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U.S. Army Corps of Engineers
New England Division

FINAL
NO FURTHER ACTION DECISION UNDER CERCLA AREA REQUIRING ENVIRONMENTAL EVALUATION 63BE BUILDING 2290 FORMER UST SITE

DEVENS, MASSACHUSETTS

CONTRACT NO DACA33-91-D-0006
DELIVERY ORDER NO. 25

MAY 1998

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ABB Environmental Services, Inc.

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FINAL
NO FURTHER ACTION DECISION UNDER CERCLA

AREE 63BE
BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

Prepared for:

U.S. Army Corps of Engineers
New England Division
Waltham, Massachusetts

Prepared by:

Harding Lawson Associates
(formerly ABB Environmental Services, Inc.)
Wakefield, Massachusetts
Project No. 7137.00

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EXECUTIVE SUMMARY

Investigations of and remedial actions at Area Requiring Environmental Evaluation 63BE (Building 2290 Former Underground Storage Tank Site) at the former Fort Devens, Massachusetts, have resulted in the decision that no further hazardous waste studies or remediation are required at this site. Area Requiring Environmental Evaluation 63BE was identified as a potential site of contamination.

On December 21, 1989, Fort Devens was placed on the National Priorities List under the Comprehensive Environmental Response, Compensation and Liability Act as amended by the Superfund Amendments and Reauthorization Act. In addition, under Public Law 101-510, the Defense Base Realignment and Closure Act of 1990, Fort Devens was selected for cessation of operations and closure. In accordance with these acts, numerous studies, including a Short Term Remedial Measure, a Supplemental Site Evaluation, a Soil Removal Action, and a Phase III Site Investigation have been conducted at Area Requiring Environmental Evaluation 63BE.

Building 2290 was located in the central portion of the Main Post near Queenstown, Givry, and Quebec Streets in Harvard, Massachusetts. A leaking underground storage tank (Tank 28) located on the southwest side of the building was removed in January 1992 by ATEC Environmental Consultants as part of a Short Term Remedial Measure. ATEC excavated petroleum-contaminated soil during the tank removal, excavated additional soil in August 1992, and backfilled the excavation. Building 2290 was demolished in 1994.

Under the Fort Devens *Underground Storage Tank Removal Protocol*, the Tank 28 site was designated a "beyond localized release site". The site was incorporated into Area Requiring Environmental Evaluation 63 (Previously Removed Underground Storage Tanks), a group of sites where underground storage tanks had caused contaminant releases into the environment.

Harding Lawson Associates (formerly ABB Environmental Services, Inc.) conducted a Supplemental Site Evaluation in 1993 - 1994. Total petroleum hydrocarbons were detected in soil samples, but were not detected in groundwater. Semivolatile organic compounds were detected in soil samples and at low concentrations in contamination due to historical oil spills or releases of petroleum has caused significant environmental contamination or poses a threat to human health or the environment. The decision has been made to remove Area Requiring Environmental Evaluation 63BE from further consideration in the Installation Restoration Program process.

1.0 INTRODUCTION

This document has been prepared to support a no further action decision at Area Requiring Environmental Evaluation (AREE) 63BE, Building 2290 Former Underground Storage Tank (UST) Site, at the former Fort Devens, Massachusetts. The report was prepared as part of the U.S. Department of Defense (DOD) Base Realignment and Closure (BRAC) program to assess the nature and extent of contamination associated with site operations at Fort Devens.

In conjunction with the Army's Installation Restoration Program (IRP), Fort Devens and the U.S. Army Environmental Center (USAEC, formerly the U.S. Army Toxic and Hazardous Materials Agency) initiated a Master Environmental Plan (MEP) in 1988. The MEP assesses the environmental status of study areas (SAs), specifies necessary investigations, and provides recommendations for response actions with the objective of identifying priorities for environmental restoration at Fort Devens. On December 21, 1989, Fort Devens was placed on the National Priorities List under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act.

An Enhanced Preliminary Assessment (PA) was performed at Fort Devens to address areas not normally included in the CERCLA process, but requiring review prior to closure. A final version of the Enhanced PA report was completed in April 1992. In addition to the SAs identified in the MEP, the Enhanced PA identified ten facility-wide AREEs. AREE 63 comprises previously removed USTs. In 1993, DOD (through USAEC) initiated a BRAC Environmental Evaluation (BRAC EE) to identify locations at Fort Devens where USTs had caused releases of contaminants into the environment. The BRAC EE for AREE 63 sites was conducted by Arthur D. Little, Inc., and originally included 53 sites. The Building 2290 UST site was added to the AREE 63 grouping after the original list was published.

Under Public Law 101-510, the Defense Base Realignment and Closure Act of 1990, Fort Devens was selected for cessation of operations and closure. AREE 63BE is located within an area which will be transferred to the Massachusetts Development Finance Agency for potential development of innovation and technology business

2.0 BACKGROUND AND PHYSICAL SETTING

2.1 DESCRIPTION AND LAND USE

Fort Devens is located approximately 35 miles northwest of Boston, Massachusetts, adjacent to the town of Ayer and within Middlesex and Worcester counties. The former installation consists of approximately 9,280 acres and includes portions of the towns of Ayer, Harvard, Lancaster, and Shirley. Cities in the vicinity include Fitchburg, Leominster, and Lowell. Land surfaces range from about 200 feet (ft) above mean sea level (MSL) along the Nashua River in the northern portion of the installation to 450 feet above MSL in the southern portion of the installation.

Fort Devens was established in 1917 as Camp Devens, a temporary training camp for soldiers from the New England area. In 1931, the camp became a permanent installation and was redesignated as Fort Devens. Throughout its history, Fort Devens served as a training and induction center for military personnel and a unit mobilization and demobilization site. All or portions of this function occurred during World Wars I and II, the Korean and Vietnam conflicts, and operations Desert Shield and Desert Storm. The most recent mission of Fort Devens was to command and train its assigned units and support various tenant activities. Fort Devens closed on March 31, 1996, in accordance with the Defense Base Realignment and Closure Act.

Fort Devens consists of three major land use areas: Main Post, South Post, and North Post.

The majority of the facilities on Fort Devens were located in the Main Post area, north of Massachusetts Route 2. The Nashua River intersects the Main Post along its western edge. The Main Post provided all of the on-post housing, including over 1,700 family units and 9,800 bachelor units (barracks and unaccompanied officer's quarters). Other facilities on the Main Post included community support activities (such as a cafeteria, post exchange, commissary, bowling alley, and golf course), administrative buildings, classrooms and training facilities, maintenance facilities, and ammunition storage facilities. AREE 63BE is located on the Main Post (Figure 2-1).

installation. The primary hydrogeologic feature at Fort Devens is the Nashua River, which flows through the installation in a south to north direction, with an average discharge rate of 55 cubic feet per second. In addition to the Nashua River, numerous brooks that are associated with attendant wetlands dissect the terrain. There are also several kettle ponds and one kettle lake located within the installation.

2.4 STUDY AREA DESCRIPTION AND HISTORY

Building 2290, Former UST Site, was located in the central portion of the Main Post on an unnamed road near Queenstown, Givry, and Quebec Streets (Figure 2-2). Building 2290 was historically used as a mess hall, but was more recently used for equipment storage. The building was demolished in 1994. A 1,000-gallon UST that was located on the southwest side of Building 2290 was used to store No. 2 fuel oil.

According to the *Devens Reuse Plan*, AREE 63BE is located within a parcel of land designated for Innovation and Technology Business uses (Vanasse Hangen Brustlin, Inc., 1994).

Soils at AREE 63BE range from poorly graded sand at a depth of approximately 4 feet to sandy clay and silt and occasional bouldery gravel at depths of over 9 feet. The shallow soil is most likely artificial fill placed at the time of building construction. The deeper soils are generally sandy silt with cobbles and with zones of sand and gravel. They were tentatively classified in the field as till, but may include weathered argillaceous bedrock of the Oakdale Formation. The contact between artificial fill and underlying native soils is not distinct, possibly in part because of reworking of the till during construction (ABB Environmental Services [ABB-ES], 1996b). In this area of the Main Post, Jahns (1953) mapped ground moraine (till) overlying shallow bedrock.

The local bedrock weathers to cohesive soils that resemble the till. The thickness of the weathered zone in the Oakdale Formation at Fort Devens ranges from less than a foot to several feet, apparently representing compositional differences in the parent rock (ABB-ES, 1996b). At AREE 63BE, bedrock was encountered at depths ranging from approximately 14 to 17 ft below ground surface (bgs), and appears to dip steeply southeastward. However, this interpretation of bedrock is complicated by conditions observed during the Supplemental Site Evaluation (ABB-ES, 1996a),

3.0 RELATED INVESTIGATIONS

3.1 MASTER ENVIRONMENTAL PLAN

AREE 63, Previously Removed Underground Storage Tanks, is a facility-wide AREE that was not identified in the MEP.

3.2 ENHANCED PRELIMINARY ASSESSMENT

The Enhanced PA included a review of the study and recommendations presented in the MEP, and considered other areas that might require evaluation due to the closure of Fort Devens. During development of the Enhanced PA, several AREEs were identified. AREE 63 was identified as Previously Removed Underground Storage Tanks, and originally included 53 areas. For each of the 53 sites, the Enhanced PA recommended that spill records be consolidated and all documentation be reviewed to determine the adequacy of cleanup. The Enhanced PA further recommended that site inspections and interviews be conducted, and that a sampling program be developed based on the information collected (Roy F. Weston, Inc., 1992). The UST at Building 2290 was added to the list of AREE 63 sites after the Enhanced PA was published.

3.3 BASE REALIGNMENT AND CLOSURE ENVIRONMENTAL EVALUATION REPORT

The BRAC EE was initiated in 1993 and included four of the facility wide AREEs listed in the Enhanced PA, and one AREE that was not previously identified (AREE 70):

- AREE 61 Maintenance and Waste Accumulation Areas
- **AREE 63 Previously Removed Underground Storage Tanks**
- AREE 66 Transformers
- AREE 69 Past Spill Sites
- AREE 70 Storm Sewer System Survey

The purpose of the AREE 63 BRAC EE, which was conducted by Arthur D. Little, Inc. under contract with the USAEC, was to identify locations where USTs had caused releases of contaminants into the environment. The Previously Removed

(MADEP). Figure 3-1 shows the final excavation limit. The excavation was enlarged to an area 18 by 25 feet and to a depth of 9.5 feet. Soil samples were collected in three rounds and were field-screened for VOCs in headspace. The VOC field screening results were used to guide the extent and direction of remedial soil removal. Six confirmatory soil samples were collected from the final excavation for laboratory analysis of TPH (Method 418.1) and VOCs (Method 8240). Analytical results are shown on Table 3-1. TPH was detected in the bottom of the excavation at concentrations of 4,840 μg/g and 4,030 μg/g. Ethylbenzene was also detected in one of the bottom samples, at a concentration of 0.030 μg/g (ATEC, 1993).

