils, reflect suggested minimum Wisconsin DNR " site characterization requirements for natural biodegradation projects" as presented on pp. 6-10 in Naturally Occurring Biodegradation as a Remedial Action Option for *Soil Contamination: Interim Guidance (Revised)* dated August 26, 1994. **BioRenewal stresses that these "suggested guidelines" are only intended to provide a working frame of reference for evaluation.** Each site is unique and requires professional judgement in order to select an appropriate remedial design. We provide this information in recognition that our clients need to work within the guidelines suggested by the state. Further, we hope this will facilitate continued evolution of a working framework for evaluating sites as to the potential for bioremediation whether through site augmentation or natural attenuation.

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NOTES:
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2) Microbial population levels in soils generally accepted as minimum to serve as an "inoculum" for implementing active bioremediation strategies.
3) See page 7 and 10, WDNR.
4) See pages 8 and 10, WDNR. Total Organic Nitrogen (calculated from TKN minus ammonium nitrogen) divided by % organic matter.
5) See pages 8 and 10, WDNR.
6) See pages 8 and 10, WDNR.
7) See page 6 and 10, WDNR. The suggested optimum range is 50-80% (p. 6).
8) See page 8 and 10, WDNR. WDNR suggests a minimum air-filled porosity in soil of 10% is necessary for adequate oxygen diffusion in the soil gas to support biodegradation.

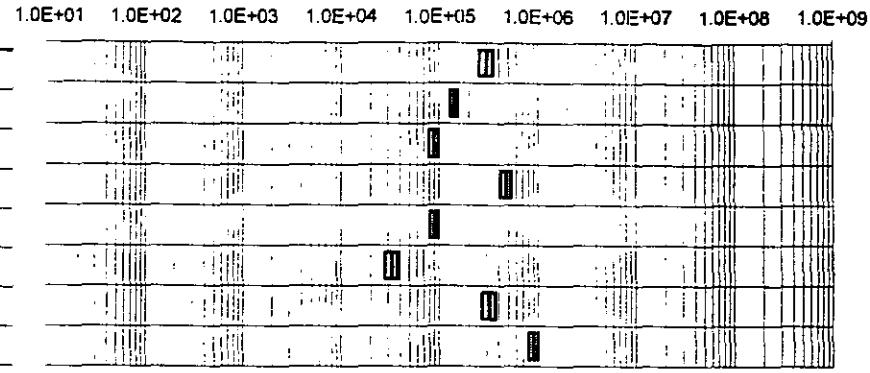
Section II - Microbial Data Summary

All values in cfu/ml*

Groundwater Samples
Total populations

Low and high indicate 95% confidence range

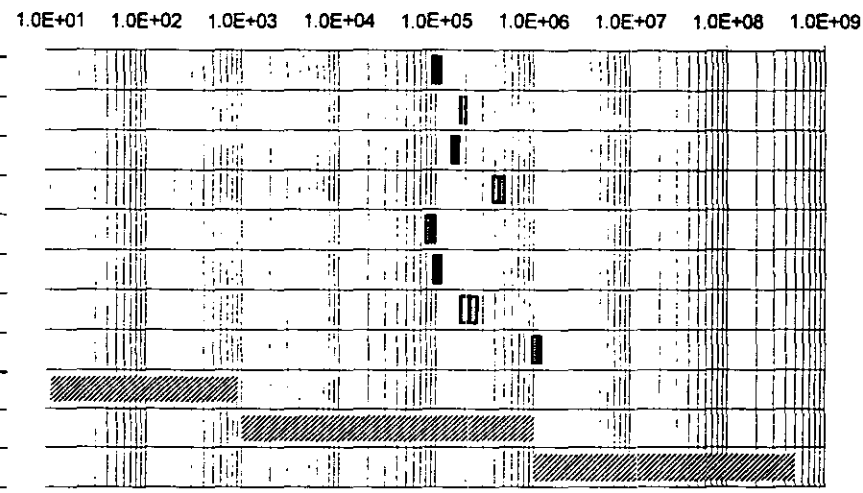
Sample ID	Mean	Low	High
WP-007	3.0E+05	2.5E+05	3.6E+05
WP-010	1.4E+05	1.3E+05	1.6E+05
WP-011	8.7E+04	7.8E+04	9.8E+04
WP-012	4.7E+05	4.2E+05	5.4E+05
WP-013	8.9E+04	8.0E+04	9.9E+04
WP-015	3.3E+04	2.8E+04	3.9E+04
WP-018	3.2E+05	2.7E+05	3.7E+05
WP-14	8.9E+05	8.0E+05	9.9E+05



Groundwater Samples
Degrader populations

Low and high indicate 95% confidence range

Sample ID	Mean	Low	High
WP-007	1.0E+05	9.3E+04	1.1E+05
WP-010	1.9E+05	1.8E+05	2.0E+05
WP-011	1.6E+05	1.4E+05	1.7E+05
WP-012	4.5E+05	3.9E+05	5.1E+05
WP-013	8.8E+04	7.9E+04	9.6E+04
WP-015	1.1E+05	9.6E+04	1.2E+05
WP-018	2.2E+05	1.8E+05	2.6E+05
WP-14	1.1E+06	9.7E+05	1.2E+06
Marginal inoculum			
Inoculum levels			
Active degradation levels			



Marginal inoculum = Degrader populations below 1.0E+03 are indicative of severe limitations. Substantial augmentation of site conditions will likely be required to attain adequate cell mass to attain measurable biotransformation rates.
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Assay conditions

	Degrader Media		Temp.	Growth	DOF **		Percent
Sample ID	Carbon source	% Carbon (v/v)	(Celcius)	Conditions	Total	Degrader	Degraders
WP-007	kerosene	1.0	22	Aerobic	9	9	34%
WP-010	kerosene	1.0	22	Aerobic	9	4	133%
WP-011	kerosene	1.0	22	Aerobic	9	4	180%
WP-012	kerosene	1.0	22	Aerobic	9	4	94%
WP-013	kerosene	1.0	22	Aerobic	9	4	99%
WP-015	kerosene	1.0	22	Aerobic	9	4	320%
WP-018	kerosene	1.0	22	Aerobic	8	4	69%
WP-14	kerosene	1.0	22	Aerobic	9	4	121%

* cfu/ml = colony forming units per ml of groundwater

** DOF = Degrees of freedom is number of replicates minus one. This parameter is used in calculation of 95% confidence intervals.

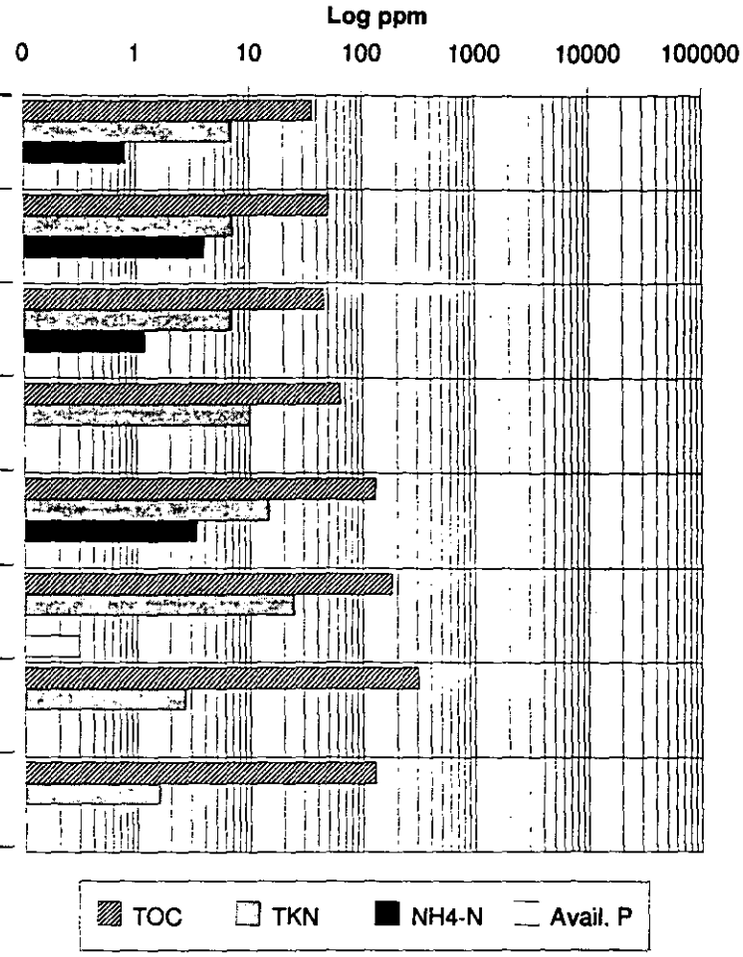
Section III - Nutrient Conditions

All results reported as parts per million (ppm) unless otherwise indicated.

Standard Nutrient Panel

Sample ID	TOC*	TKN	NH4-N	Avail. P
WP-007	37	6.8	0.8	<0.1
WP-010	51	7.1	3.9	<0.1
WP-011	46	6.8	1.2	<0.1
WP-012	64	10.0	<0.1	<0.1
WP-013	130	14.8	3.4	<0.1
WP-015	180	24.5	<0.1	0.3
WP-018	310	2.7	<0.1	<0.1
WP-14	130	1.6	<0.1	<0.1

* Total Organic Carbon



Other Analyses and Calculations

Guideline Published Threshholds*		C:N	C:P
Wis Dept. Natural Resources	Below:	40	120
Nat'l Academy of Sciences	Below:	6	30

Sample ID	% Organic* Matter	TON**	Calculated Ratios C:N	Calculated Ratios C:P	pH	SO4-S	NO3-N	Avail. K	Total Fe	CEC meq/100g
WP-007	n/a	6.0	6	n/a	5.6	2.5	<0.1	NR	NR	NR
WP-010	n/a	3.2	16	n/a	4.8	40.0	<0.1	NR	NR	NR
WP-011	n/a	5.6	8	n/a	4.9	48.0	1.1	NR	NR	NR
WP-012	n/a	10.0	6	n/a	5.2	45.0	2.2	NR	NR	NR
WP-013	n/a	11.4	11	n/a	5.4	<0.1	1.1	NR	NR	NR
WP-015	n/a	24.5	7	600	5.1	10.0	2.2	NR	NR	NR
WP-018	n/a	2.7	115	n/a	5.1	38.0	11.0	NR	NR	NR
WP-14	n/a	1.6	81	n/a	5.3	25.0	<0.1	NR	NR	NR

Sources: Naturally Occurring Biodegradation as a Remedial Action Option for Soil Contamination: Interim Guidance (Revised), 1994.
In-situ Bioremediation: When Does it Work?, B. Rittman, Ed., National Academy of Sciences, 1993. p 117.

* = Estimated % organic matter - See Methods.

** = Total Organic Nitrogen (Calculated as Total Kjeldahl Nitrogen (TKN) minus ammonium nitrogen).

NR = Not requested.

n/a = Not applicable.

BioRenewal Technologies, Inc.
Bio-Analytical Summary Report

Job Code: **AUN**

Site Information

Site Name	NASB Fuel Farm	Date received	9-Aug-96
Location	NASB, ME	Date of this report	9-Sep-96
Consultant	EA Engineering	BioRenewal Job Code	AUN (3 of 3)
Proj. Contact	Curt Varner		
Project Ref ID	#29600.35.3628	Number of soil samples	0
Contaminant	kerosene	Number of gw samples	18

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Sample ID	Soil microbial populations: Exceeds norm for: Passive	Active	pH	% TON / % OM	C:N	C:P	% moisture / SWHC	% Air-filled pore space
	>1E+06	>1E+03	5.5-8.5	>1.5%	<40	<120	25-85%	>10%
Guideline note reference:	1	2	3	4	5	6	7	8
WP-019	Guidelines not applicable for groundwater at this time.							
WP-020	Guidelines not applicable for groundwater at this time.							