ATEC lined the tank excavation with polyethylene sheeting and backfilled it with uncontaminated fill material (ATEC, 1993). One waste characterization sample was collected from the contaminated soil stockpile and submitted for the following analyses: VOCs, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), reactive cyanide, reactive sulfide, flashpoint, corrosivity, and 13 TCLP metals. All contaminated soil (135.50 cubic yards) was ultimately disposed of for recycling at Trimount Bituminous Product Company in Shrewsbury, Massachusetts.

On September 30, 1992, Geosearch, Inc. (under subcontract to ATEC) installed three monitoring wells at the site (Figure 3-1). Groundwater was encountered at approximately 9 to 10.5 feet in the wells, and ATEC concluded that groundwater flows southward at the site. Groundwater samples were collected by ATEC from all three wells and were submitted to an off-site laboratory for analysis for TPH by NDIR (Method 418.1). TPH was not detected in wells 2290W-01X and 2290W-02X, but was detected at 12,000 micrograms per liter (μg/L) in well 2290W-03X (ATEC, 1993). Groundwater analytical results are summarized in Table 3-1.

3.5 SUPPLEMENTAL SITE EVALUATION METHODOLOGY

On the basis of the conditions reported by ATEC, the Fort Devens Environmental Management Office (EMO) identified the site of Tank 28 as a suspected "beyond localized release site" (BLRS), as defined in the Fort Devens *Underground Storage Tank Removal Protocol* (EMO, 1992). Under contract to the USACE NED, HLA conducted a supplemental site evaluation (SSE) of AREE 63BE in 1993 and 1994 (ABB-ES, 1996a, Section 6).

3.6 PHASE III SITE INVESTIGATION METHODOLOGY

In September 1995 HLA (formerly ABB-ES), under contract to NED, began a Phase III Site Investigation in order to delineate the extent of petroleum contamination associated with the former UST at Building 2290 (ABB-ES, 1996b). The Phase III field program at AREE 63BE included the following activities:

- GPR survey to clear drilling locations;
- Installation of twelve soil borings, and subsurface soil sampling;
- Field screening of soil samples for TPH;
- Installation and development of monitoring wells in four of the twelve boreholes (existing wells 2290W-01X through 2290W-03X were destroyed during soil removal in 1994);
- Five rounds of groundwater sampling;
- Elevation and location survey of borings and monitoring wells;
- Laboratory analysis of selected soil samples for SVOCs and TPH; and
- Laboratory analysis of groundwater samples for SVOCs, TPH, and/or extractable petroleum hydrocarbons (EPH).

Field activities were conducted between September 1995 and December 1997. Exploration locations are shown on Figure 3-3.

Twelve soil borings (2290B-21X through 2290B-28X and 2290W-11X through 2290W-14X) were installed at locations selected based on previously encountered soil contamination. Using split spoon samplers, subsurface soil samples were collected at 5-foot intervals until either the water table or bedrock refusal was encountered. All soil samples were field screened for TPH by NDIR, and one sample from each boring was submitted to an off-site laboratory for SVOCs (Method 8270) and TPH by NDIR (Method 418.1) analyses. A 5 5/8-inch rollerbit was used to advance boring 2290W-11X into bedrock from 14 to 15 feet bgs, but bedrock was not drilled elsewhere as part of this investigation.

3.7 PRELIMINARY RISK EVALUATION METHODOLOGY

A preliminary risk evaluation (PRE) was performed at AREE 63BE as part of the Phase III Site Investigation (ABB-ES, 1996b) to establish whether environmental contamination will require one of the following actions:

- Nomination for closure (no further action under CERCLA)
- Additional soil removal
- Additional site investigations

HLA completed the PRE, which evaluated contamination in subsurface soil and groundwater. The methodology used to conduct the human health risk evaluation is described below in Section 3.7.1. An ecological risk evaluation was not conducted at AREE 63BE, for reasons described in Section 3.7.2.

3.7.1 Preliminary Human Health Risk Evaluation

This section presents the general approach used in conducting the human health PRE; the findings of the PRE are presented in Section 5.

Human health PREs are screening level evaluations that involve a comparison of readily available health standards and guidelines to the concentrations of contaminants detected in the vicinity of the former UST site. These standards and guidelines can be used as screening criteria to evaluate the health risks associated with exposure to residual contamination at the site. The human health PRE at AREE 63BE included the following elements:

Current and Future Land Use: Current and future land uses are particularly relevant with respect to the applicability of soil and groundwater screening values used in the PRE. According to the *Devens Reuse Plan* (Vanasse Hangen Brustlin, Inc., 1994), the planned future land use at AREE 63BE is "Innovation and Technology Business". Because this anticipated future use is industrial in nature, detected compounds were compared to United States Environmental Protection Agency (USEPA) Region III risk-based concentrations (RBCs) for commercial/industrial soil, MADEP Massachusetts Contingency Plan (MCP) Method 1 /GW-1 soil and groundwater standards, and federal and Massachusetts drinking water standards and guidelines.

USEPA Region III Risk-Based Concentration Table. This table is a risk-based screening tool for Superfund sites, used by USEPA Region III toxicologists as a benchmark for evaluating preliminary site investigation data and preliminary remediation goals (USEPA, 1995). Although it has no official status either as regulation or guidance, it is a useful screening tool. The table is updated semi-annually, and therefore regularly incorporates new USEPA toxicity constants as they are developed. The PRE used the January to June 1995 update (USEPA, 1995). Although more recent updates have been issued (October 1997), none of the relevant risk-based soil concentrations have changed since the January to June 1995 update.

For subsurface soil in the UST graves, USEPA Region III RBCs for commercial/industrial soil exposures were used for comparison. Subsurface soil was defined, for the purposes of this PRE, as soil between 3 ft and 15 ft in depth; exposure is considered possible to a depth of 15 feet. This is consistent with the MCP, in which subsurface soil to a depth of 15 feet is defined as accessible or potentially accessible whereas soil below 15 feet is defined as isolated.

The Region III RBCs for commercial/industrial soil have been developed to be protective of a worker who incidentally ingests soil 250 days per year for 25 years, at an ingestion rate of 100 milligrams/day.

Massachusetts Contingency Plan Method 1 Soil Standards. Health-protective soil standards categories were established by the MADEP for use in risk characterization (MADEP, 1995). For assumed future commercial/industrial use, soil concentrations were compared to the lowest of the Method 1 /GW-1, /GW-2, or /GW-3 soil standards. The category indicates high adult use of the area and minimal use of the area by children. For isolated soil (soil at a depth of over 15 feet), the lowest of the S-3/GW-1, S-3/GW-2, or S-3/GW-3 soil standards were used. For a Method 1 Risk Characterization under the MCP, compliance with the appropriate Method 1 soil standards constitutes a demonstration of no significant health risk from exposure to oil or hazardous material in soil.

Risk-Based Concentration for Diesel Oil (HLA, formerly ABB-ES). To evaluate the significance of the TPH concentration data in subsurface soil, HLA calculated a risk-based concentration for diesel oil using the same

4.0 CONTAMINATION ASSESSMENT

AREE 63BE analytical results are discussed in the following paragraphs. Discussions of the analytical results are also included in the SSE Report (ABB-ES, 1996a) and the Phase III Site Investigation Report (ABB-ES, 1996b).

4.1 SUPPLEMENTAL SITE EVALUATION RESULTS

During the AREE 63BE Supplemental Site Evaluation, HLA (formerly ABB-ES) collected soil samples from TerraProbe(TM) points and a soil boring for field screening for TPH and total VOCs, and/or laboratory analysis of VOCs, SVOCs, and TPH. HLA also submitted groundwater samples to a laboratory for VOCs, SVOCs, and TPH analyses (ABB-ES, 1996a). Analytical results are summarized below.

4.1.1 Soils

Soil samples collected from the five TerraProbe(TM) points and one soil boring were field-screened for TPH and total VOCs in soil jar headspace. Soil screening results are presented on Figure 4-1 and in Tables 4-1 and 4-2. The highest TPH concentrations were detected generally in the 9- to 10-foot depth interval (TerraProbe(TM) samples) and in the 10- to 12-foot depth interval (soil boring sample). Fuel odors were observed throughout the sampled intervals.

Two soil samples (from the 10-ft and 15-ft depth intervals) from boring 2290B-01X were submitted to the contract laboratory for TPH, VOCs, and SVOCs analyses. TPH was detected in both samples at 1,460 μg/g (10-ft) and at 500 μg/g (15-ft). Methylene chloride and acetone were detected in both samples, but are believed to be laboratory contaminants. Ethylbenzene was detected at a concentration below the sample quantitation limit in the 15-ft sample. SVOCs were detected in both samples (ABB-ES, 1996a). Soil analytical results are shown on Figure 4-2 and in Table 4-3.

compliance with these soil standards constitutes a demonstration of no significant health risk from exposure to oil or hazardous material in soil. Category S-1 has the greatest potential for exposure. At the time of the AREE 63BE soil removal action, the S-1 soil standard for TPH was 500 $\mu g/g$. This value was selected as the target cleanup goal for the removal action.

4.2.2 Field Observations and Screening Results

In September 1994, OHM began excavating more petroleum-contaminated soil at AREE 63BE. Because contaminated soil was found to extend beneath Building 2290, the building was demolished during the removal action. The excavation encompassed the area where the three monitoring wells had been installed in 1992 by Geosearch, as well as the entire area included in the subsurface explorations of the SSE conducted by HLA.

Using the 500 $\mu g/g$ clean-up goal for TPH, OHM removed approximately 2,500 cubic yards of soil to depths of approximately 13 to 15 feet bgs. Soil samples were continually collected from the excavation walls and base for field screening analysis for TPH. Field screening results were used direct the excavation. Bedrock was encountered in the southeastern part of the excavation, and groundwater seepage into the excavation required dewatering.