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5) See pages 8 and 10, WDNR.
6) See pages 8 and 10, WDNR.
7) See page 6 and 10, WDNR. The suggested optimum range is 50-80% (p. 6).
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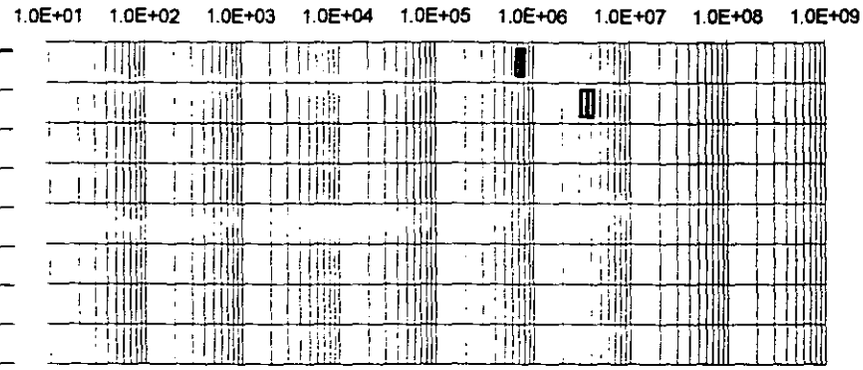
Groundwater Samples
Total populations

Low and high indicate 95% confidence range

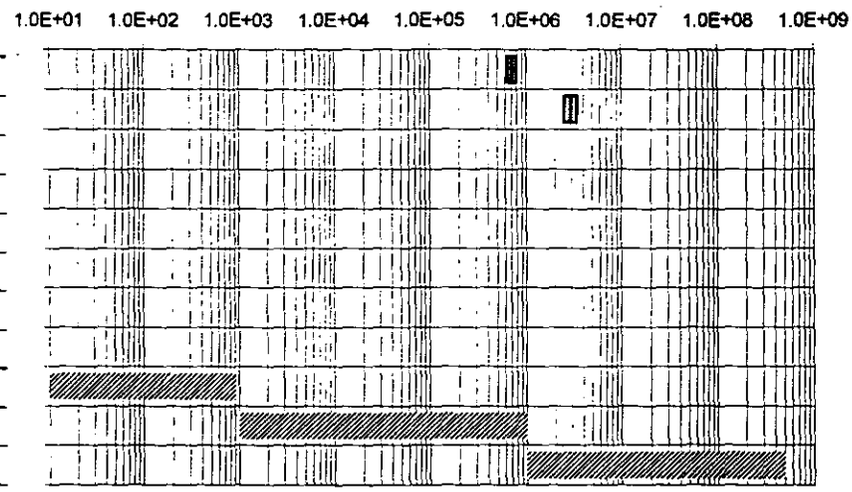
Sample ID	Mean	Low	High
WP-019	7.4E+05	6.7E+05	8.2E+05
WP-020	3.7E+06	3.2E+06	4.3E+06



Groundwater Samples
Degrader populations

Low and high indicate 95% confidence range

Sample ID	Mean	Low	High
WP-019	7.1E+05	6.4E+05	7.9E+05
WP-020	3.0E+06	2.5E+06	3.5E+06



Marginal inoculum = Degrader populations below 1.0E+03 are indicative of severe limitations. Substantial augmentation of site conditions will likely be required to attain adequate cell mass to attain measurable biotransformation rates.
Inoculum levels = Degrader populations between 1.0E+03 and 1.0E+06 are amenable to site augmentation, but are generally insufficient to attain adequate biotransformation without site augmentation.
Active degradation levels = Degrader populations greater than 1.0E+06 are generally of sufficient magnitude to support measurable biotransformation without site augmentation. However, site augmentation may still be required to attain desireable rates of transformation due to specific site conditions.

Assay conditions

Sample ID	Degrader Media: Carbon source	Degrader Media: % Carbon (v/v)	Temp. (Celcius)	Growth Conditions	DOF ** Total	DOF ** Degrader	Percent Degraders
WP-019	kerosene	1.0	22	Aerobic	9	4	96%
WP-020	kerosene	1.0	22	Aerobic	4	4	80%

* cfu/ml = colony forming units per ml of groundwater

** DOF = Degrees of freedom is number of replicates minus one. This parameter is used in calculation of 95% confidence intervals.

BioRenewal Technologies, Inc.
Bio-Analytical Summary Report

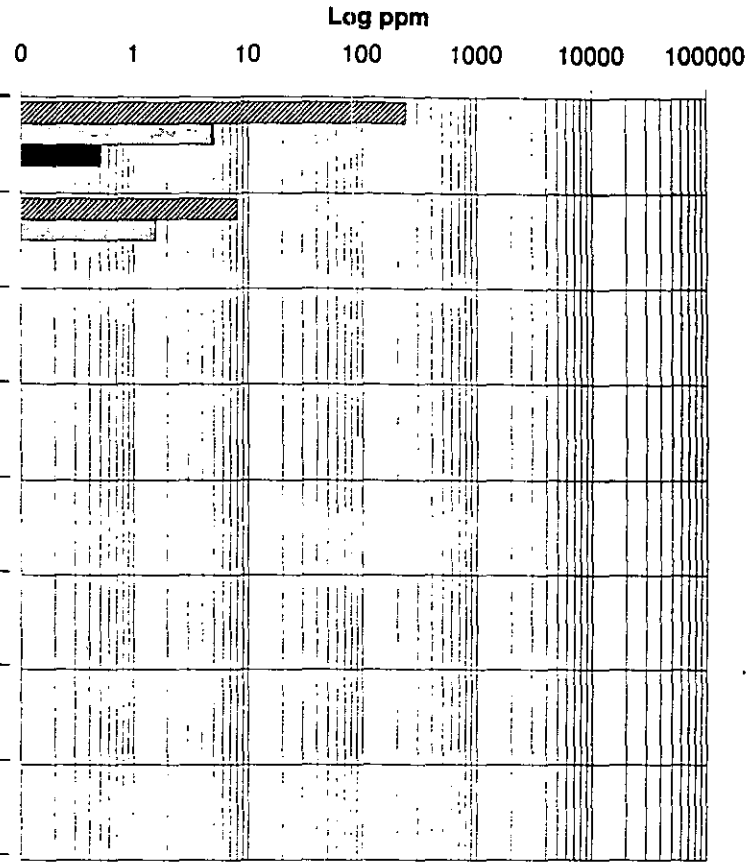
Job Code: **AUN**

Section III - Nutrient Conditions

All results reported as parts per million (ppm) unless otherwise indicated.

Standard Nutrient Panel

Sample ID	TOC*	TKN	NH4-N	Avail. P
WP-019	240	4.9	0.5	<0.1
WP-020	8	1.6	<0.1	<0.1



* Total Organic Carbon

TOC TKN NH4-N Avail. P

Other Analyses and Calculations

Guideline Published Threshholds*		C:N	C:P
Wis Dept. Natural Resources	Below:	40	120
Nat'l Academy of Sciences	Below:	6	30

Sample ID	% Organic* Matter	TON**	Calculated Ratios C:N	Calculated Ratios C:P	pH	SO4-S	NO3-N	Avail. K	Total Fe	CEC meq/100g
WP-019	n/a	4.4	55	n/a	5.8	35.0	<0.1	NR	NR	NR
WP-020	n/a	1.6	5	n/a	5.9	78.0	<0.1	NR	NR	NR

Sources: Naturally Occurring Biodegradation as a Remedial Action Option for Soil Contamination: Interim Guidance (Revised), 1994.
In-situ Bioremediation: When Does it Work?, B. Rittman, Ed., National Academy of Sciences, 1993. p 117.

* = Estimated % organic matter - See Methods.

** = Total Organic Nitrogen (Calculated as Total Kjeldahl Nitrogen (TKN) minus ammonium nitrogen).

NR = Not requested.

n/a = Not applicable.

EA08AUN3.XLS

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 No. 0296 00.050
Dept.: 6125 Task: 3628
Sample Storage Location:

Project Manager or Contact: Mike Battle / Curt Varner
Phone: (914) 565-8100
Project Name: NASB Fuel Farm
ATO Number: —NA—

Page 1 of 1
Report #:

Report Deliverables: 1 2 3 4 D E
EDD: Yes/No
DUE TO CLIENT: _____

Parameters/Method Numbers for Analysis

Date	Time	Water	Soil	Sample Identification 19 Characters	No. of Containers	Comparative Hic. Enum.	Nutrient Avail. Assessment	Sulfate	Nitrate	EA Labs Accession Number	Remarks
				~~NASB-01-BK~~						At	LPM:
8/7/96	10:00	X		NASB-FF-01-WP-001	2	X	X	X	X	AUN01	
8/7/96	11:10	X		NASB-FF-01-WP-002	2	X	X	X	X	AUN02	
8/7/96	11:45	X		NASB-FF-01-WP-003	2	X	X	X	X	AUN03	
8/7/96	13:45	X		NASB-FF-01-WP-004	2	X	X	X	X	AUN04	
8/7/96	14:50	X		NASB-FF-01-WP-006	2	X	X	X	X	AUN05	
8/7/96	14:20	X		NASB-FF-01-WP-008	2	X	X	X	X	AUN06	
8/7/96	14:00	X		NASB-FF-01-WP-009	2	X	X	X	X	AUN07	
8/7/96	15:00	X		NASB-FF-PRODUCT	2						Product (JP-5) Sample

— JP-5 is the contaminant of concern —

— 13 Additional Samples to arrive 10:00 AM 8/9/96 —

Samples by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
[signature]	8/7/96 15:30	[signature]	8/7/96 15:30	K. Wallen	8/8 10AM

Relinquished by: (Signature)	Date/Time	Received by Laboratory: (Signature)	Date/Time	Airbill Number:	Sample Shipped by: (Circle)
					Fed Ex. Purol. UPS
					Hand Carried
					Other:

Cooler Temp. ____ 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

Contact person: Curt Varner/Mike Battle Sampler: Curt Varner
Project name: NASB Fuel Farm Project #: 29600.35.3628
Project location: NASB, Maine (City) (state)

Site contaminant *: JP-5 (use Kerosene if necessary)
(Used in test for degrader microbial populations, give ratios if applicable, e.g. 50:50, gasoline:diesel)

* If available, a sample of free product is preferred for use as the carbon source for enumerating the degrader microbial populations. Free product included? ☐ yes ☐ No

NASB-FF-01 ↓ Sample ID	Lab ID	Date	Time	(✓) Soil	(✓) Gw	Sample depth	(#) Jars	(#) Vials	(#) Core	Additional comments	Comparative Enumeration Assay (Total heterotroph and degrader microbial populations) ☒ Aerobic, ☐ Microaerophilic (s/gw)	Standard nutrient panel (soil/gw) - incl. TKN, ammonium nitrogen, available P, pH, total organic carbon, % moisture (s)	Particle size analysis (soil) ☐ sieve and hydrometer, ☐ sieve only	% air-filled pore space (includes bulk density) (soil)	Intact core: Soil moisture at field capacity	Intact core: Bulk density (soil)	Sulfate by EPA 300	Nitrate by EPA 300			
WP-005	[redacted]	8/8/96	0915		X	6 ft		2			X	X					X	X			
WP-007	[redacted]	8/8/96	0920		X	6 ft		2			X	X					X	X			
WP-010	[redacted]	8/8/96	0910		X	6 ft		2			X	X					X	X			
WP-011	[redacted]	8/8/96	0900		X	6 ft		2			X	X					X	X			
WP-012	[redacted]	8/8/96	0745		X	6 ft		1			X	X					X	X			
WP-013	[redacted]	8/8/96	0800		X	6 ft		2			X	X					X	X			
WP-014	[redacted]	8/8/96	0940		X	6 ft		2			X	X					X	X			
WP-015	[redacted]	8/8/96	0915		X	6 ft		2			X	X					X	X			

Relinquished by: Curt Varner Date/time: 8/8/96 14:25
Received by: Jim Andreen Date/time: 8-9-96 - 10:30 AM
Comments:
Sample condition upon arrival:
On ice? ☐ Yes, ☐ No

BioRenewal Technologies, Inc.
The Faraday Center
2800 S. Fish Hatchery Rd.
Madison, WI 53711
(608)276-8980
Fax (608)273-6989

Send results to:
Name: Curt Varner
Company: EA Engineering
Address: 3 Washington Center
City: Newburgh State: NY Zip: 12550
Phone: (914) 565-8100 Fax: (914) 565-8203

Send invoice to: ☒ Same as results
Name
Company
Address
City State Zip
Phone Fax

White - Original Copy Canary - BioRenewal Copy Pink - Sampler Copy

Chain-of-Custody

Contact person: Curt Varner Sampler: Curt Varner
Project name: NASD Fuel Farm Project #: 29600 35-3628
Project location: NASD, Maine (City) (state)

Site contaminant *: JP-5
(Used in test for degrader microbial populations, give ratios if applicable, e.g. 50:50, gasoline:diesel)

* If available, a sample of free product is preferred for use as the carbon source for enumerating the degrader microbial populations. Free product included? ☐ yes ☐ No

NASD-FF-01

Sample ID	Lab ID only	Date	Time	(✓) Soil	(✓) Gw	Sample depth	(#) Jars	(#) Vials	(#) Core	Additional comments	Comparative Enumeration Assay (Total heterotroph and degrader microbial populations) ☒ Aerobic, ☐ Microaerophilic (s/gw)	Standard nutrient panel (soil/gw) - incl. TKN, ammonium nitrogen, available P, pH, total organic carbon, % moisture (s)	Particle size analysis (soil) ☐ sieve only ☐ sieve and hydrometer,	% air-filled pore space (soil) (includes bulk density)	Intact core: Soil moisture at field capacity	Intact core: Bulk density (soil)	Sulfate by EPA 300	Nitrate by EPA 300			
WP-018	[redacted]	8/8/96	10:00		X	6 ft		2			X	X					X	X			
WP-019	[redacted]	8/8/96	10:40		X	6 ft		2			X	X					X	X			
WP-020	[redacted]	8/8/96			X	6 ft		2			X	X					X	X			

Relinquished by: Curt Varner Date/time: 8/8/96 - 1500
Received by: Jim Andreas Date/time: 8-9-96 10:30 AM
Comments:
Sample condition upon arrival:
On ice? ☐ Yes, ☐ No

BioRenewal Technologies, Inc.
The Faraday Center
2800 S. Fish Hatchery Rd.
Madison, WI 53711
(608)276-8980
Fax (608)273-6989

Send results to:
Name: Curt Varner
Company: EA Engineering
Address: 3 Washington Center
City: Newburgh State: NY Zip: 12550
Phone: (914) 565-8100 Fax: (914) 565-8203

Send invoice to: ☐ Same as results
Name
Company
Address
City State Zip
Phone Fax

White - Original Copy Canary - BioRenewal Copy Pink - Sampler Copy

BioRenewal Technologies, Inc.
The Faraday Center
2800 South Fish Hatchery Road
Madison, WI 53711-5368

Invoice

Number: 1414
Date: Sep 5, 1996

Sold to:

EA Engineering, Science & Tech
3 Washington Center
Newburgh, NY 12550

Customer ID	Purchase Order	Payment Terms	Sales Rep	Page
EAE0SP	29600.35.3628	Net 30 Days		1

Quantity	Item	Description	Unit Price	Extension
18.00	M1000	Comparative enumeration assay - total and degrader populations at ambient atmosphere	150.00	2,700.00
18.00	N1000	Standard nutrients panel - Groundwater sample including NH3,TKN, TON (calcd), TOC, ortho-phosphate, C:N & C:P ratios (calcd), pH	65.00	1,170.00
18.00	N2010	Nitrate - N groundwater sample	12.00	216.00
18.00	N2020	Sulfate - sulfur groundwater sample	12.00	216.00
	Z5000	Shipping-Sampling containers sent via UPS on 7/31/96		25.50
		This invoice is for the NASB Fuel Farm site in NASB, Maine. Project no. 29600.35.3628. Project contacts are Curt Varner and Mike Battle. BioRenewal Contact is W. Allen Price. Job code is AUN.		

Sales Tax	
Total Invoice amount	$4,327.50
Amount received with invoice	0.00
Total	$4,327.50

Thank you for selecting BioRenewal.

Questions regarding this invoice? Phone 608/276-8980 or Fax 608/273-6989

BioRenewal

Technologies, Inc.

Facsimile Cover Sheet

RECEIVED
JAN 14 1997
EA Engineering, Science, & Technology, Inc.
Newburgh, NY 12550

To:	**Mike Battle**
Company:	**EA Engineering**
Phone:	**914/565-8100**
Fax:	**914/565-8203**

From:	**Allen Price**
Company:	**BioRenewal Technologies, Inc.**
Phone:	**608/ 276-8980**
Fax:	**608/ 273-6989**

Date:	**1/7/97**
Pages (incl cover):	**7**

NOTICE: This facsimile is intended only for the addressee shown below and may contain confidential or privileged information. If the recipient of this material is not the intended recipient or if you have received this transmission in error, please notify us immediately by telephone and return the original material to BioRenewal Technologies at the below address via U.S. Postal Service. Thank you for your cooperation.

If there is a problem with this transmission, please call (608) 276-8980

FAXED

Comments:

re: BioRenewal Job Code: BDV

Dear Mr Battle:

This report presents the results from Comparative Enumeration Assays and nutrient/chemical analyses performed on 19 groundwater samples we received on 12/6/96 in connection with the Fuel Farm site located in Brunswick, ME (project number 2960035 3696). The invoice and chain-of-custody for this project will accompany a confirmation copy sent via mail.

The analytical results requested are presented in the following sections:

- Microbial data summary
- Nutrient conditions

These samples were analyzed by BioRenewal using kerosene as the sole carbon source for enumerating the "degrader" microbial populations. Samples were received on ice.

Please give me a call if you have any questions or wish to discuss these results further. We look forward to working with you in the future.

Sincerely,

W A Price II

Wm. Allen Price II
Manager, Laboratory Services

Enclosures: Analytical results
Invoice
Chain-of-custody

The Faraday Center ♦ 2800 South Fish Hatchery Rd ♦ Madison, WI 53711 ♦ (608) 276-8980 ♦ Fax: (608) 273-6989

BioRenewal Technologies, Inc.

Bio-Analytical Summary Report

Job Code: **BDV (Part 1 of 3)**

Site Information

Site Name	Fuel Farm	Date received	6-Dec-96
Location	Brunswick, ME	Date of this report	6-Jan-97
Consultant	EA Engineering	BioRenewal Job Code	BDV (Part 1 of 3)
Proj. Contact	Mike Battle		
Project Ref ID	#2960035 3696	Number of soil samples	0
Contaminant	kerosene	Number of gw samples	19

Section I - Microbial Data Summary

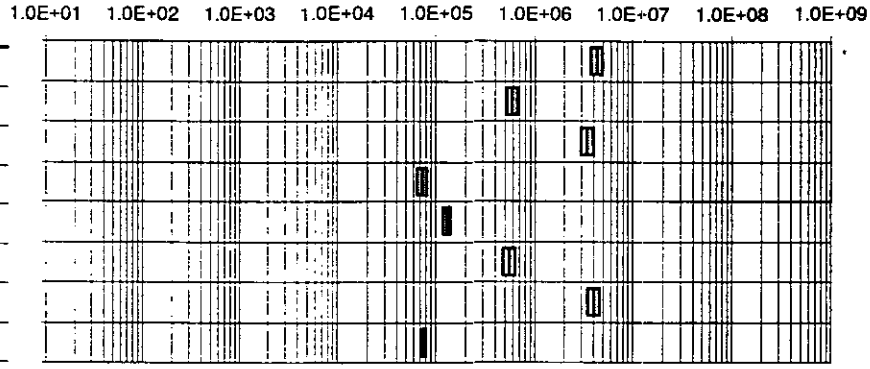
All values in cfu/ml*

Groundwater Samples

Total populations

Low and high indicate 95% confidence range

Sample ID	Mean	Low	High
WP001	4.4E+06	3.8E+06	5.0E+06
WP002	5.9E+05	5.2E+05	6.7E+05
WP003	3.4E+06	2.9E+06	4.0E+06
WP004	7.3E+04	6.6E+04	8.2E+04
WP005	1.3E+05	1.2E+05	1.4E+05
WP006	5.5E+05	4.8E+05	6.4E+05
WP007	4.1E+06	3.5E+06	4.6E+06
WP008	7.7E+04	7.4E+04	8.0E+04

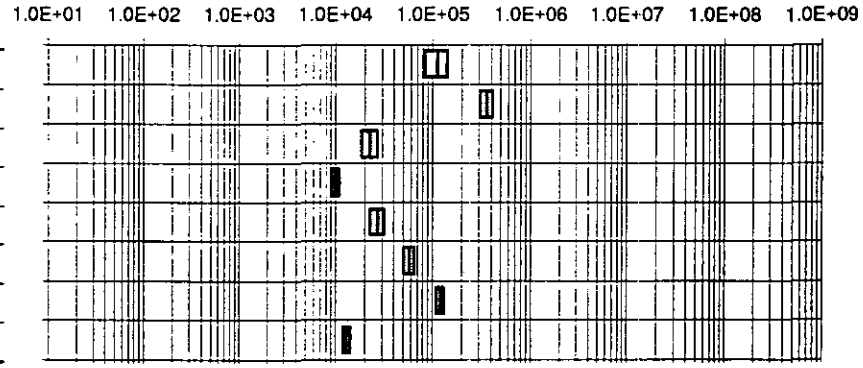


Groundwater Samples

Degrader populations

Low and high indicate 95% confidence range

Sample ID	Mean	Low	High
WP001	1.1E+05	8.3E+04	1.4E+05
WP002	3.6E+05	3.1E+05	4.1E+05
WP003	2.2E+04	1.8E+04	2.7E+04
WP004	1.0E+04	9.1E+03	1.1E+04
WP005	2.7E+04	2.2E+04	3.2E+04
WP006	5.8E+04	5.1E+04	6.5E+04
WP007	1.2E+05	1.1E+05	1.3E+05
WP008	1.3E+04	1.2E+04	1.4E+04



Assay conditions

Sample ID	Degrader Media: Carbon source	Degrader Media: % Carbon (v/v)	Temp. (Celcius)	Growth Conditions	DOF ** Total	DOF ** Degrader	Percent Degraders
WP001	kerosene	1.0	22	Aerobic	4	4	2%
WP002	kerosene	1.0	22	Aerobic	4	4	61%
WP003	kerosene	1.0	22	Aerobic	4	4	1%
WP004	kerosene	1.0	22	Aerobic	4	4	14%
WP005	kerosene	1.0	22	Aerobic	4	4	21%
WP006	kerosene	1.0	22	Aerobic	3	4	10%
WP007	kerosene	1.0	22	Aerobic	4	4	3%
WP008	kerosene	1.0	22	Aerobic	3	4	17%

* cfu/ml = colony forming units per ml of groundwater

** DOF = Degrees of freedom is number of replicates minus one. This parameter is used in calculation of 95% confidence intervals.

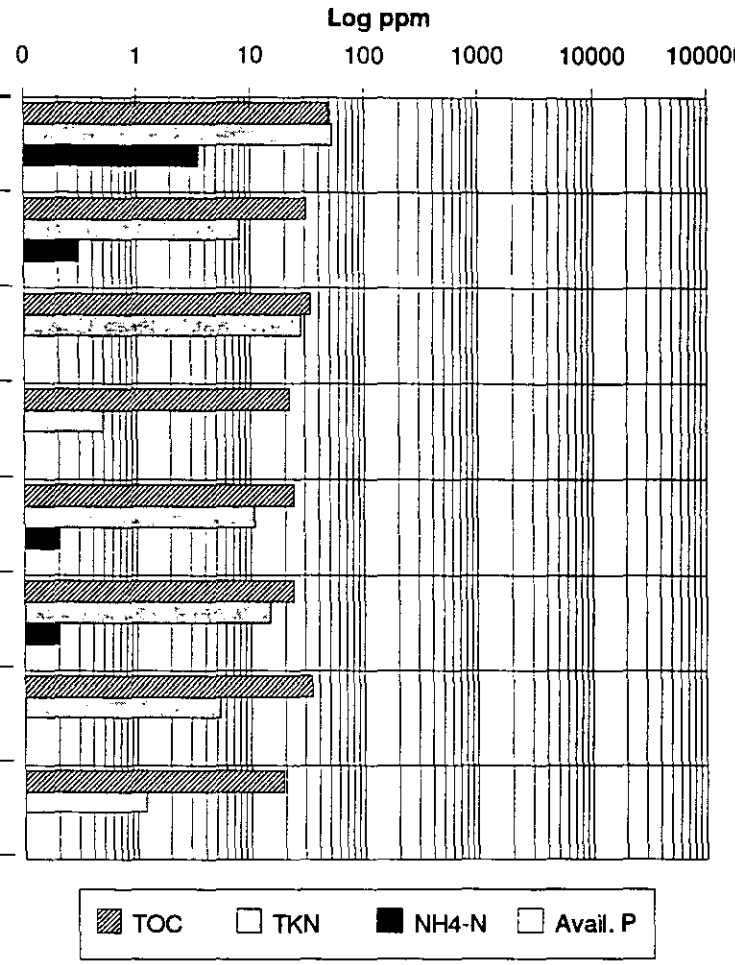
Section II - Nutrient Conditions

All results reported as parts per million (ppm) unless otherwise indicated.