The excavation was discontinued when it became apparent that TPH concentrations in excess of 500 $\mu g/g$ were present beneath the adjacent streets (OHM, 1995). The final excavation limit is shown on Figure 4-4.

4.2.3 Soil Sampling Program

In December 1994 OHM undertook a soil boring program to assess the extent of petroleum contamination. Ten borings (IB-1 through IB-10) were drilled to total depths ranging from 10 feet to 17 feet bgs (Figure 4-4). Continuous split-spoon soil samples were collected and were screened on site for TPH, and one sample from each boring was sent for off-site confirmatory analysis of TPH using Method 418.1. Field screening and confirmatory analytical results are presented in Table 4-5.

TPH was not detected north of the former tank location (borings IB-1 through IB-4), but was present in all of the other OHM borings. TPH was detected in soil at depths ranging from 7 to 17 ft bgs. The highest concentrations were generally also in the 9- to 11-foot bgs sample from boring 2290B-23X. All other TPH detections were at concentrations less than 50 μg/g. These off-site laboratory TPH results are consistent with the field analytical results (ABB-ES, 1996b).

Collectively, the soil sampling results indicate that the farthest extent of residual petroleum contamination is between borings 2290B-23X and 2290B-27X (at a depth of 9 to 11 feet bgs) and between borings IB-7 and 2290B-22X (at a depth of 9 to 13 feet bgs). The approximate limit of residual petroleum contamination in soil at AREE 63BE is shown on Figure 4-5.

4.3.2 Groundwater

Water level measurements taken on December 7, 1995 indicate that groundwater flow at the site is to the southeast (Figure 4-7).

Round 1 groundwater samples were collected from all four Phase III monitoring wells on October 24 and 25, 1995. One Round 2 groundwater sample was collected on January 18, 1996, from monitoring well 2290W-14X. Groundwater samples were collected from all four wells on March 4 and 5, 1996 (Round 3), on March 12, 1997 (Round 4), and on December 19, 1997 (Round 5). All samples from Rounds 1 through 4 were analyzed for TPH by NDIR (Method 418.1). For comparison, and to provide petroleum hydrocarbon data that can be used for health risk assessment, the Rounds 2, 3, 4, and 5 groundwater samples were analyzed for EPH (MADEP, 1998). EPH is considered a more accurate measure of petroleum hydrocarbon concentrations and is not subject to the interferences that can affect NDIR spectroscopy. Round 1 samples were also submitted for SVOCs analysis, and Round 5 samples were also submitted for PAHs (Method 8270 with SIM). As part of Round 5, one split sample was also submitted to the USACE NED Environmental Engineering and Geology Section for CQA analyses of EPH (MADEP) and PAHs (Method 8270 with SIM).

Analytical results for all five groundwater sampling rounds are summarized on Figure 4-6 and in Tables 4-8 through 4-12. Complete analytical results of sampling Rounds 1, 2, and 3 are presented in the Phase III Site Investigation Report (ABB-ES, 1996b). Complete analytical results of sampling Rounds 4 and 5 are provided in this report as Appendix A. The USACE NED Chemical Quality Assurance Report is provided as Appendix B.

nonfilterable suspended matter or plant material, which can produce a response. No petroleum odors or VOCs were detected at any of the well heads, and no petroleum odors were observed in the samples. It is also notable that the samples from wells 2290W-13X and 2290W-14X, which had similar reported concentrations of EPH fractions, had very different TPH concentrations. The same comparison is true of the sample and duplicate sample from well 2290W-14X. This would suggest that the TPH concentrations reflect interferences rather than the presence of petroleum compounds.

No PAHs were detected in any of the Round 5 samples, and none of the EPH hydrocarbon fractions were reported. The CQA Report (Appendix B) confirmed that no EPH or PAH compounds were present in the split sample.

5.0 PRELIMINARY HUMAN HEALTH RISK EVALUATION

A preliminary human health risk evaluation was performed for AREE 63BE as part of the Phase III SI. The PRE provides a screening-level evaluation of the actual and potential risks that environmental contaminants pose to persons at the site. The PRE evaluated residual contamination in subsurface soil and groundwater associated with former UST 28 (a No. 2 fuel oil tank). Findings of the PRE are presented in the Phase III Site Investigation report (ABB-ES, 1996b), and are summarized below.

5.1 SOILS

The human health PRE compared detected concentrations of each analyte to published risk-based concentrations or regulatory standards and guidelines. The PRE evaluated both soils that are considered accessible under a commercial/ industrial scenario (which includes soils at depths of up to 15 ft), and soils that are considered inaccessible (soils at depths of over 15 ft).

5.1.1 Accessible Soils

For accessible soils, the PRE compared detected concentrations of each analyte to MCP Method 1 /GW-1 standards and USEPA Region III RBCs for commercial/ industrial exposure. The PRE evaluated field screening results of subsurface soil samples collected by HLA (formerly ABB-ES) at four monitoring well locations (2290W-11X through 2290W-14X) and eight soil boring locations (2290B-21X through 2290B-28X). The PRE also evaluated subsurface soil samples collected by OHM at ten locations (IB-1 through IB-10). Sample depths ranged from 5 to 15 ft bgs.

Table 5-1 presents summary statistics calculated in the PRE. TPH was detected in 21 of 85 screening samples, at concentrations ranging from an average of 143 μg/g to a maximum of 1,900 μg/g. Both the average and maximum TPH concentrations are below the calculated commercial/industrial soil concentration of 16,360 μg/g for No. 2 fuel oil (using diesel oil as a surrogate and USEPA exposure assumptions).

2290W-14X. The maximum detected concentration, 2 μg/L, was below the federal drinking water standard of 6 μg/L and the Massachusetts drinking water guideline of 6 μg/L. TPH was detected in Round 1 samples at concentrations ranging from 0.4 to 1.7 mg/L. However, these concentrations are not presented in Table 5-2 because analysis by NDIR often causes interferences and can present false positive results. To eliminate this problem in subsequent sampling rounds, TPH analyses were conducted using the MADEP method for EPH analysis. Round 2 results are not presented in Table 5-2 because only one monitoring well out of four was sampled and more recent data for all four monitoring wells were collected. Results from Round 3, in which all four wells were sampled, are presented on the table (ABB-ES, 1996b). EPH (C_{19} - C_{36} aliphatic range) was detected in two of the four monitoring wells (2290W-13X and 2290W-14X). The average concentration (44 μg/L) and the maximum concentration (135 μg/L) were both below the MCP GW-1 standard of 5,000 μg/L for C_{19} - C_{36} aliphatic hydrocarbons (MADEP, 1998).

5.3 QUALITATIVE EVALUATION OF RESIDUAL RISK

The maximum detected concentration of TPH in soil and EPH in Rounds 1, 2, 3, and 5 groundwater samples are below the applicable MCP standards for TPH, and below the calculated commercial/industrial soil concentration for No. 2 fuel oil. Based on the findings of this PRE, residual contamination in the vicinity of UST 28 does not appear to present unacceptable human health risks. Because there are no ecological habitats or receptors present at the site, residual contamination does not present unacceptable risks to the environment.

6.0 CONCLUSIONS

No further action is recommended for AREE 63BE. This recommendation is based on historical site use as confirmed by physical observations, sampling, and chemical analysis.

Analytical results of soil samples collected from the former UST area at Building 2290 suggested that a release of oil may have occurred resulting in soil contamination. TPH concentrations in subsurface soil were above the respective action levels, prompting a removal action. The UST and associated contaminated soil were removed in 1992, and additional contaminated soil was removed during the 1994 soil removal action. Although residual soil contamination extends a maximum of approximately 90 feet southeast of the remedial excavation, concentrations of TPH in all of the soil samples collected are below applicable screening levels. The SVOC 2-methylnaphthalene, which exceeded its MCP /GW-1 standard in one of twelve soil samples, is the only analyte which exceeded health-based screening guidelines.

The results of five rounds of groundwater sampling and analysis at AREE 63BE indicate no unacceptable risks. Slight exceedances in the EPH C_{10}-C_{22} range in Round 4 appear to be an artifact of blank contamination. This conclusion is supported by the fact that no analytes were detected in the subsequent Round 5 samples. The collective results of five rounds of groundwater sampling and analysis indicate that SVOCs, TPH and EPH concentrations in groundwater are below applicable risk screening levels. No significant residual risks to human health or the environment exist at AREE 63BE.

7.0 DECISION

With the removal of significantly contaminated soil from Building 2290 Former UST Site and a determination of no residual risk, there is no evidence or reason to conclude that residual hazardous waste contamination due to past activities at the site has caused significant environmental contamination or poses a threat to human health or the environment. The decision has been made to remove AREE 63BE from further consideration in the IRP process. In accordance with CERCLA 120 (h) (3), all remedial actions necessary have taken place, and the USEPA and MADEP signatures constitute concurrence in accordance with the same.