Standard Nutrient Panel

Sample ID	TOC*	TKN	NH4-N	Avail. P
WP001	49	52.7	3.5	<0.1
WP002	31	8.0	0.3	<0.1
WP003	34	28.4	<0.1	<0.1
WP004	22	0.5	<0.1	<0.1
WP005	24	10.8	0.2	<0.1
WP006	24	14.7	0.2	<0.1
WP007	35	5.3	<0.1	<0.1
WP008	19	1.2	<0.1	<0.1

* Total Organic Carbon



Other Analyses and Calculations

Sample ID	% Organic* Matter	TON**	Calculated Ratios C:N	Calculated Ratios C:P	pH	Sulfate (as SO4)	Nitrate (as N)	Avail. K	Total Fe	CEC meq/100g
WP001	n/a	49.2	1	n/a	6.2	170	10.0	NR	NR	NR
WP002	n/a	7.7	4	n/a	6.2	25	7.0	NR	NR	NR
WP003	n/a	28.4	1	n/a	6.0	42	5.5	NR	NR	NR
WP004	n/a	0.5	44	n/a	5.7	75	5.0	NR	NR	NR
WP005	n/a	10.6	2	n/a	5.6	20	8.7	NR	NR	NR
WP006	n/a	14.5	2	n/a	5.6	43	4.5	NR	NR	NR
WP007	n/a	5.3	7	n/a	5.8	100	5.2	NR	NR	NR
WP008	n/a	1.2	16	n/a	6.0	140	9.5	NR	NR	NR

* = Estimated % organic matter - See Methods.

** = Total Organic Nitrogen (Calculated as Total Kjeldahl Nitrogen (TKN) minus ammonium nitrogen).

NR = Not requested.

n/a = Not applicable.

BioRenewal Technologies, Inc.

Bio-Analytical Summary Report

Job Code: **BDV (Part 2 of 3)**

Site Information

Site Name	Fuel Farm	Date received	6-Dec-96
Location	Brunswick, ME	Date of this report	6-Jan-97
Consultant	EA Engineering	BioRenewal Job Code	BDV (Part 2 of 3)
Proj. Contact	Mike Battle		
Project Ref ID	#2960035 3696	Number of soil samples	0
Contaminant	kerosene	Number of gw samples	19

Section I - Microbial Data Summary

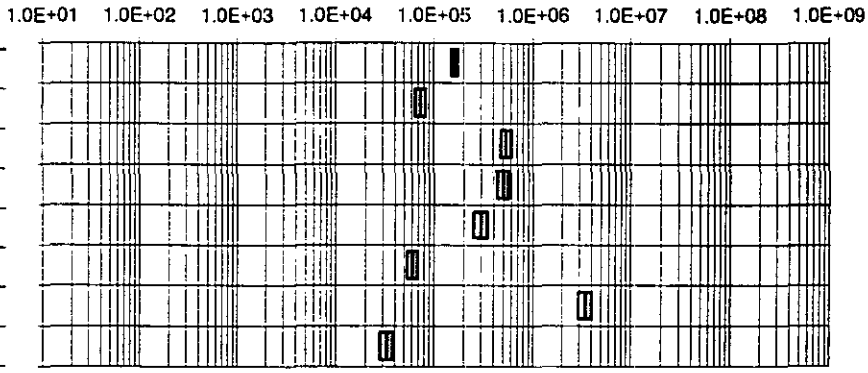
All values in cfu/ml*

Groundwater Samples

Total populations

Low and high indicate 95% confidence range

Sample ID	Mean	Low	High
WP009	1.6E+05	1.5E+05	1.8E+05
WP010	7.4E+04	6.5E+04	8.3E+04
WP011	5.4E+05	4.8E+05	6.1E+05
WP012	4.9E+05	4.3E+05	5.6E+05
WP013	3.0E+05	2.5E+05	3.5E+05
WP014	6.1E+04	5.4E+04	6.8E+04
WP015	3.5E+06	3.0E+06	4.0E+06
WP018	3.3E+04	2.8E+04	3.9E+04

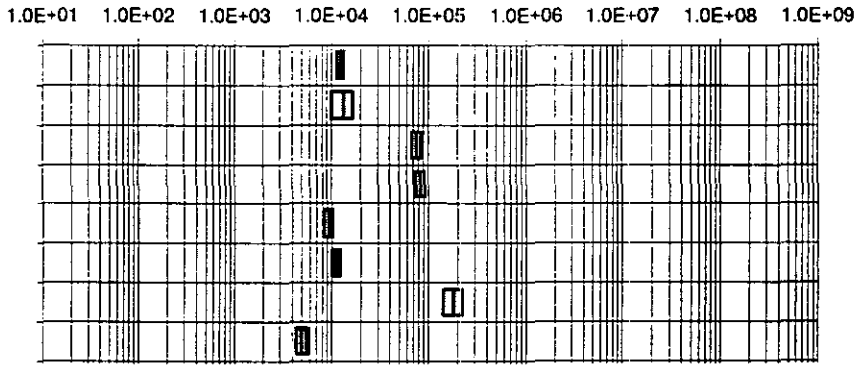


Groundwater Samples

Degrader populations

Low and high indicate 95% confidence range

Sample ID	Mean	Low	High
WP009	1.2E+04	1.1E+04	1.3E+04
WP010	1.3E+04	1.0E+04	1.7E+04
WP011	7.6E+04	6.8E+04	8.5E+04
WP012	8.3E+04	7.5E+04	9.3E+04
WP013	9.3E+03	8.5E+03	1.0E+04
WP014	1.1E+04	1.0E+04	1.2E+04
WP015	1.8E+05	1.4E+05	2.2E+05
WP018	5.0E+03	4.4E+03	5.7E+03



Assay conditions

Sample ID	Degrader Media: Carbon source	Degrader Media: % Carbon (v/v)	Temp. (Celcius)	Growth Conditions	DOF ** Total	DOF ** Degrader	Percent Degraders
WP009	kerosene	1.0	22	Aerobic	4	4	7%
WP010	kerosene	1.0	22	Aerobic	3	4	17%
WP011	kerosene	1.0	22	Aerobic	4	4	14%
WP012	kerosene	1.0	22	Aerobic	4	4	17%
WP013	kerosene	1.0	22	Aerobic	4	4	3%
WP014	kerosene	1.0	22	Aerobic	4	4	18%
WP015	kerosene	1.0	22	Aerobic	4	4	5%
WP018	kerosene	1.0	22	Aerobic	4	4	15%

* cfu/ml = colony forming units per ml of groundwater

** DOF = Degrees of freedom is number of replicates minus one. This parameter is used in calculation of 95% confidence intervals.

EA201BDV.XLS

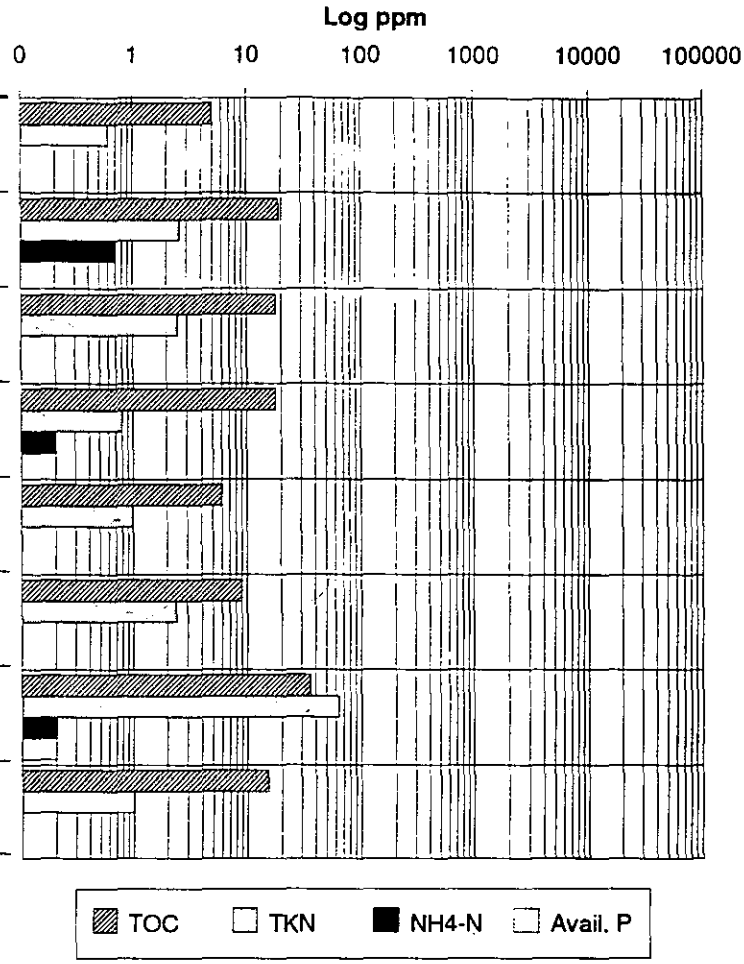
Section II - Nutrient Conditions

All results reported as parts per million (ppm) unless otherwise indicated.

Standard Nutrient Panel

Sample ID	TOC*	TKN	NH4-N	Avail. P
WP009	5	0.6	<0.1	<0.1
WP010	19	2.6	0.7	<0.1
WP011	18	2.5	<0.1	<0.1
WP012	18	0.8	0.2	<0.1
WP013	6	1.0	<0.1	<0.1
WP014	9	2.4	<0.1	<0.1
WP015	36	63.4	0.2	0.2
WP018	15	1.0	<0.1	<0.1

* Total Organic Carbon



Other Analyses and Calculations

Sample ID	% Organic* Matter	TON**	Calculated Ratios C:N	Calculated Ratios C:P	pH	Sulfate (as SO4)	Nitrate (as N)	Avail. K	Total Fe	CEC meq/100g
WP009	n/a	0.6	8	n/a	6.2	118	6.2	NR	NR	NR
WP010	n/a	1.9	10	n/a	5.9	23	3.3	NR	NR	NR
WP011	n/a	2.5	7	n/a	5.8	45	5.5	NR	NR	NR
WP012	n/a	0.6	30	n/a	5.5	95	5.0	NR	NR	NR
WP013	n/a	1.0	6	n/a	5.8	40	7.5	NR	NR	NR
WP014	n/a	2.4	4	n/a	5.7	20	7.0	NR	NR	NR
WP015	n/a	63.2	1	180	5.7	190	11.0	NR	NR	NR
WP018	n/a	1.0	15	n/a	5.4	43	6.0	NR	NR	NR

Sources: Naturally Occurring Biodegradation as a Remedial Action Option for Soil Contamination: Interim Guidance (Revised), 1994.
In-situ Bioremediation: When Does it Work?, B. Rittman, Ed., National Academy of Sciences, 1993. p 117.

* = Estimated % organic matter - See Methods.

** = Total Organic Nitrogen (Calculated as Total Kjeldahl Nitrogen (TKN) minus ammonium nitrogen).

NR = Not requested.

n/a = Not applicable.