James C Cha

JAMES C. CHAMBERS
BRAC Environmental Coordinator

6 MAY 98
Date

U.S. ENVIRONMENTAL PROTECTION AGENCY

James P. Byrne

JAMES P. BYRNE
Fort Devens Remedial Project Manager

5/6/98
Date

[✓] Concur

[ ] Non-concur (Please provide reasons for non-concurrence in writing)

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

Robt B Bois

ROBERT ~~BOYCE~~ Bois
Section Chief, Federal Facilities - CERO

6 May 98
Date

[✓] Concur

[ ] Non-concur (Please provide reasons for non-concurrence in writing)

ABB-ES	ABB Environmental Services, Inc.
AREE	Area Requiring Environmental Evaluation
ATEC	ATEC Environmental Consultants
bgs	below ground surface
BRAC	Defense Base Realignment and Closure Act of 1990
BRAC EE	Base Realignment and Closure Environmental Evaluation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CQA	Chemical Quality Assurance
DOD	Department of Defense
ECAO	Environmental Criteria and Assessment Office
EMO	Environmental Management Office
EPH	extractable petroleum hydrocarbons
ft	foot or feet
gpm	gallons per minute
GPR	ground-penetrating radar
HLA	Harding Lawson Associates (formerly ABB Environmental Services, Inc.)
IRP	Installation Restoration Program
MADEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MCP	Massachusetts Contingency Plan
MEP	Master Environmental Plan
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MMCL	Massachusetts Maximum Contaminant Level
MSL	mean sea level
μg/g	micrograms per gram
μg/L	micrograms per liter

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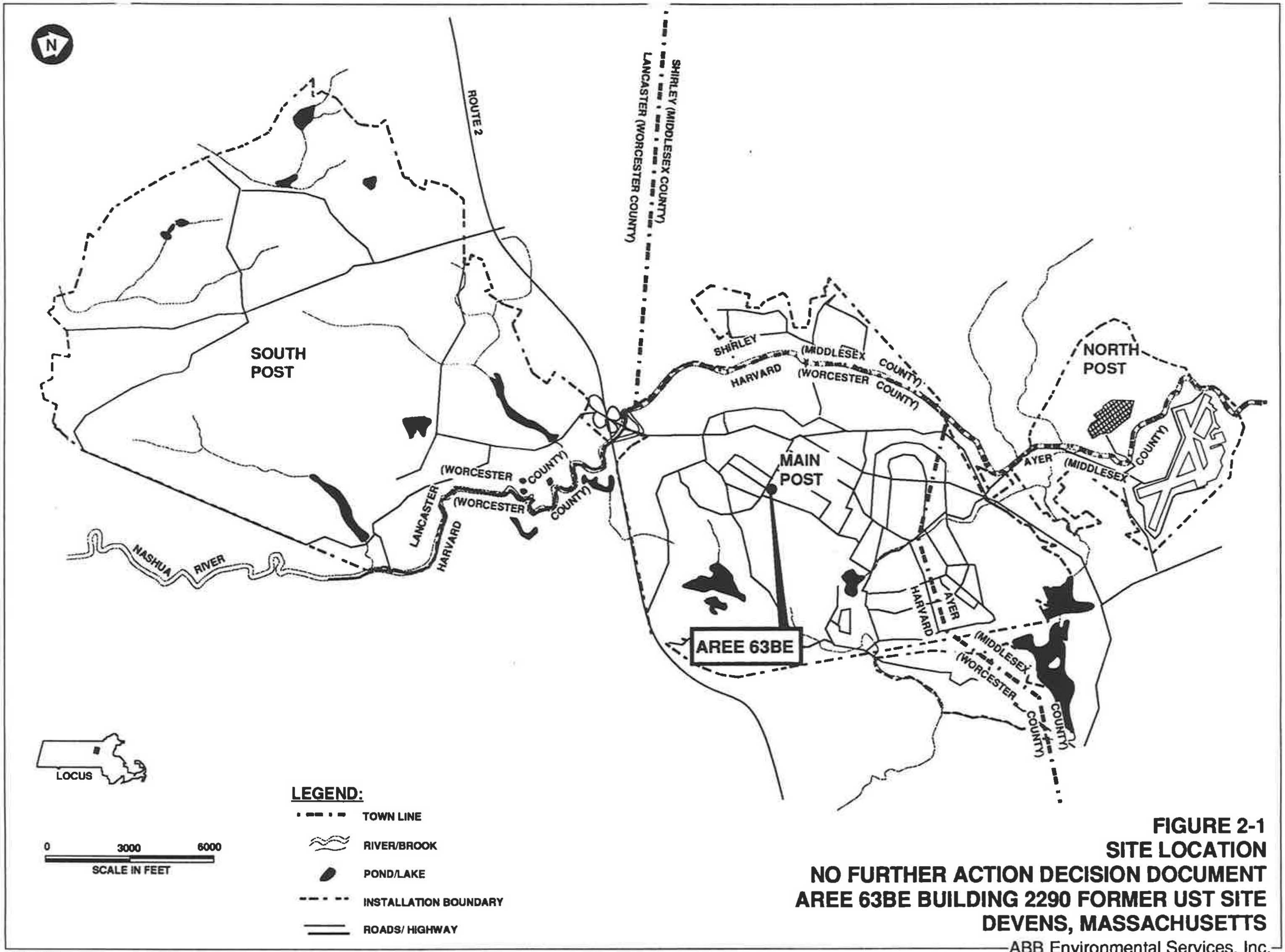


FIGURE 2-1
SITE LOCATION
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.

7053-07 AA

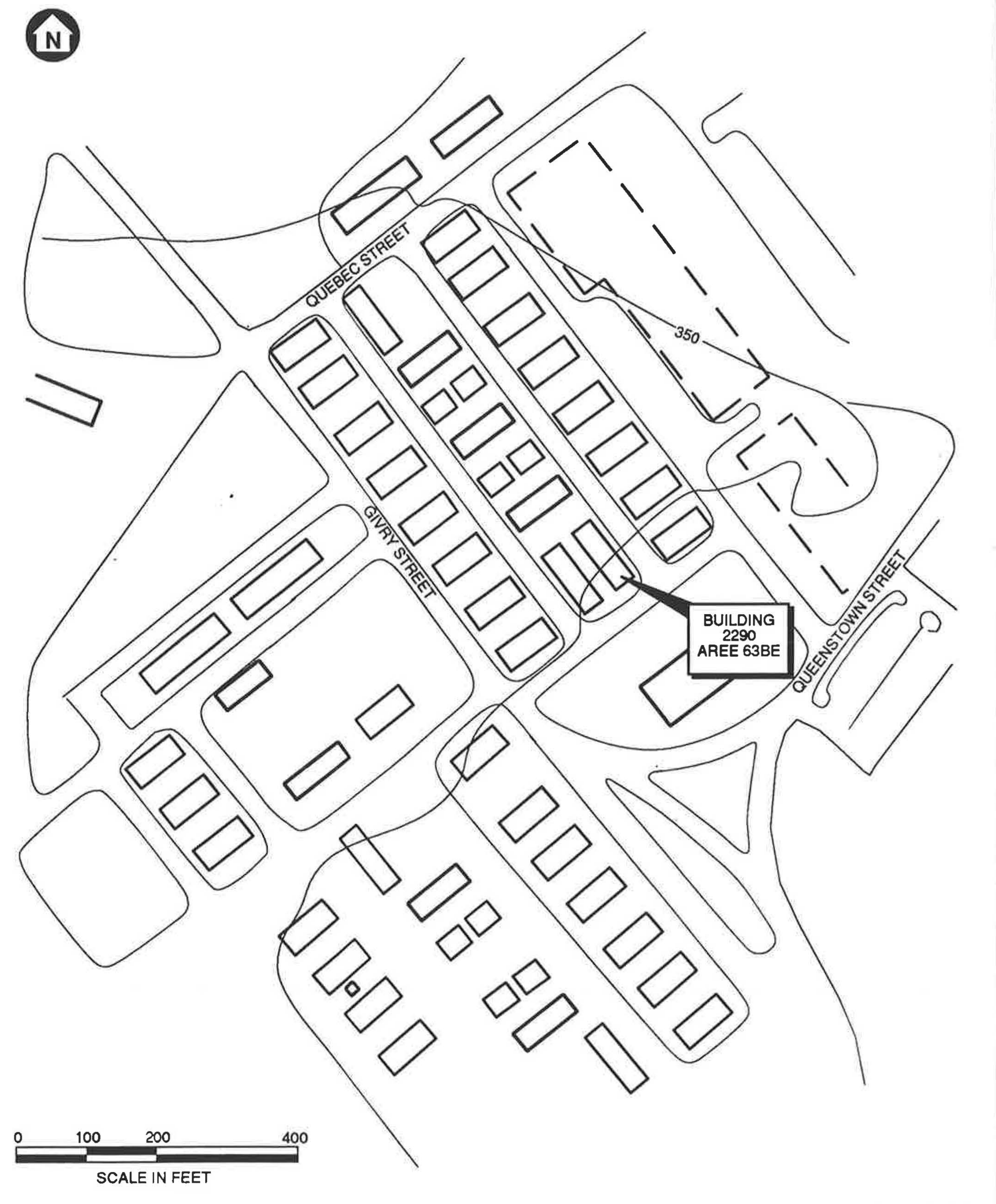


FIGURE 2-2
VICINITY OF AREE 63BE
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

ABB Environmental Services Inc.

7137-00

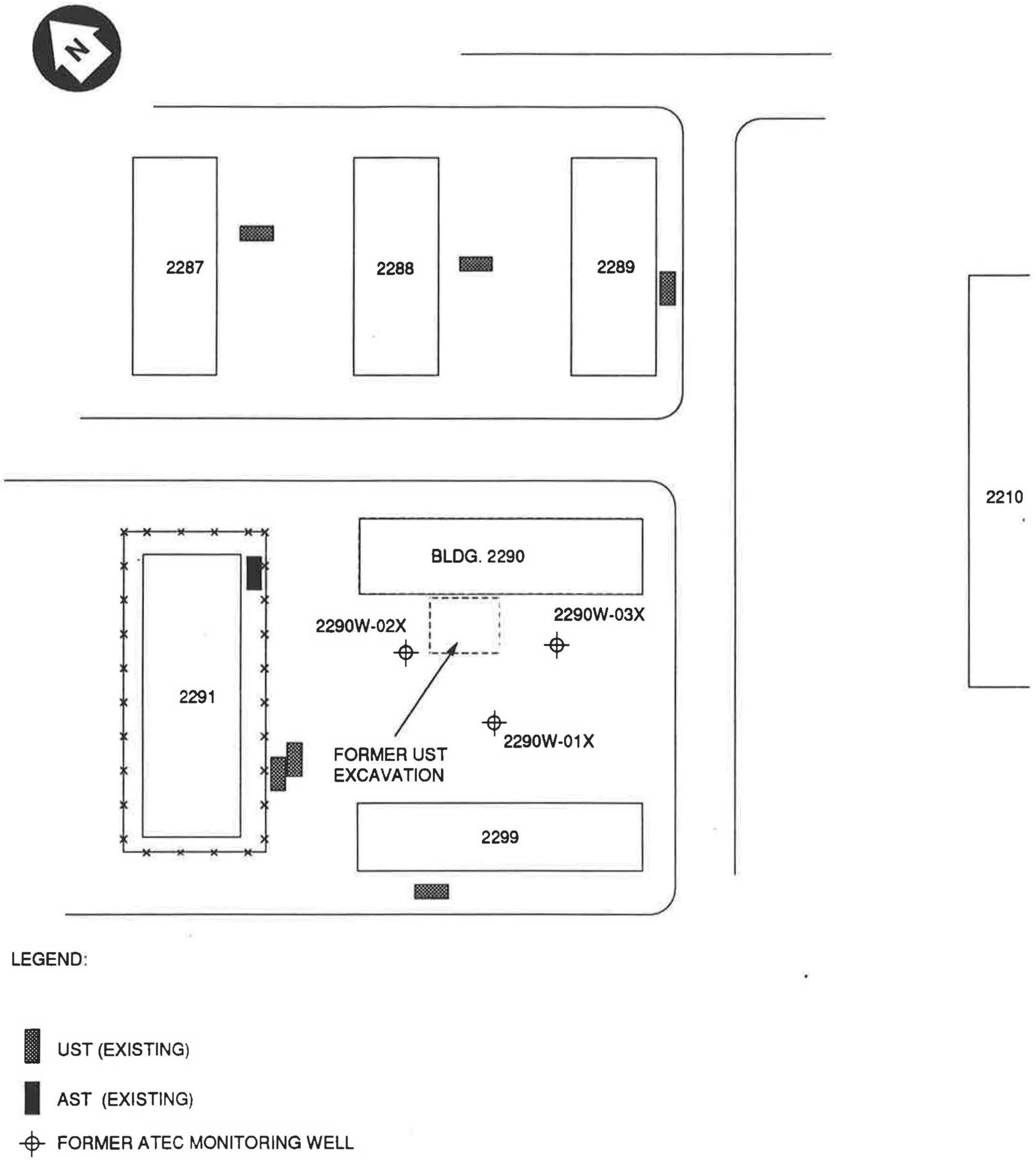


FIGURE 3-1
SHORT TERM REMEDIAL MEASURE:
FINAL EXCAVATION LIMIT AND MONITORING WELL LOCATIONS
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.

7137-00a

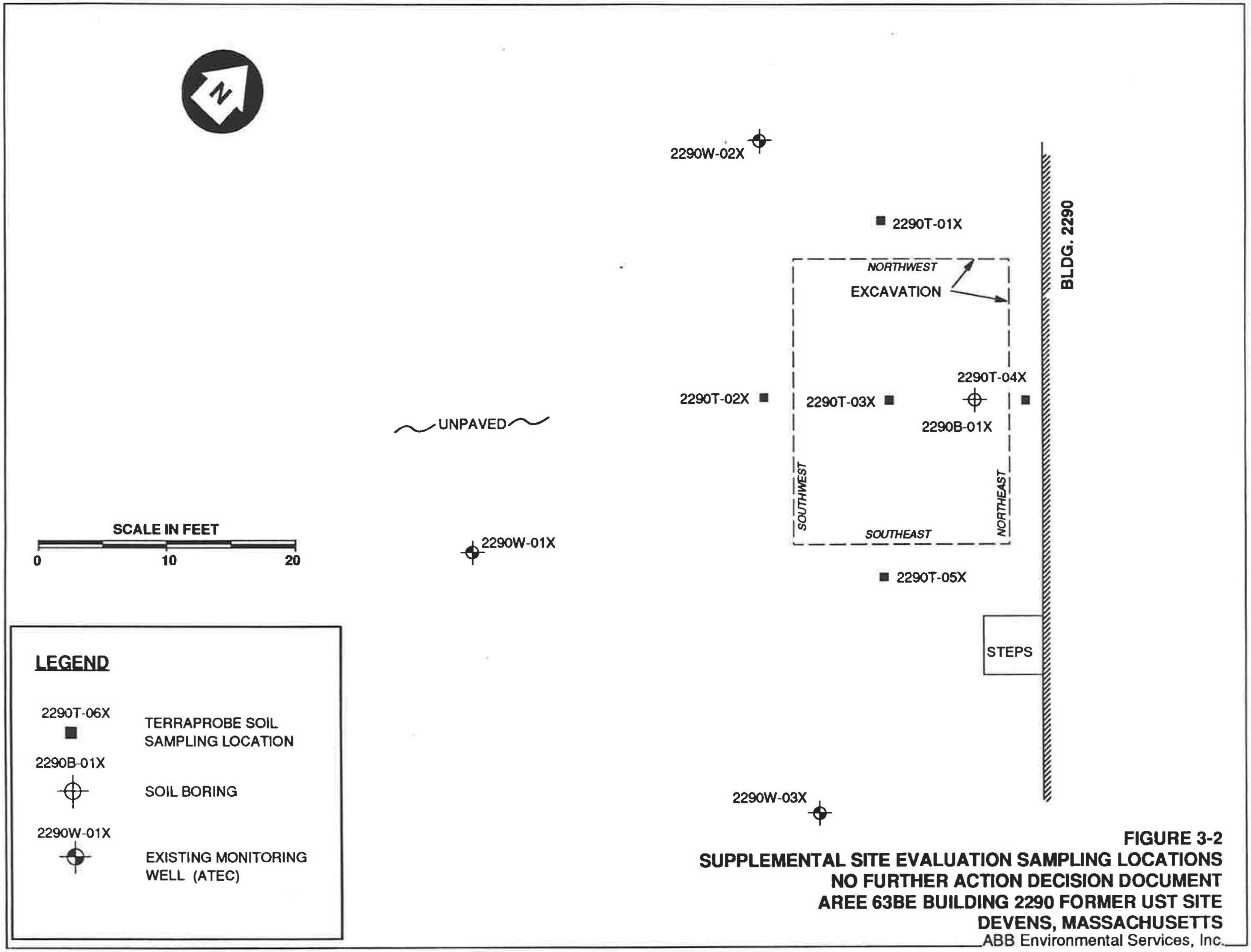


FIGURE 3-2
SUPPLEMENTAL SITE EVALUATION SAMPLING LOCATIONS
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS
ABB Environmental Services, Inc.

7137-00E

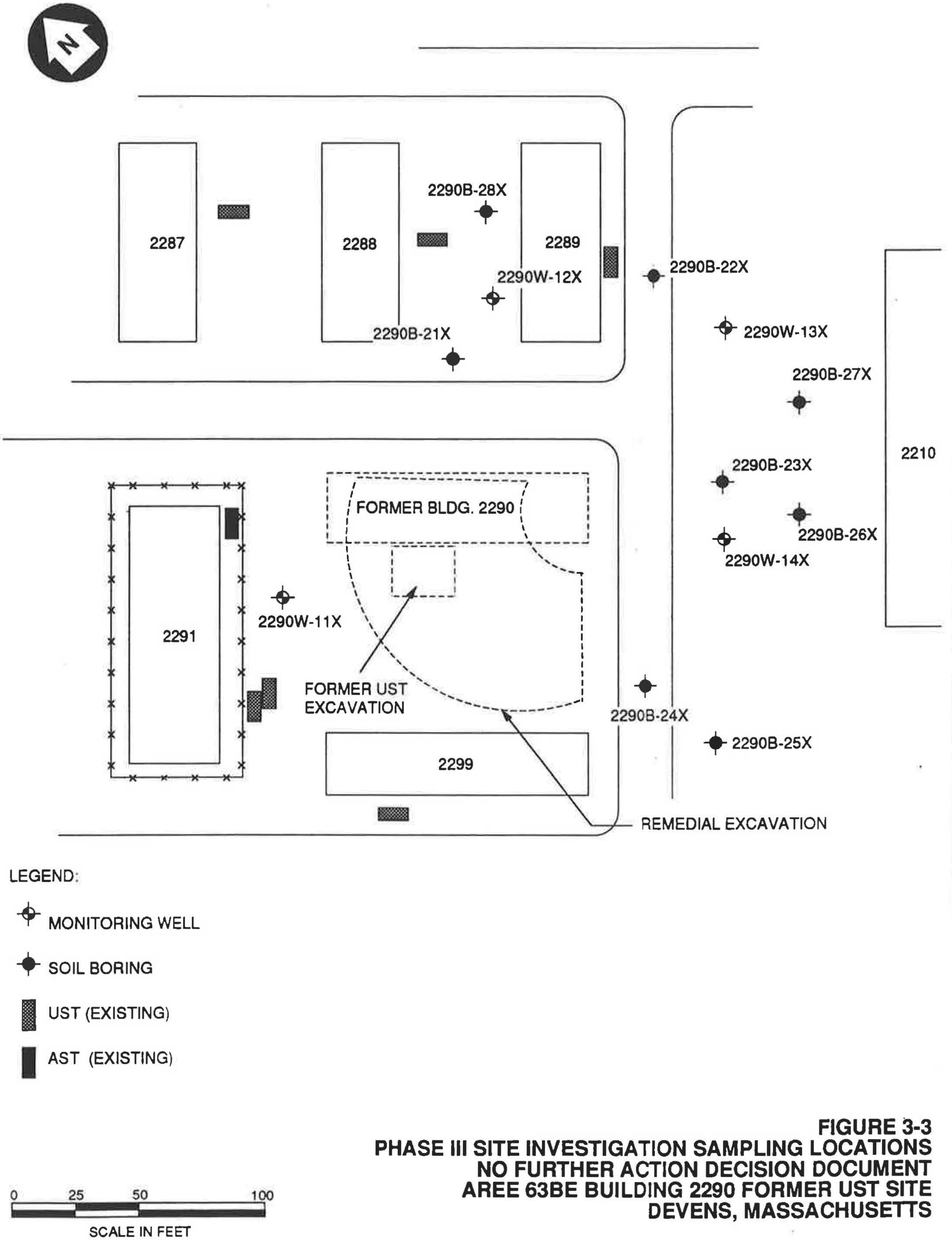


FIGURE 3-3
PHASE III SITE INVESTIGATION SAMPLING LOCATIONS
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.