BioRenewal Technologies, Inc.
Bio-Analytical Summary Report

Job Code: **BDV (Part 3 of 3)**

Site Information

Site Name	Fuel Farm	Date received	6-Dec-96
Location	Brunswick, ME	Date of this report	6-Jan-97
Consultant	EA Engineering	BioRenewal Job Code	BDV (Part 3 of 3)
Proj. Contact	Mike Battle		
Project Ref ID	#2960035 3696	Number of soil samples	0
Contaminant	kerosene	Number of gw samples	19

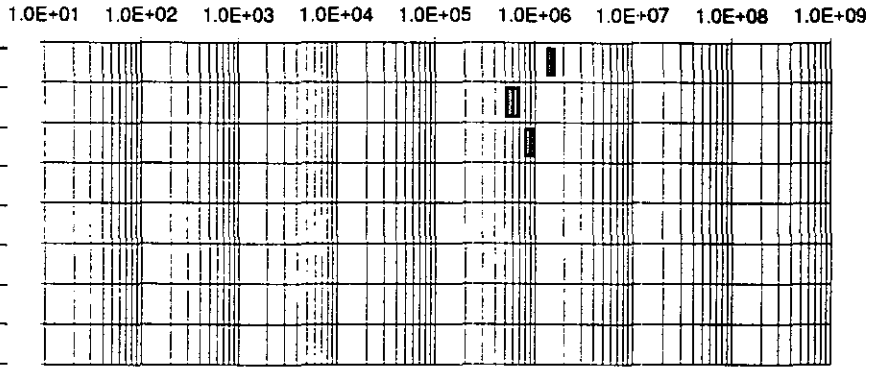
Section I - Microbial Data Summary

All values in cfu/ml*

Groundwater Samples
Total populations

Low and high indicate 95% confidence range

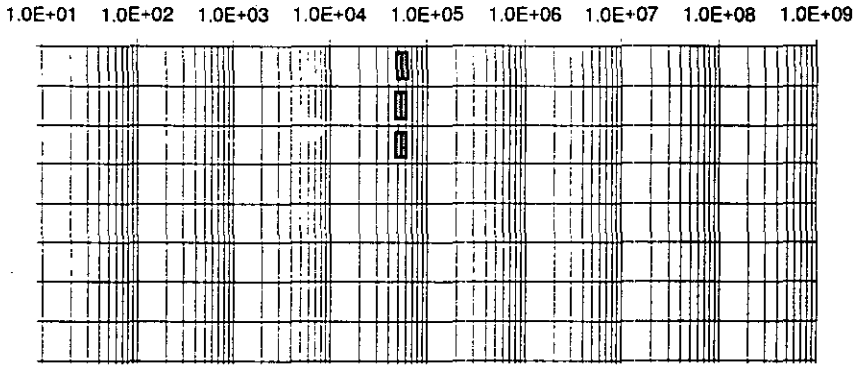
Sample ID	Mean	Low	High
WP019	1.5E+06	1.4E+06	1.6E+06
WP020	6.0E+05	5.3E+05	6.7E+05
WPXD1	9.0E+05	8.1E+05	9.9E+05



Groundwater Samples
Degrader populations

Low and high indicate 95% confidence range

Sample ID	Mean	Low	High
WP019	5.6E+04	4.9E+04	6.3E+04
WP020	5.3E+04	4.7E+04	6.1E+04
WPXD1	5.5E+04	4.8E+04	6.1E+04



Assay conditions

Sample ID	Degrader Media: Carbon source	Degrader Media: % Carbon (v/v)	Temp. (Celcius)	Growth Conditions	DOF ** Total	DOF ** Degrader	Percent Degraders
WP019	kerosene	1.0	22	Aerobic	4	4	4%
WP020	kerosene	1.0	22	Aerobic	4	4	9%
WPXD1	kerosene	1.0	22	Aerobic	4	4	6%

* cfu/ml = colony forming units per ml of groundwater

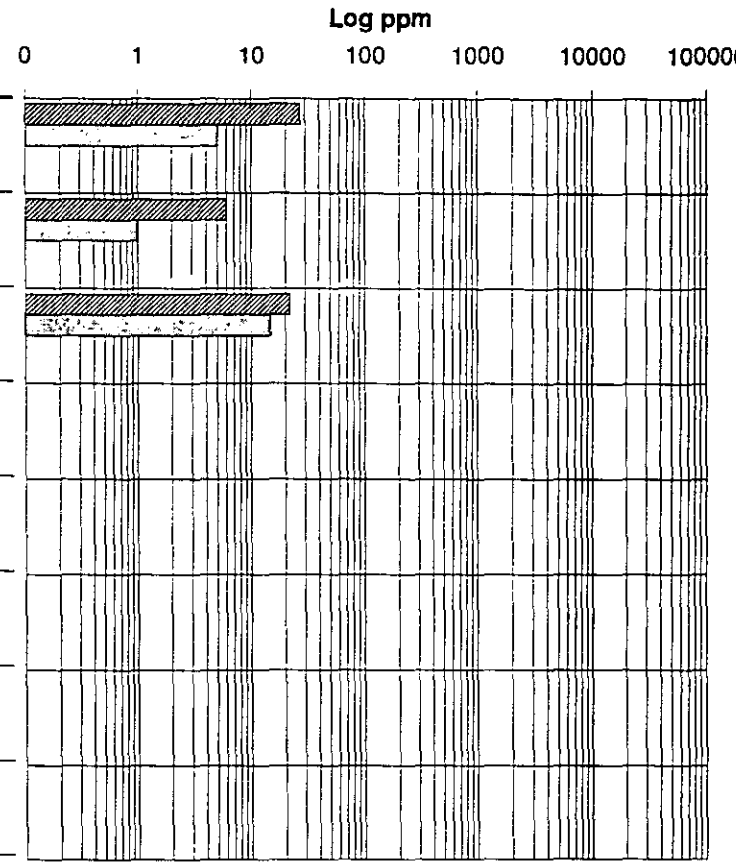
** DOF = Degrees of freedom is number of replicates minus one. This parameter is used in calculation of 95% confidence intervals.

Section II - Nutrient Conditions

All results reported as parts per million (ppm) unless otherwise indicated.

Standard Nutrient Panel

Sample ID	TOC*	TKN	NH4-N	Avail. P
WP019	27	5.0	<0.1	<0.1
WP020	6	1.0	<0.1	<0.1
WPXD1	22	14.7	<0.1	<0.1



* Total Organic Carbon

TOC TKN NH4-N Avail. P

Other Analyses and Calculations

Sample ID	% Organic* Matter	TON**	Calculated Ratios C:N	Calculated Ratios C:P	pH	Sulfate (as SO4)	Nitrate (as N)	Avail. K	Total Fe	CEC meq/100g
WP019	n/a	5.0	5	n/a	5.7	30	5.5	NR	NR	NR
WP020	n/a	1.0	6	n/a	6.0	140	8.0	NR	NR	NR
WPXD1	n/a	14.7	1	n/a	5.7	140	7.0	NR	NR	NR

* = Estimated % organic matter - See Methods.

** = Total Organic Nitrogen (Calculated as Total Kjeldahl Nitrogen (TKN) minus ammonium nitrogen).

NR = Not requested.

n/a = Not applicable.

Chain-of-Custody

Contact person Mike Battle Sampler Sue Chase John Carnright Mike Chase

Project name Fuel Farm Project # 29600035 3696

Project location Brunswick (City) Maine (state)

Site contaminant * JP-5 (use Kerosene if necessary)
(Used in test for degrader microbial populations, give ratios if applicable, e.g. 50:50, gasoline:diesel)

* If available, a sample of free product is preferred for use as the carbon source for enumerating the degrader microbial populations. Free product included? ☐ yes ☐ No

Requested analyses (✓)

NASB-FF-Q- Sample ID	Lab use only	Date	Time	(✓) Soil	(✓) Gw	Sample depth	(#) Jars	(#) Vials	(#) Core	Additional comments	Comparative Enumeration Assay (Total heterotroph and degrader microbial populations) # Aerobic, ☐ Microaerophilic (s/gw)	Standard nutrient panel (soil/gw) - incl. TKN, ammonium nitrogen, available P, pH, total organic carbon, % moisture (s)	Particle size analysis (soil) ☐ sieve and hydrometer, ☐ sieve only	% air-filled pore space (soil) (includes bulk density)	Intact core: Soil moisture at field capacity	Intact core: Bulk density (soil)	Sulfate by EPA 300	Nitrate by EPA 300			
WP001	BDV01	12/5/96	0825		X	6 Ft		2			X	X					X	X			
WP002	BDV02	12/5/96	0943		X	6 Ft		2			X	X					X	X			
WP003	BDV03	12/5/96	0940		X	6 Ft		2			X	X					X	X			
WP004	BDV04	12/5/96	0958		X	6 Ft		2			X	X					X	X			
WP005	BDV05	12/5/96	1125		X	6 Ft		2			X	X					X	X			
WP006	BDV06	12/5/96	1110		X	6 Ft		2			X	X					X	X			
WP007	BDV07	12/5/96	1045		X	6 Ft		2			X	X					X	X			
WP008	BDV08	12/5/96	1025		X	6 Ft		2			X	X					X	X			

Relinquished by: Dynome Chase Date/time: 12/5/96 1500

Received by: K. Waller Date/time: 12/6/96 10:20A

Comments:

Sample condition upon arrival:

On ice? ☑ Yes, ☐ No

BioRenewal Technologies, Inc.

The Faraday Center
2800 S. Fish Hatchery Rd.
Madison, WI 53711
(608)276-8980
Fax (608)273-6989

Send results to:

Name Mike Battle
Company EA Engineering
Address 3 Washington Center
City Newburgh State NY Zip 12550
Phone ____ Fax ____

Send invoice to: ☑ Same as results

Name ____
Company ____
Address ____
City ____ State ____ Zip ____
Phone ____ Fax ____

White - Original Copy Canary - BioRenewal Copy Pink - Sampler Copy

Chain-of-Custody

Contact person: Mike Battle Sampler: Sue Chase Mike Chase John Cannright
Project name: Fuel Farm Project #: 29600035 3696
Project location: Brunswick (City) Maine (state)

Site contaminant *: JP-5 (Kerosene use if necessary)
(Used in test for degrader microbial populations, give ratios if applicable, e.g. 50:50, gasoline:diesel)

* If available, a sample of free product is preferred for use as the carbon source for enumerating the degrader microbial populations. Free product included? ☐ yes ☐ No

NASB-FF-02

Sample ID	Lab use only	Date	Time	(✓) Soil	(✓) Gw	Sample depth	(#) Jars	(#) Vials	(#) Core	Additional comments	Comparative Enumeration Assay (Total heterotroph and degrader microbial populations) ☒ Aerobic, ☐ Microaerophilic (s/gw)	Standard nutrient panel (soil/gw) - incl. TKN, ammonium nitrogen, available P, pH, total organic carbon, % moisture (s)	Particle size analysis (soil) ☐ sieve and hydrometer, ☐ sieve only	% air-filled pore space (includes bulk density) (soil)	Intact core: Soil moisture at field capacity (soil)	Intact core: Bulk density (soil)	Sulfate by EPA 300	Nitrate by EPA 300			
WP009	BDV09	12/5/96	1000		X	6 Ft		2			X	X					X	X			
WP010	BDV10	12/5/96	1140		X	6 Ft		2			X	X					X	X			
WP011	BDV11	12/5/96	1135		X	6 Ft		2			X	X					X	X			
WP012	BDV12	12/5/96	1045		X	6 Ft		2			X	X					X	X			
WP013	BDV13	12/5/96	1007		X	6 Ft		2			X	X					X	X			
WP014	BDV14	12/5/96	1350		X	6 Ft		2			X	X					X	X			
WP015	BDV15	12/5/96	1420		X	6 Ft		2			X	X					X	X			
~~WP016~~																					

Requested analyses (✓)

Relinquished by: Suzanne Chase Date/time: 12/5/96 1500
Received by: R. Waller Date/time: 12/6/96 10:20

Comments:

Sample condition upon arrival:
On ice? ☒ Yes, ☐ No

BioRenewal Technologies, Inc.
The Faraday Center
2800 S. Fish Hatchery Rd.
Madison, WI 53711
(608)276-8980
Fax (608)273-6989

Send results to:
Name: Mike Battle
Company: EA Engineering
Address: 3 Washington Center
City: Newburgh State: NY Zip: 12550
Phone: 914-565-8100 Fax: 914-565-8203

Send invoice to: ☒ Same as results
Name
Company
Address
City State Zip
Phone Fax

White - Original Copy Canary - BioRenewal Copy Pink - Sampler Copy

Chain-of-Custody

Contact person: Mike Battle Sampler: SC JC MC
Project name: Fuel Farm Project #: 2960035 3696
Project location: Brunswick (City) Maine (state)

Site contaminant *: JP-5 (use Kerosene if necessary)
(Used in test for degrader microbial populations, give ratios if applicable, e.g. 50:50, gasoline:diesel)

* If available, a sample of free product is preferred for use as the carbon source for enumerating the degrader microbial populations. Free product included? ☐ yes ☐ No

Requested analyses (✓)

NASB-FF-02 Sample ID	Lab use only	Date	Time	(✓) Soil	(✓) Gw	Sample depth	(#) Jars	(#) Vials	(#) Core	Additional comments	Comparative Enumeration Assay (Total heterotroph and degrader microbial populations) ☑ Aerobic, ☐ Microaerophilic (s/gw)	Standard nutrient panel (soil/gw) - incl. TKN, ammonium nitrogen, available P, pH, total organic carbon, % moisture (s)	Particle size analysis (soil) ☐ sieve and hydrometer, ☐ sieve only	% air-filled pore space (soil) (includes bulk density)	Intact core: Soil moisture at field capacity	Intact core: Bulk density (soil)	Sulfate by EPA300	Nitrate by EPA300			
WP018	BDV16	12/5/96	1350		X	6 Ft		2			X	X					X	X			
WP019	BDV17	12/5/96	1400		X	6 Ft		2			X	X					X	X			
WP020	BDV18	12/5/96	1415		X	6 Ft		2			X	X					X	X			
WPXD1 ~~WXD~~	BDV19	12/5/96	?		X	6 FT		2			X	X					X	X	PER JOHN C. ← 12/6/96 KW		