7137-00a

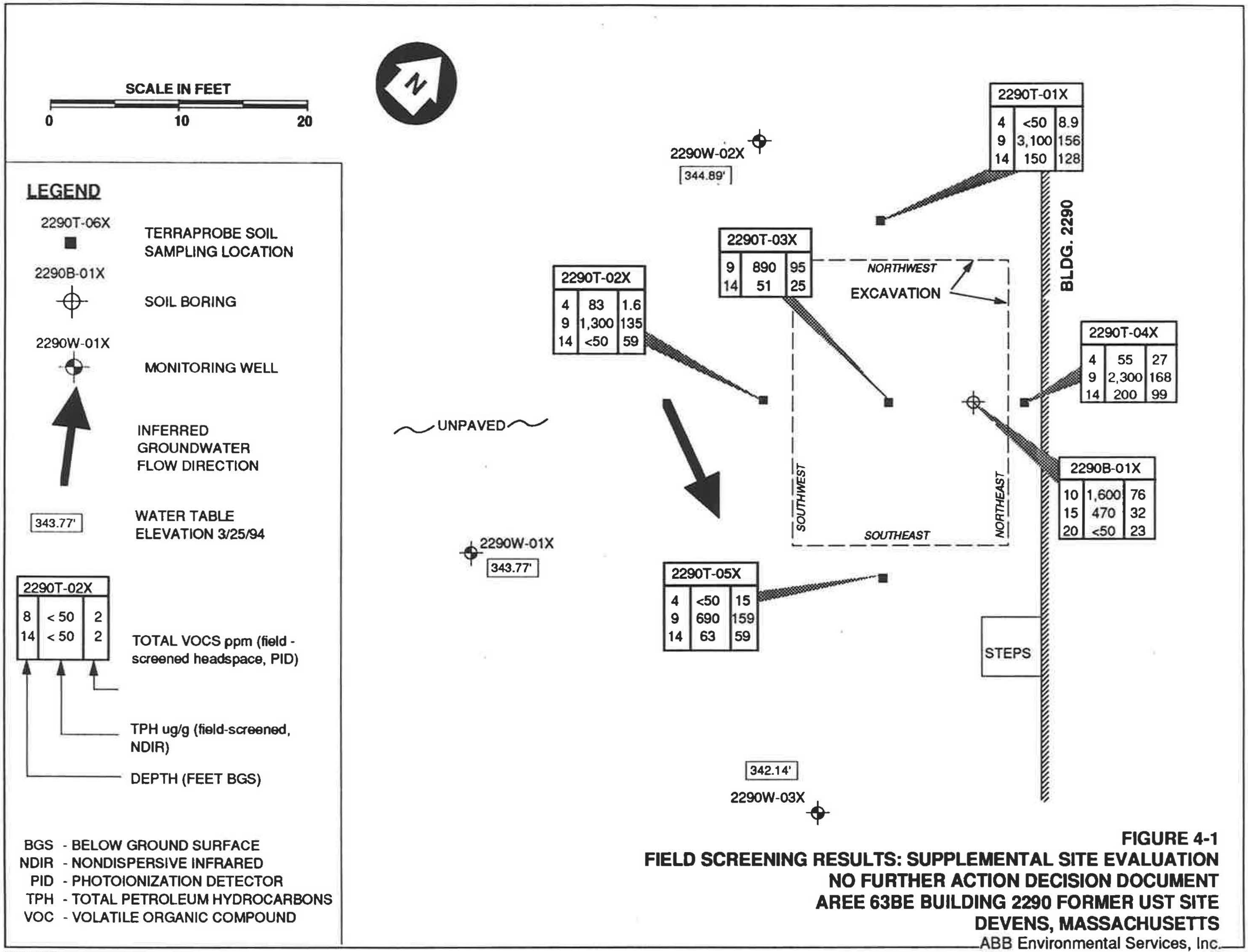
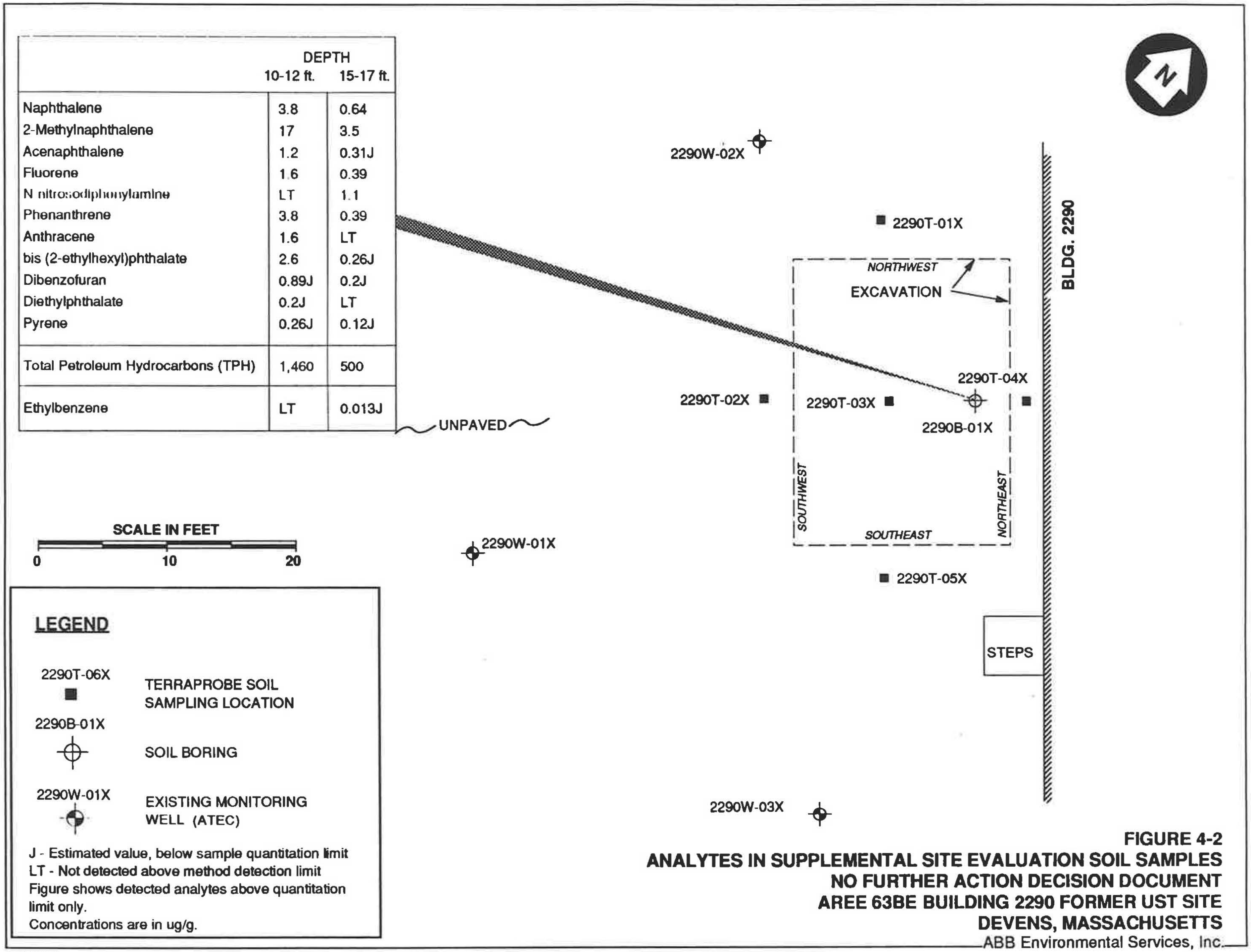


FIGURE 4-1
FIELD SCREENING RESULTS: SUPPLEMENTAL SITE EVALUATION
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS
ABB Environmental Services, Inc.

7137-00E

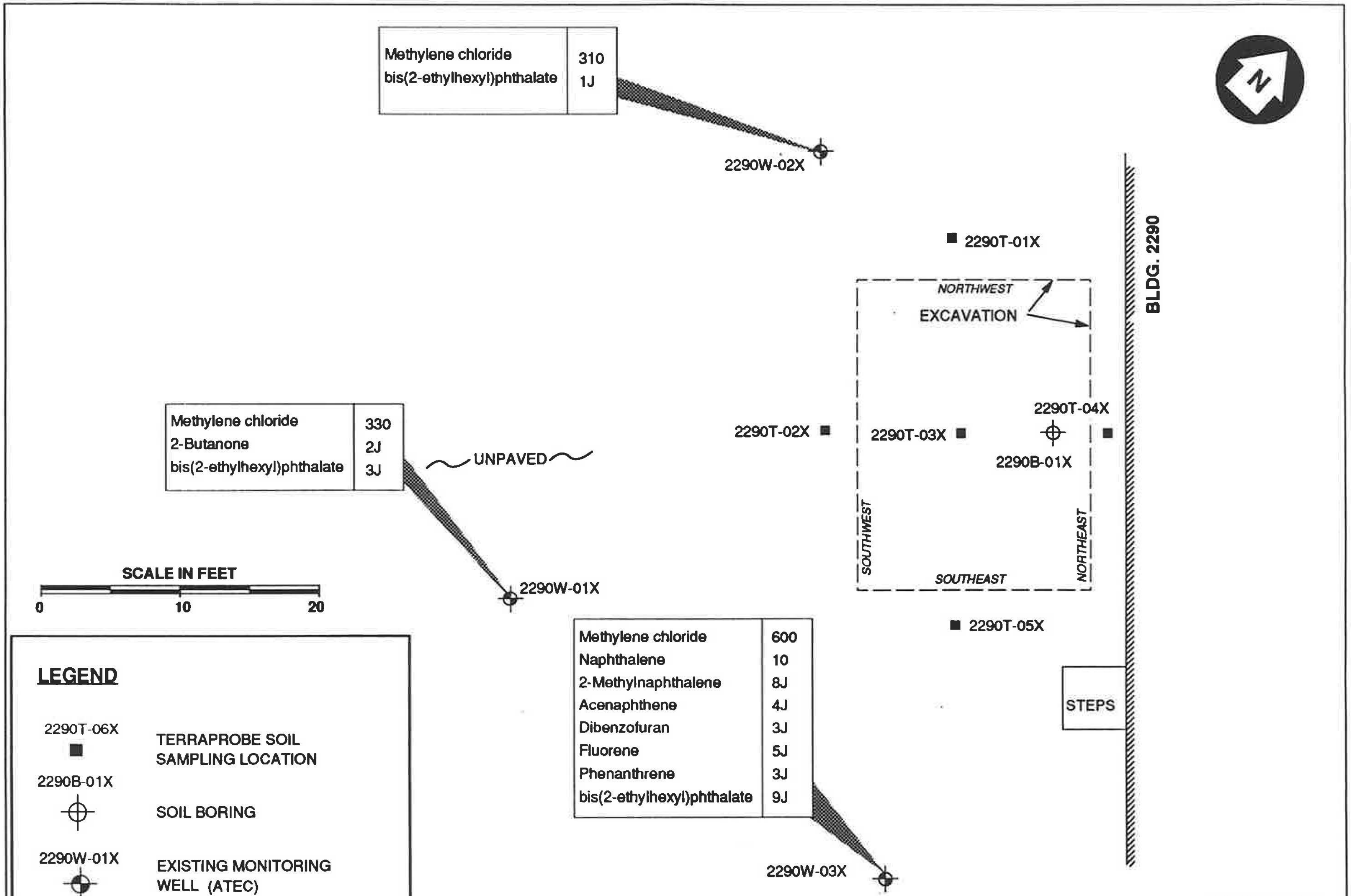


	DEPTH 10-12 ft.	 15-17 ft.
Naphthalene	3.8	0.64
2-Methylnaphthalene	17	3.5
Acenaphthalene	1.2	0.31J
Fluorene	1.6	0.39
N-nitrosodiphenylamine	LT	1.1
Phenanthrene	3.8	0.39
Anthracene	1.6	LT
bis (2-ethylhexyl)phthalate	2.6	0.26J
Dibenzofuran	0.89J	0.2J
Diethylphthalate	0.2J	LT
Pyrene	0.26J	0.12J
Total Petroleum Hydrocarbons (TPH)	1,460	500
Ethylbenzene	LT	0.013J

J - Estimated value, below sample quantitation limit
LT - Not detected above method detection limit
Figure shows detected analytes above quantitation limit only.
Concentrations are in ug/g.