Relinquished by: Dayane Chase Date/time: 12/5/96 1500
Received by: K. Waller Date/time: 12/6/96 10:20
Comments:
Sample condition upon arrival: On ice? ☑ Yes, ☐ No

BioRenewal Technologies, Inc.
The Faraday Center
2800 S. Fish Hatchery Rd.
Madison, WI 53711
(608)276-8980
Fax (608)273-6989

Send results to:
Name: Mike Battle
Company: EA Engineering
Address: 3 Washington Center
City: Newburgh State: NY Zip: 12550
Phone: 914-565-8100 Fax: 914-565-8203

Send invoice to: ☑ Same as results
Name
Company
Address
City State Zip
Phone Fax

White - Original Copy Canary - BioRenewal Copy Pink - Sampler Copy

BioRenewal Technologies, Inc.
The Faraday Center
2800 South Fish Hatchery Road
Madison, WI 53711-5368

Invoice

Number: 1678
Date: Jan 7, 1997

Sold to:

EA Engineering, Science & Tech
3 Washington Center
Attn Accts Payable
Newburgh, NY 12550

Customer ID	Purchase Order	Payment Terms	Sales Rep	Page
EAEOSP	2960035 3696	Net 30 Days		1

Quantity	Item	Description	Unit Price	Extension
19.00	M1000	Comparative enumeration ass[illegible] including total and degrader populations	150.00	2,850.00
19.00	N1000	Standard nutrients [illegible] NH3,TKN, TON (calcd), TOC, [illegible] C:P ratios (calcd), pH	65.00	1,235.00
19.00	N2010	Nitrate (groundwater)	12.00	[illegible].00
19.00	N2020	Sulfate (groundwater)	12.00	228.00
	Z5000	Shipping-Sampling containers sent 11/22/96 via Fed Ex. This invoice is for the Fuel Farm site in Brunswick, Maine. Project number 2960035 3696. Project contact is Mike Battle. BioRenewal conatct is W. Allen Price. Job code is BDV.		25.83

RECEIVED
JAN 14 1997
EA Engineering, Science, & Technology, Inc.
Newburgh, NY 12550

Sales Tax	
Total invoice amount	$4,566.83
Amount received with invoice	0.00
Total	$4,566.83

Thank you for selecting BioRenewal.

Questions regarding this invoice? Phone 608/276-8980 or Fax 608/273-6989

Appendix E

Methodology and Results

APPENDIX E

SUMMARY OF BASELINE MOBILE LABORATORY ANALYTICAL RESULTS, 8 AUGUST 1996 OLD NAVY FUEL FARM, NAVAL AIR STATION, BRUNSWICK, MAINE

Sample	Benzene (μg/L)	Toluene (μg/L)	Ethylbenzene (μg/L)	*m&p*-xylene (μg/L)	*o*-xylene (μg/L)	Total BTEX (μg/L)
WP-1	<1.0	3.1	1.2	10.2	3.0	17.5
WP-2	621	54.5	228	467	243	1,613
WP-3	14.9	185	NA	128	218	545
WP-4	<1.0	6.0	10.2	24.4	10.2	50.8
WP-5	14.4	410	353	585	454	1,816
WP-6	2.1	3.5	2.1	10.4	16.1	34.2
WP-7	882	8.6	56.9	24.6	6.8	979
WP-8	14.0	8.1	1.6	5.5	1.8	31.0
WP-9	<1.0	5.3	6.2	4.9	13.9	30.3
WP-9 DUP	1.0	6.0	<1.0	3.3	2.2	12.5
WP-10	33.8	62.4	20.8	55.4	28.2	201
WP-11	61.6	667	239	409	112	1,489
WP-11 DUP	58.7	714	221	396	111	1,501
WP-13	15.0	363	74.3	246	132	830
WP-14	1.2	8.3	<1.0	2.6	1.8	13.9
WP-15	4.3	15.8	1.4	4.3	1.8	27.6
WP-18	<1.0	5.9	<1.0	2.6	1.4	9.9
WP-19	205	<1.0	<1.0	1.4	<1.0	206
WP-20	2.6	7.7	1.6	5.2	2.8	19.9
WP-20-DUP	1.5	7.3	1.2	4.6	2.9	17.5
Detection	0.1	0.1	0.1	0.1	0.1	0.7
Method	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NOTE: NA = Not applicable; rejected peak analysis for ethylbenzene.
BTEX = Benzene, toluene, ethylbenzene, and total xylenes.

Appendix F

Field Record of Biosparging System Operations Forms

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: CSV	Date: 8/8/97	Time: 1630
Weather:	Main Gauge (Pressure/Flow/Temp.): 210CFM	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
SVE-1		No			OFF - Flooded line
SVE-2		Slight			ON - Flooded line
SVE-3		No			OFF
SVE-4		Yes			ON - Bubbling in hole
SVE-5		No			ON - Bubbling in hole
SVE-6		Yes			ON - Surging water in line Flooded
SVE-7		No			Flooded line
SVE-8		No			ON sheen
SVE-9		No			OFF
SVE-10		No			OFF
SVE-11		Slight			ON Bubbling in hole
SVE-12		Slight			ON Sheen on water
SVE-13		Slight			ON
SVE-14		Yes			ON
SVE-15		Yes			OFF
SVE-16		Yes			ON water in line
SVE-17		Yes			ON water in line
SVE-18		NO			OFF Dry hole

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: CSV	Date: 8/8/97	Time: 1630
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.): 210 CFM	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
AAS-1		N/A			OFF
AAS-2		N/A			OFF
AAS-3		N/A			OFF
AAS-4		30			ON
AAS-5		>100			ON
AAS-6		80			ON
AAS-7		95			ON
AAS-8		N/A			OFF
AAS-9		N/A			OFF
AAS-10		N/A			OFF
AAS-11		20			ON
AAS-12		50+			ON
AAS-13		50+			ON
AAS-14					
AAS-15					
AAS-16					
AAS-17					
AAS-18					

EA 5120 0794-4

- Baseline -

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS

Brunswick Naval Air Station Fuel Farm Biosparging System

Note: After @ 18 hrs System Activation

EA Personnel: MC, BA	Date: 8/9/96	Time: 10:00
Weather: Sunny, Hazy, @ 75°F	Main Gauge (Pressure/Flow/Temp.): NA	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
SVE-1	–	–	94.50	0.95	Flooded Line, Not Active
SVE-2	Yes	Slight	73.55	4.57	Flooded Line
SVE-3	–	–	456	8.08	Not Active, Line Blocked
SVE-4	Yes	High	89.24	9.67	Standing Water Bubbling in Vault
SVE-5	Yes	High	478	14.56	Standing Water Bubbling in Vault
SVE-6	Yes	Surging	203	5.38	Flooded Line/Surging Flow
SVE-7	–	–	33.35	2.98	Flooded Line/Not Active
SVE-8	Yes	Slight	–	0.10	Sheen on Standing Water
SVE-9	–	–	58.76	0.37	Not Active, Line Blocked
SVE-10	–	–	28.98	0.08	Not Active, Ball Valve Stuck Shut
SVE-11	Yes	Slight	1,133	5.12	Standing Water Slightly Bubbling
SVE-12	Yes	Slight	95.6	5.04	Sheen on Standing Water
SVE-13	Yes	Slight	33.67	4.11	Slight Flow
SVE-14	Yes	High	701	5244	Standing Water Briskly Bubbling
SVE-15	–	–	112	13.52	Dry Vault, Line Blocked
SVE-16	Yes	High	82.5	7.82	Good Flow, Water in Line
SVE-17	Yes	High	16.65	2.02	Good Flow, Water in Line
SVE-18	–	–	631	6.52	Dry Vault

EA 5120 0794-4

- Baseline -

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: DA MC	Date: 8/9/96	Time: 10:00
Western (Pressure/Flow/Temp.): 6.5 psi / 210 cfm	Eastern (Pressure/Flow/Temp.): 8.0 psi / >300 cfm	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
AAS-1	–	–	0.72	0.79	
AAS-2	–	–	2.11	1.05	
AAS-3	–	–	57.22	1.09	
AAS-4	Yes	~30 cfm	4,378	15.90	Water Surging in Line
AAS-5	Yes	>100	940	15.42	
AAS-6	Yes	~80	1,028	43.95	
AAS-7	Yes	~95	121	4.24	
AAS-8	–	–	–	0.22	
AAS-9	–	–	3.81	0.06	
AAS-10	NA	NA	111	0.43	
AAS-11	Yes	~20	14.93	0.26	Water Surging in Line
AAS-12	Yes	>50	894	27.09	
AAS-13	Yes	>50	76.44	5.01	Petroleum Odor in Hole
AAS-14	Yes	High	692	42.33	Dry Vault, Good Flow
AAS-15	Yes	High	1,062	68.92	Dry Vault, Good Flow
AAS-16	Yes	High	4.0%	185	Dry Vault, Good Flow
AAS-17	Yes	High	3,600	65.22	Dry Vault, Good Flow
AAS-18	Yes	Very High	61.66	1.80	Dry Vault, Very High Flow

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: NOC	Date: 8/14/96	Time: 13:00
Weather: Sunny, Breezy, @ 80°F	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm_v)	PID TVH (ppm_v)	Comments
SVE-1	–	–	ND	42.4	
SVE-2	Yes	High	ND	1.90	
SVE-3	Yes	High	7.20	4.40	
SVE-4	Yes	Slight	ND	8.60	
SVE-5	Yes	Surging	5.80	38.4	
SVE-6	–	–	ND	5.60	
SVE-7	–	–	ND	28.3	
SVE-8	–	–	ND	24.4	
SVE-9	–	–	210	27.4	
SVE-10	–	–	69.5	32.4	
SVE-11	–	–	390	33.21	
SVE-12	–	–	212	46.9	
SVE-13	Yes	Slight	3214	191	
SVE-14	Yes	High	2%	450	
SVE-15	Yes	High	44.4	6.20	
SVE-16	Yes	High	68.5	8.30	
SVE-17	Yes	High	ND	ND	
SVE-18	Yes	Slight	32.3	44.0	

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MOC	Date: 8/14/96	Time: 13:00
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
AAS-1	–	–	ND	42.6	
AAS-2	Yes	Slight	ND	~~38.2~~	38.2
AAS-3	–	↓	709	84.2	
AAS-4	Yes	~55	4,900	301	
AAS-5	Yes	~95	33.3	28.1	
AAS-6	Yes	>100	140	72.3	
AAS-7	Yes	High	ND	52.8	
AAS-8	Yes	~5.0	1.40	10.2	
AAS-9	Yes	~10.0	8.20	13.7	
AAS-10	Yes	Slight	80.2	28.5	
AAS-11	–	↓	70.6	30.6	
AAS-12	Yes	~45	170	33.6	
AAS-13	–	–	ND	32.0	
AAS-14	Yes	Slight	652	95.2	
AAS-15	Yes	Slight	3.0%	260	
AAS-16	Yes	Slight	>70%	>300	
AAS-17	–	↓	ND	36.9	
AAS-18	–	–	ND	34.9	

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 1916	Time:
Weather: 85° Sunny slight wind	Main Gauge (Pressure/Flow/Temp.): S UG - PSI 4	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
SVE-1		–	–	1.5	
SVE-2		yes	–	–	
SVE-3		yes	~~75~~	10.1	
SVE-4		–	~~80.0~~	~~75~~ 80	
SVE-5	–	yes	–	–	
SVE-6	–	yes	–	3.2	Gurgling water
SVE-7	–	~~strong~~	–	26.8	
SVE-8		–	–	–	3" water
SVE-9		–	50.8	–	4" water
SVE-10			69.6	–	3" water in Vault Value off can't turn
SVE-11		–	57.7	–	3" water in Vault
SVE-12		–	27.1	1.9	
SVE-13		–	1630	100	
SVE-14		?	1%	460	fitting to far in hole - not going in with FID off
SVE-15		med	80.2	10.7	up draft out of manhole
SVE-16		med	89.6	11.8	
SVE-17		med	–	–	
SVE-18		–	90.6	–	

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 8/20/96	Time:
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.): 4 psi 250 CFM	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm.)	PID TVH (ppm.)	Comments
AAS-1			—	9.5	pulled Gauge - strong flow - water
AAS-2		Strong	—	—	when Gauge pulled got water
AAS-3		strong	88.7	15.3	
AAS-4		65	635	61.2	
AAS-5		95	—	10.0	
AAS-6	—	100+	8.1	28.9	
AAS-7	—	Strong	—	23.6	
AAS-8		—	—	—	
AAS-9		—	4.4	—	
AAS-10		—	19.3	—	
AAS-11		—	3.1	—	
AAS-12		Low	—	—	
AAS-13		—	—	—	
AAS-14			230	22.5	
AAS-15		—	2%	395	
AAS-16		—	28%	315	
AAS-17		—	—	—	
AAS-18		—	—	—	

EA 5120 0794-4

08-21-1996 01:49PM EA ENG SYRACUSE 1 315 431 4280 P.02

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: CJV, SAP	Date: 8/28/96	Time: 16:00
Weather: Cloudy + 65°F	Main Gauge (Pressure/Flow/Temp.): 4.0 psi; ↓; 140° F	

Drop/Eastern psi Flow: Eastern: 4 in H_2O ; Western: NA

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments CH_4	CO_2	O_2		
SVE-1	-	-	1.9	0.0	0.0	1.1	19.7	Off	
SVE-2	-	-	0.7	0.0	0.0	0.0	21.0	Off	
AAS ~~SVE~~-3	-	-	14.4	0.7	0.0	1.1	19.6	Off	
SVE-3 ~~SVE-4~~	-	-	3.6	0.0	0.0	0.0	20.9	Off	
AAS-4 ~~SVE-5~~	-	-	159	14.74	0.0	1.1	19.7	Off	
SVE-~~4~~	-	-	143	14.9	0.0	0.0	20.8	Off	
SVE-7	-	-	0.0	0.0	0.0	0.2	20.5	Off	
SVE-8	-	-	3.0	0.0	0.0	0.0	20.9	Off	water
SVE-9	-	-	25.1	0.0	0.0	0.0	20.9	Off	
SVE-10	-	-	2.3	0.0	0.0	0.0	20.9	Off	wet
SVE-11	-	-	79.4	0.3	0.1	0.0	20.9	Off	wet
SVE-12	-	-	34.0	2.1	0.1	0.1	20.9	Off	
SVE-13	-	-	1053.8	123	15%	21	20.7	Off	Gas small
SVE-14	-	-		247	>90	5.3	18.2	Off	
SVE-15	Yes	Yes	589	42	0.0	0.0	13.6	+ Pressure	
SVE-16	-	-	112.0	70	0.0	0.0	20.92	+ Vapor Pressure	
AAS ~~SVE~~-17	Yes	Yes	0.0	0.0	0.0	0.0	20.9	ON	
SVE-18	-	-	2.5	0.0	0.0	2.2	18.3	Off	
SVE-5	-	-	0.0	0.0	0.0	0.0	20.8	Off	
SVE-6	-	-	0.0	0.0	0.0	0.0	20.8	Off	

* Blower C-18 has a broken belt not functioning.

* AAS-17 Air blowing out the hole on the top.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

16:00

EA Personnel: CJV, SAP		Date: 8/28/96	Time: ~~[illegible]~~
~~Western~~ (Pressure/Flow/Temp.): 5.0 psi / 26 cfm		~~Eastern~~ (Pressure/Flow/Temp.): OFF	

C1A 150°F C1B

Location	Pressure (psi)	Flowrate (cfm)	TVH (ppm$_v$) FID	TVH (ppm$_v$) FID	CH_4	CO_2	O_2	Comments
AAS-1	—	—	0.8	0.0	0	0	21.0	OFF
AAS-2	—	—	0.9	0.0	0.0	0.3	20.6	OFF / Dry
AAS-3								
AAS-4								
AAS-5	Yes	Yes	2.14	0.0	0	1.2	19.6	ON (Rinsed)
AAS-6	Yes	Yes	2.93	0.3	0	0.2	20.6	on (Rinsed)
AAS-7	Yes	Yes	13.5	0.2	0	0.6	20.2	on
AAS-8	—	—	43.5	0	0	0	20.9	off
AAS-9	—	—	77	0	0	0	20.9	off
AAS-10	—	—	14	0	0.1	0.3	20.3	off
AAS-11	—	—	3.2	0	0	0.2	20.8	off
AAS-12	—	—	27	0.0	0.1	0.5	20.2	off
AAS-13	—	—	8.5	0	0.1	0.4	20.4	off
AAS-14	—	—	28.3	22.4	0.5	1.3	20.3	off
AAS-15	Yes	—	1.09	118	>90	7.2	11.2	+ he purging
AAS-16	—	—	15.37	555	>90	4.2	14.3	off
~~AAS~~-17	—	—	3.4	0	0	3.2	17.7	off
AAS-18	—	—	0	0	0	1.6	19.2	off

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC	Date: 9/13/96	Time: 830
Weather: 29.9 Hg	Main Gauge (Pressure/Flow/Temp.): 3 psi Flow 1	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments * CH_4	CO_2	O_2	CFF (%)
SVE-1		—	359	.7	00.0	00.64	21.4	
SVE-2		Med	—	—	00.0	00.0	22.0	
SVE-3		Heavy	—	—	00.0	00.0	22.2	
SVE-4		Low	231	28.28	00.1	00.0	22.9	
SVE-5		Low	—	—	00.0	00.0	23.3	
SVE-6		Med	—	.29	00.0	00.0	21.2	
SVE-7	—	—	—	0.01	00.0	00.0	21.1	
SVE-8	—	—	0.01	1712	00.0	00.0	21.0	
SVE-9	—	—	38.12	1040	00.0	00.0	21.0	
SVE-10	—	—	114	324	00.1	00.0	21.0	
SVE-11	—	—	404	96.8	00.1	00.0	20.6	
SVE-12	—	—	595	98	00.2	00.1	20.7	
SVE-13	N/A		1.14%	518	32.0	4.1	15.7	
SVE-14	N/A		2.98%	738	102.1	5.4	18.8	
SVE-15	unknown		68.12	15.00	03.5	00.0	20.7	
SVE-16		yes	110	51.64	00.0	00.0	20.9	
SVE-17	Yes	Low	1.86	19.02	00.0	00.0	20.9	
SVE-18			294	31.52	00.0	1.4	19.5	

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC	Date: 9/3/96	Time: 8 30
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.): 250 cfm 4 PSI	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments CH_4	CO_2	O_2	O.2 OFF
AAS-1		Heavy	—	—	00.0	00.0	21.9	
AAS-2		20	—	—	00.0	00.0	21.9	
AAS-3		Heavy	—	—	00.0	00.5	21.1	
AAS-4		60	52.3	9.58	00.0	00.7	21.7	
AAS-5		Heavy	126	13.58	00.0	1.3	21.6	
AAS-6		Heavy	—	—	00.0	00.0	23.4	
AAS-7		Heavy	—	—	00.0	00.5	20.7	
AAS-8	—	—			00.0	00.0	20.9	
AAS-9	—	—	0.18	1392	00.0	00.0	20.8	
AAS-10	—	—	1.24	685	00.0	00.3	20.6	
AAS-11	—	—	9.11	64.81	00.1	00.0	21.0	
AAS-12		Low	14.08	64.3	00.0	00.0	20.7	
AAS-13	N/A		14.96	78.2	00.2	00.0	20.8	
AAS-14	—	—	584	97.81	1.9	00.0	20.6	
AAS-15	—	—	3.74%	712	>129	6.6	12.2	
AAS-16	—	—	33.1%	1045	>129	3.2	16.0	
AAS-17	—	—	66.40	81.47	00.0	01.6	19.2	
AAS-18	—	—	4.52	55.18	00.0	00.7	20.1	

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC	Date: 9/26/96	Time:
Weather:	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
SVE-1	—	—	2.2%	215	
SVE-2	Strong	good	1.2	—	
SVE-3		~~good~~	—	—	
SVE-4			2.9	—	
SVE-5			—	—	
SVE-6			—	—	
SVE-7			—	—	
SVE-8	Strong	~~good~~	—	—	Same as SVE 9
SVE-9	—	—	—	—	Mass air flow from bottom of Vault - Vault ½ full water churning violently
SVE-10	—	—	1321	127	
SVE-11			—	—	Mass air flow out of bottom corner of
SVE-12			4.7%	137	
SVE-13			2.3%	162	
SVE-14			3.6%	414	
SVE-15			143	19.4	
SVE-16			17.1	1.3	
SVE-17			—	—	
SVE-18			3000	3.2	

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 9/11/96	Time:
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm_v)	PID TVH (ppm_v)	Comments
AAS-1	Y	Y	7.1	—	
AAS-2	Y	Y	—	—	
AAS-3		~~Strong~~ good	265	34.8	
AAS-4			4.3	—	
AAS-5			80.4	13.3	
AAS-6	Strong	good	23.2	4.1	
AAS-7	Strong	good	—	—	
AAS-8			15.6	—	
AAS-9			9.5	1.4	
AAS-10	—	—	38.3	2.2	water in Vault Boiling
AAS-11			3523	250	
AAS-12			320	32.7	
AAS-13			3.67%	156	
AAS-14		5274	~~4683~~	295	
AAS-15			4286	383	
AAS-16			4468	347	
AAS-17			45.6	1.0	
AAS-18			—	—	

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC	Date: 10/2/96	Time: 1300
Weather: 65° cloudy	Main Gauge (Pressure/Flow/Temp.): 15 lb - 200 cfm	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppmv)	PID TVH (ppmv)	Comments
SVE-1	off		11%	270	
SVE-2			1.1%	360	
SVE-3			50	2.7	
SVE-4			3000	1.87	
SVE-5			0	0	
SVE-6			0	5.1	
SVE-7			—	—	
SVE-8			25%	409	
SVE-9			1000	103	Vault Boiling
SVE-10			4300	370	Vault Boiling
SVE-11			550	52	
SVE-12			29%	300	
SVE-13			7%	170	
SVE-14			4368	214	
SVE-15			14%	400	
SVE-16			5972	58.3	
SVE-17			—	—	
SVE-18			550	45	

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 10/2/96	Time:
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm_v)	PID TVH (ppm_v)	Comments
AAS-1	off		58	1240	
AAS-2	NA	30	82	3.7	
AAS-3	NA	30	1411	104	
AAS-4	NA	100+	7.0	27.7	
AAS-5	off		0	0	
AAS-6	off		0	5.1	
AAS-7	off	—	0	6.4	
AAS-8	—	10	140	10.2	
AAS-9	—	30+	73.8	8.3	
AAS-10	—	30+	380	40.1	
AAS-11	off	—	700	80	
AAS-12	—	50+	4%	550	
AAS-13	off		28%	300	
AAS-14			800	55	
AAS-15			1200	110	
AAS-16			1963	168	
AAS-17			—	—	
AAS-18				1.2	

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC, SKC	Date: 10/8/96	Time:
Weather: overcast 50°	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
SVE-1			8400	500	
SVE-2			46.5	3.7	
SVE-3			14.3	0.0	
SVE-4			700	80.4	
SVE-5			8.7	0.0	
SVE-6			3.1	0.0	
SVE-7			0.0	0.0	
SVE-8			9.8°	757	
SVE-9			1650	155	
SVE-10			5%	650	
SVE-11			1.0%	660	
SVE-12			18%	665	
SVE-13			743.0%	390	checked twice
SVE-14			3.0%	680	
SVE-15			23.2%	640	
SVE-16			1.7%	717	
SVE-17			1780	180	
SVE-18			270	36.6	

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 10/8/96	Time:
Eastern ~~Western~~ (Pressure/Flow/Temp.): 8PSI 240cfm 230°F	Western ~~Eastern~~ (Pressure/Flow/Temp.): 8PSI 225cfm 190°F	

9PSI 260cfm 220°F

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
AAS-1			18.5	19.9	
AAS-2			8.2	0.0	
AAS-3			3368	296	
AAS-4	unknown	>100	52.0	60.6	
AAS-5	unknown	>100	4.2	0.0	
AAS-6			44	0.0	
AAS-7			0.0	0.0	
AAS-8			65.5	6.9	
AAS-9			150	15.2	
AAS-10		>30	225	17.6	
AAS-11			705	75	
AAS-12		>50	6.9%	820	
AAS-13		>50	8.0%	775	
AAS-14			38.0%	580	did twice to check FID#
AAS-15			4100	450	
AAS-16			1450	156	
AAS-17			332	32.7	
AAS-18			18.2	2.2	