FIGURE 4-2
ANALYTES IN SUPPLEMENTAL SITE EVALUATION SOIL SAMPLES
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.



2290W-02X

Methylene chloride	310
bis(2-ethylhexyl)phthalate	1J

2290W-01X

Methylene chloride	330
2-Butanone	2J
bis(2-ethylhexyl)phthalate	3J

2290W-03X

Methylene chloride	600
Naphthalene	10
2-Methylnaphthalene	8J
Acenaphthene	4J
Dibenzofuran	3J
Fluorene	5J
Phenanthrene	3J
bis(2-ethylhexyl)phthalate	9J

LEGEND

2290T-06X ■	TERRAPROBE SOIL SAMPLING LOCATION
2290B-01X ⌖	SOIL BORING
2290W-01X ⌖	EXISTING MONITORING WELL (ATEC)

J - Estimated value, below sample quantitation limit
LT - Not detected above method detection limit
Figure shows detected analytes only.

Concentrations are in ug/L.

FIGURE 4-3
ANALYTES IN SUPPLEMENTAL SITE EVALUATION GROUNDWATER SAMPLES
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.

7137-00E

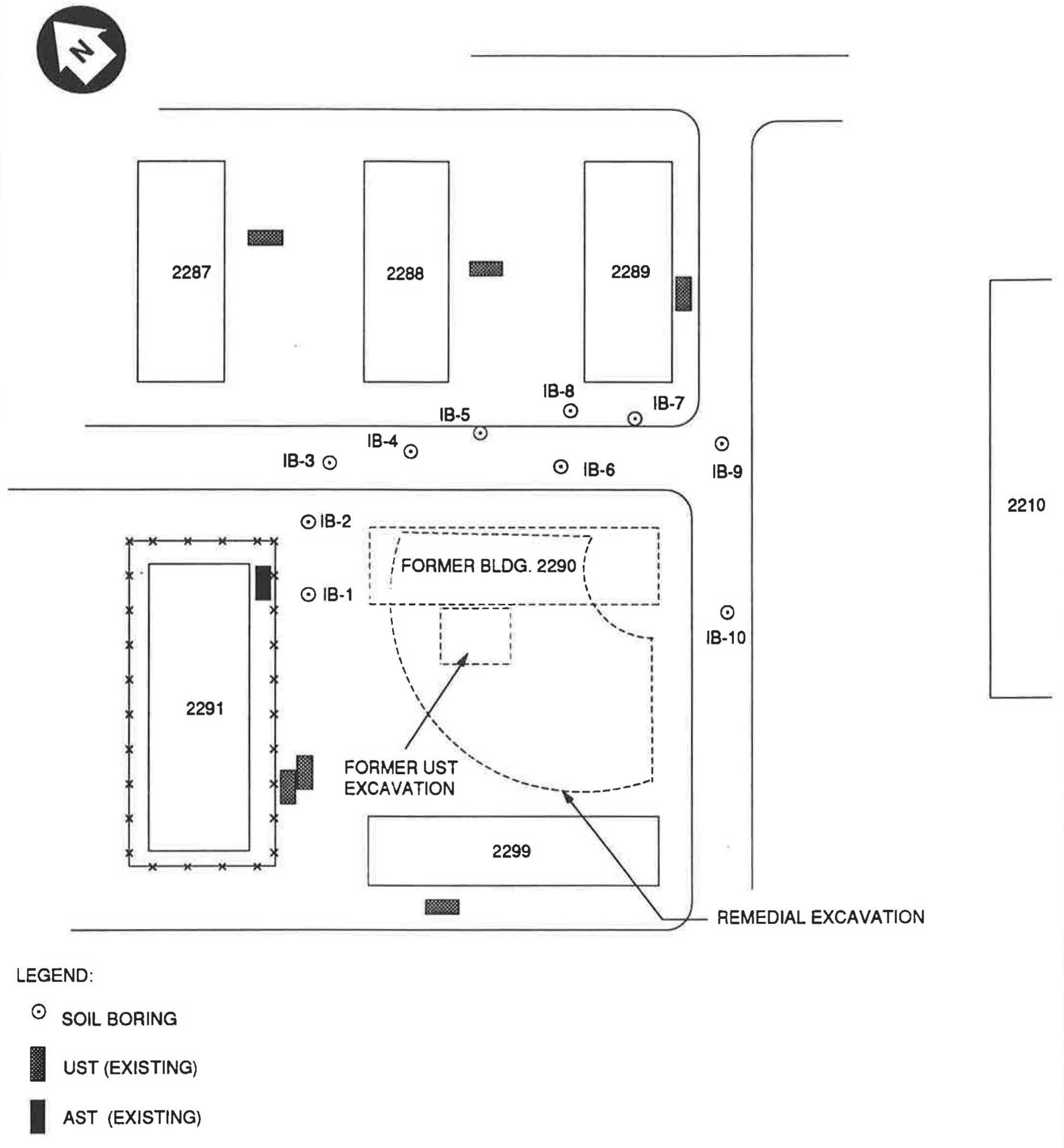
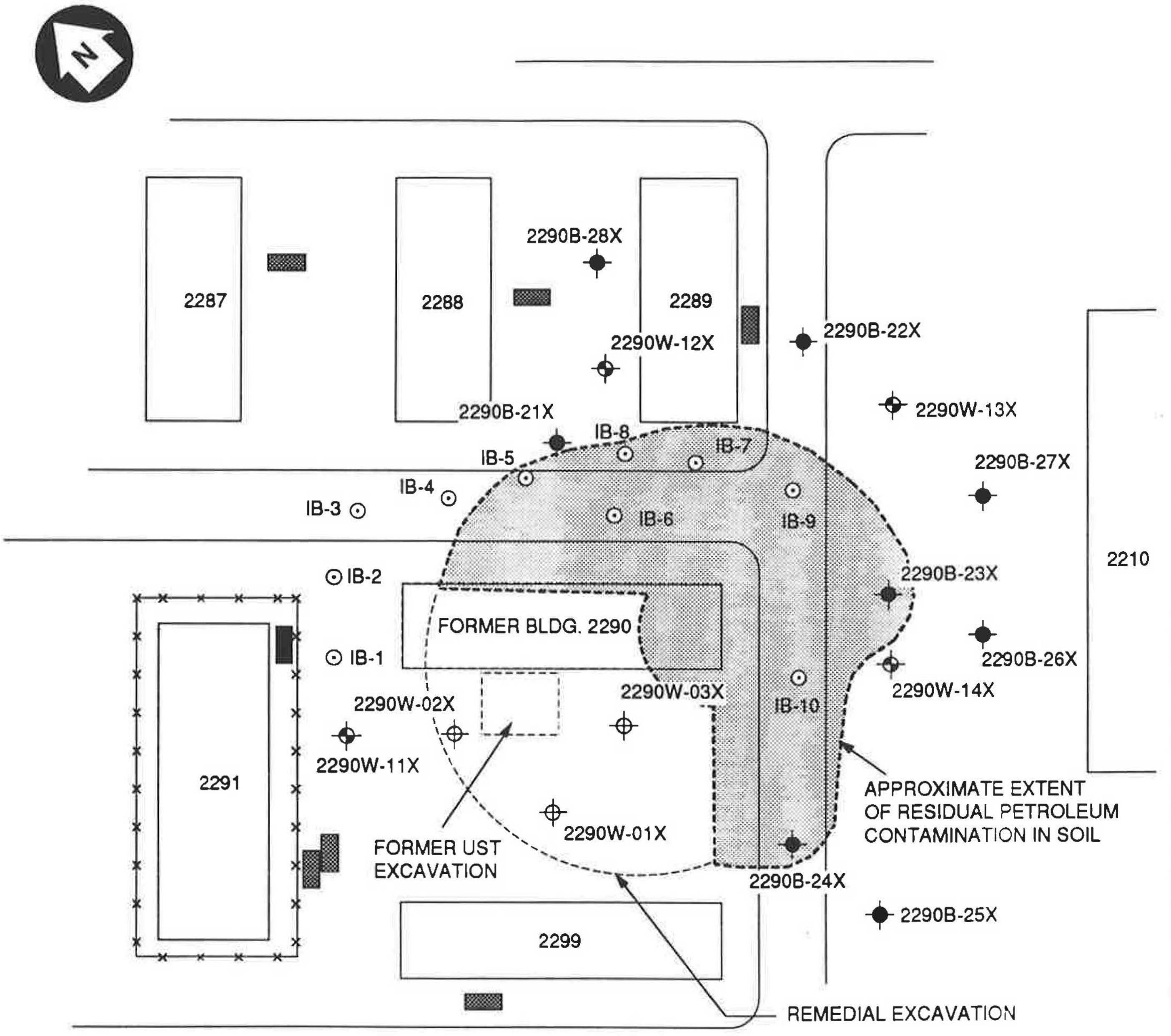


FIGURE 4-4
1994 SOIL REMOVAL ACTION:
FINAL EXCAVATION LIMIT AND SOIL BORING LOCATIONS
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS
ABB Environmental Services, Inc.