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDX SYC	Date: 10/18/96	Time:
Weather: cool sunny Breezy 35°	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
SVE-1			750	61	
SVE-2			122	0.0	
SVE-3			0.0	0.0	
SVE-4			400	40.5	
SVE-5			0.0	0.0	
SVE-6			0.0	0.0	
SVE-7			0.0	0.0	
SVE-8			5000	380	
SVE-9			1550	165	
SVE-10			1900	160	
SVE-11			3%	870	
SVE-12			13%	909	
SVE-13			>40%	675	
SVE-14			3.8%	314	hole on side of vault above sponge in cuttle
SVE-15			>40%	700	
SVE-16			3.5%	850	
SVE-17			4.0	1.0	
SVE-18			0.0	0.0	

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 10/18/96	Time:
Western (Pressure/Flow/Temp.): 225cfm 8psi 190°	Eastern (Pressure/Flow/Temp.): 200cfm <1psi 140	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm)	PID TVH (ppm)	Comments
AAS-1			4	0.0	
AAS-2			0.0	0.0	
AAS-3			1000	80	
AAS-4		>100	~~7~~ 2	~~7~~ 0	
AAS-5		>100	0.0	0.0	
AAS-6			0.0	0.0	
AAS-7			0.0	0.0	
AAS-8			28	3.0	
AAS-9			30.1	4.2	
AAS-10		>30	144	16.1	
AAS-11			1000	70	
AAS-12		>50	~~4.0~~ 7%	930	
AAS-13		>50	25%	810	
AAS-14			5.5%	666	
AAS-15			8.0%	762	
AAS-16		>50	20%	760	
AAS-17			9.0	1.1	
AAS-18			0.0	0.0	

EA 5120 0794-4

Compressor C2 Tripped.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC, MDC	Date: 10/25/96	Time: 1200
Weather: Sunny, windy	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
SVE-1			5500	80	
SVE-2			0.0	8.1	
SVE-3			1.0	8.2	
SVE-4			2.0	70	
SVE-5			0.0	10	
SVE-6			0.0	16	
SVE-7			2.0	35	
SVE-8			55	5	
SVE-9			1700	30	hole near concrete vault at PVC intake
SVE-10			1.2%	50	sparging
SVE-11			1%	74	
SVE-12				620	FID & Flameout too high
SVE-13				500	FID unreadable - too high
SVE-14			8000	340	
SVE-15			[illegible]	600	FID unreadable too high Kept putting Flameout
SVE-16			2%	650	
SVE-17			0.0	0.0	
SVE-18			0.0	13	

EA 5120 0794-4

System was [illegible] upon arrival. Restarted compressor [illegible]. Other two would not start (CB and CB3)

FID reading was not recorded. Before the # stabilized flame went out and we could not get a reading

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 10/25/96	Time:
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
AAS-1			8	0	Strong swamp odor
AAS-2			0	7	
AAS-3			7	10	
AAS-4			0.0	9	
AAS-5			0.0	10	
AAS-6			40	17	
AAS-7			0.0	22	
AAS-8			5	0	
AAS-9			20	2	
AAS-10			110	4	
AAS-11			49	2	
AAS-12			8%	380	
AAS-13				600	FID unreadable
AAS-14			400	31	
AAS-15			500	43	
AAS-16		>50	7200	490	
AAS-17		>50	22	0	
AAS-18			0.0	6	

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: [illegible]	Date: 11/1/96	Time:
Weather: Overcast, 45°	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
SVE-1			105	10	
SVE-2			0	0	
SVE-3			0	0	
SVE-4			3	0	
SVE-5			0	0	
SVE-6			2	0	
SVE-7			0	0	
SVE-8			6200	330	
SVE-9			3.5%	450	sink hole by concrete vault sparging
SVE-10			11%	200	sparging
SVE-11			5000	300	
SVE-12			3%	180	
SVE-13			1250	140	
SVE-14			3%	400	sink hole near concrete vault
SVE-15			6%	440	
SVE-16			1%	400	
SVE-17			0	1	
SVE-18			0	0	

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 11/1/96	Time:
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
AAS-1			0	0	
AAS-2			0	0	
AAS-3			0	1	
AAS-4			0	0	
AAS-5			1	0	
AAS-6			0	0	
AAS-7			0	0	
AAS-8			25	7	
AAS-9			44	7	
AAS-10			150	18	
AAS-11			88	11	
AAS-12		7	1750	160	
AAS-13		7	11%	400	
AAS-14			1.4%	360	
AAS-15			5025	270	
AAS-16		7 30	1.2%	450	
AAS-17		7 30	8	1	
AAS-18			0	0	

EA 5120 0794-4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC MDC	Date: 11/8/96	Time: 1300
Weather: windy overcast 60	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
SVE-1			3	0	
SVE-2			0	0	
SVE-3			0	0	
SVE-4			0	0	
SVE-5			0	0	
SVE-6			0	0	
SVE-7			1	0	
SVE-8			620	52	
SVE-9			6500	570	hole by vault horizontal line getting bigger
SVE-10			725%	660	
SVE-11			3290	305	
SVE-12			2.8%	900	
SVE-13			15%	860	
SVE-14			0.7%	520	hole by vault horizontal line
SVE-15			4%	880	
SVE-16			9000	600	
SVE-17			1	0	
SVE-18			0	0	

IF+X/F 16ii

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 11/5/96	Time:
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm_v)	PID TVH (ppm_v)	Comments
AAS-1			0	0	
AAS-2			0	0	
AAS-3			0	0	
AAS-4			0	0	
AAS-5			0	0	
AAS-6			0	0	
AAS-7			0	0	
AAS-8			28	0	
AAS-9			45	1	
AAS-10			120	10	
AAS-11			1.3%	650	
AAS-12			3550	330	
AAS-13			6.5%	870	
AAS-14			1.1%	450	
AAS-15			5600	350	
AAS-16			1.6%	800	
AAS-17			0	0	
AAS-18		Z	0	0	

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EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MOC SYC	Date: 11/13/96	Time:
Weather: Sunny, 35°	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
SVE-1			10	0	
SVE-2			0	0	
SVE-3			0	0	
SVE-4			0	0	
SVE-5			0	0	
SVE-6			0	0	
SVE-7			0	0	
SVE-8			2,000	125	
SVE-9			2365	200	Sparging inside vault - [illegible]
SVE-10			>25%	550	Sparging inside vault
SVE-11			3000	216	
SVE-12			2.4%	640	
SVE-13			2%	475	
SVE-14			1.4%	160	hit by concrete vault
SVE-15			3.1%	570	
SVE-16			6,724	370	
SVE-17			0	0	
SVE-18			0	0	

EA 5120 0794-4

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC, SYC	Date: 11/13/96	Time:
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm_v)	PID TVH (ppm_v)	Comments
AAS-1			0	0	
AAS-2			0	0	
AAS-3			0	0	
AAS-4			0	0	
AAS-5			0	0	
AAS-6			0	0	
AAS-7			0	0	
AAS-8			57	6	
AAS-9			55	7	
AAS-10			155	18	
AAS-11			3.3%	560	
AAS-12		>30	3875	267	
AAS-13		>30	5.7%	555	
AAS-14			1.5%	460	
AAS-15			1.7%	440	
AAS-16		>30	1.1%	500	FLAPPING
AAS-17			0	0	
AAS-18			0	0	

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EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: SYC	Date: 7/25/96	Time:
Weather: 40 snowing [illegible]	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
SVE-1			1	1	
SVE-2			0	0	
SVE-3			0	0	
SVE-4			56	25	
SVE-5			0	0	
SVE-6			0	0	
SVE-7			0	0	
SVE-8			48	23	
SVE-9			24	14	hole by concrete vault
SVE-10			420	197	
SVE-11			176	80	
SVE-12			1761	600	
SVE-13			2228	858	
SVE-14			1.2%	1165	hole by concrete vault
SVE-15			4320	780	
SVE-16			950	377	
SVE-17			0	0	
SVE-18			0	0	

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* pipe out of building to west side came apart. Blowing into air.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel:	Date: 11/25/96	Time:
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm_v)	PID TVH (ppm_v)	Comments
AAS-1			0	0	
AAS-2			0	0	
AAS-3			114	41	
AAS-4			14	4	
AAS-5			0	0	
AAS-6			0	0	
AAS-7			0	0	
AAS-8			13	6	
AAS-9			17	8	
AAS-10			59	19	
AAS-11			220	106	
AAS-12			1040	398	
AAS-13		730	9880	950	
AAS-14			1404	414	
AAS-15			2310	590	
AAS-16		730	1770	620	
AAS-17			0	0	
AAS-18			0	0	

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EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: JAC, MDC	Date: 12/4/96	Time: 0930
Weather: 32°/Light wind/cloudy	Main Gauge (Pressure/Flow/Temp.): N/A	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
SVE-1	X	X	76.0	1.0	
SVE-2			2.0	0.0	
SVE-3			2.0	0.0	
SVE-4			31.0	4.0	
SVE-5			0.0	0.0	
SVE-6			1.0	0.0	
SVE-7			0.0	0.0	
SVE-8			72.0	10.0	
SVE-9			N/A	N/A	water filled vault no data
SVE-10			3.5%	76.0	
SVE-11			1910	780	
SVE-12			1400	162	
SVE-13			1870	156	
SVE-14			1%	650	
SVE-15			1%	653	
SVE-16			1395	189	
SVE-17			0.0	0.0	
SVE-18	X	X	0.0	0.0	

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FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: JAC MDC	Date: 12/4/96	Time: 0930
Western (Pressure/Flow/Temp.): —	Eastern (Pressure/Flow/Temp.): —	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
AAS-1	X	X	0.0	0.0	
AAS-2			2.7	0.0	
AAS-3			9.0	1.0	
AAS-4			36.0	5.0	
AAS-5			14.0	0.0	
AAS-6			1.0	0.0	
AAS-7			0.0	0.0	
AAS-8			7.0	1.0	
AAS-9			1.0%	62.0	
AAS-10			263.0	6.0	
AAS-11			36.0	8.0	
AAS-12			2.8%	186	
AAS-13			4350	517	
AAS-14			4920	308.0	
AAS-15			320	46.0	
AAS-16			358	72.8	
AAS-17			2.8	0.0	
AAS-18	X	X	0.0	0.0	

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EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC	Date: 12/19	Time: 1100
Weather: 40° Raining	Main Gauge (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm$_v$)	PID TVH (ppm$_v$)	Comments
SVE-1			0	0	
SVE-2			0	0	
SVE-3			0	0	
SVE-4			480	13	
SVE-5			0	6	
SVE-6			0	0	
SVE-7			0	0	
SVE-8			2	12	
SVE-9			4	32	Hole down side of vault near pipe
SVE-10			220	140	
SVE-11			4	17	
SVE-12			10	32	
SVE-13			70	96	
SVE-14			303	~~478~~	300 Hole near ~~pipe~~ pipe line
SVE-15			318	470	
SVE-16			30	100	
SVE-17			0	0	
SVE-18			0	0	

EA 5120 0794-4

Entire western Half sparging, the water lying on the ground is boiling.

Eastern side is not as active but some activity.
Most activity around the South west area.
Water lying in the divider road sparging 3"-4" high in some areas.

FIELD RECORD OF BIOSPARGING SYSTEM OPERATIONS
Brunswick Naval Air Station Fuel Farm Biosparging System

EA Personnel: MDC	Date: 12/18/96	Time:
Western (Pressure/Flow/Temp.):	Eastern (Pressure/Flow/Temp.):	

Location	Pressure (psi)	Flowrate (cfm)	FID TVH (ppm,)	PID TVH (ppm,)	Comments
AAS-1			0	0	
AAS-2			0	0	
AAS-3			0	0	
AAS-4			0	0	
AAS-5		on	600	14	
AAS-6			0	0	
AAS-7			0	0	
AAS-8			4	28	
AAS-9			2	25	
AAS-10			2	30	
AAS-11			0	0	
AAS-12			10	36	
AAS-13			400	530	
AAS-14			1%	470	
AAS-15			35	77	
AAS-16			30	103	
AAS-17			0	0	
AAS-18			0	0	

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AAS 16 - ground sparging