7137-00a



LEGEND:

⊕ MONITORING WELL

⊕ FORMER MONITORING WELL

● SOIL BORING

⊙ SOIL BORING

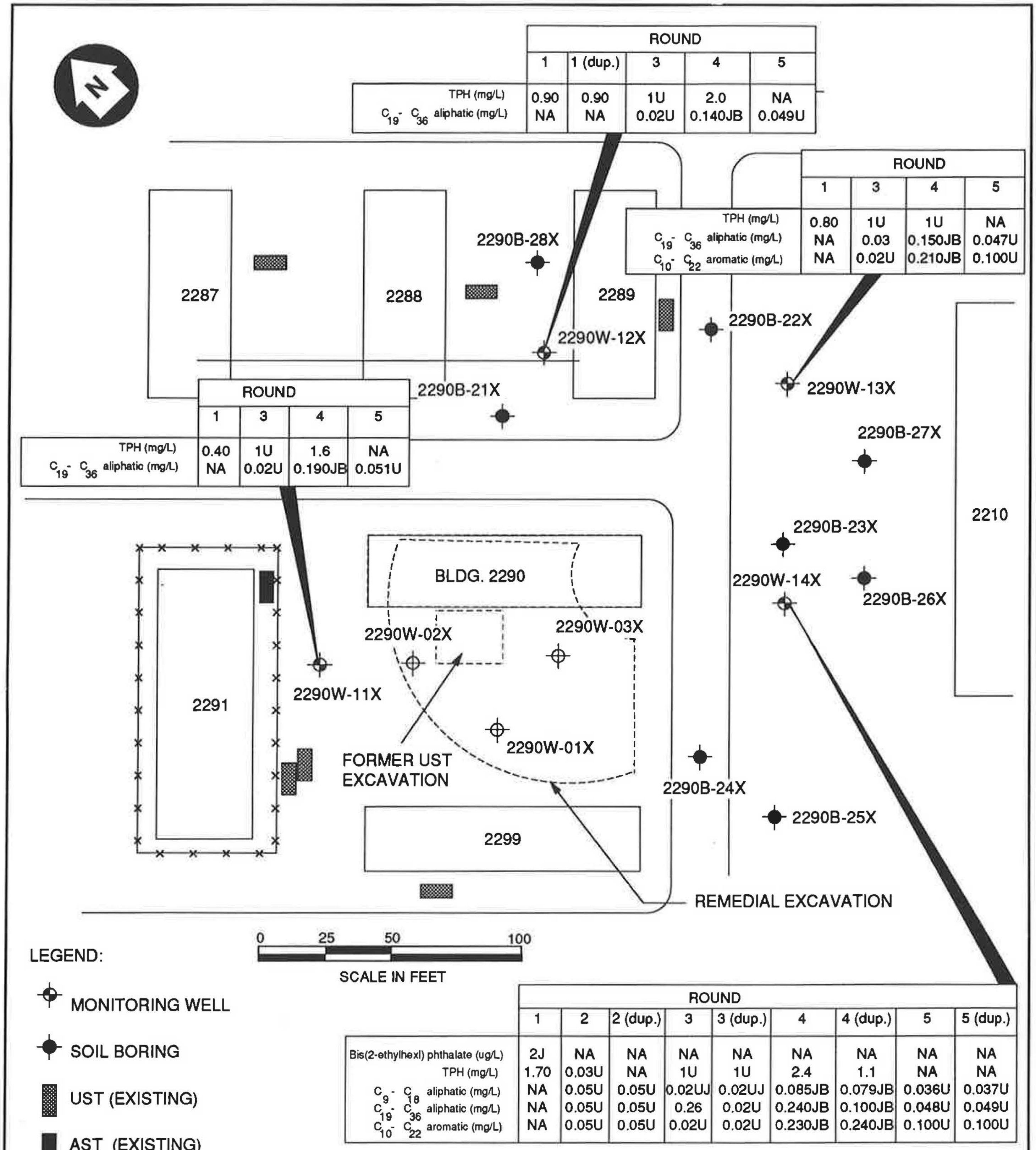
▨ UST (EXISTING)

■ AST (EXISTING)

0 25 50 100

SCALE IN FEET

FIGURE 4-5
RESIDUAL PETROLEUM CONTAMINATION
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS



	ROUND				
	1	1 (dup.)	3	4	5
TPH (mg/L)	0.90	0.90	1U	2.0	NA
C_{19}- C_{36} aliphatic (mg/L)	NA	NA	0.02U	0.140JB	0.049U

	ROUND			
	1	3	4	5
TPH (mg/L)	0.80	1U	1U	NA
C_{19}- C_{36} aliphatic (mg/L)	NA	0.03	0.150JB	0.047U
C_{10}- C_{22} aromatic (mg/L)	NA	0.02U	0.210JB	0.100U

	ROUND			
	1	3	4	5
TPH (mg/L)	0.40	1U	1.6	NA
C_{19}- C_{36} aliphatic (mg/L)	NA	0.02U	0.190JB	0.051U

	ROUND								
	1	2	2 (dup.)	3	3 (dup.)	4	4 (dup.)	5	5 (dup.)
Bis(2-ethylhexl) phthalate (ug/L)	2J	NA	NA	NA	NA	NA	NA	NA	NA
TPH (mg/L)	1.70	0.03U	NA	1U	1U	2.4	1.1	NA	NA
C_9- C_{18} aliphatic (mg/L)	NA	0.05U	0.05U	0.02UJ	0.02UJ	0.085JB	0.079JB	0.036U	0.037U
C_{19}- C_{36} aliphatic (mg/L)	NA	0.05U	0.05U	0.26	0.02U	0.240JB	0.100JB	0.048U	0.049U
C_{10}- C_{22} aromatic (mg/L)	NA	0.05U	0.05U	0.02U	0.02U	0.230JB	0.240JB	0.100U	0.100U

LEGEND:

- ⌖ MONITORING WELL
- ● SOIL BORING
- ▨ UST (EXISTING)
- ■ AST (EXISTING)

NA - not analyzed
dup. - duplicate sample
U - compound was not detected above practical quantitation limit
J - estimated value
B - analyte also detected in associated blank
TPH - total petroleum hydrocarbons
ug/L - micrograms per liter
mg/L - milligrams per liter

Figure shows detected analytes only.

FIGURE 4-6
ANALYTES IN PHASE III SITE INVESTIGATION GROUNDWATER SAMPLES, ROUNDS 1,2,3 AND 4
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.

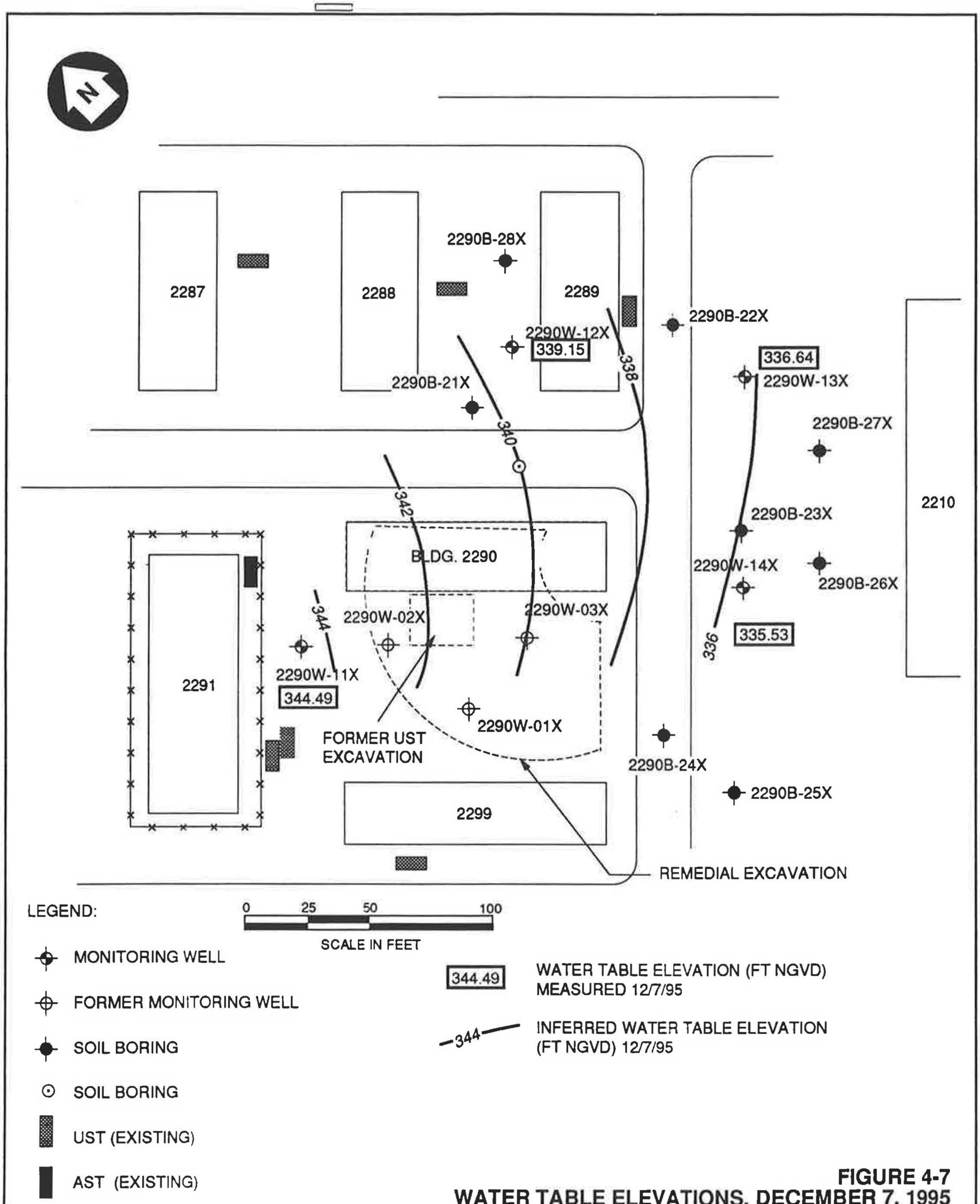


FIGURE 4-7
WATER TABLE ELEVATIONS, DECEMBER 7, 1995
NO FURTHER ACTION DECISION DOCUMENT
AREE 63BE BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

TABLE 3-1
ANALYTES DETECTED IN SOIL AND GROUNDWATER: 1992 SHORT TERM REMEDIAL MEASURE[1,2]
AREE 63BE - BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

SOIL			
SAMPLE NUMBER	**VOCs (ug/g)**	**TPH (ug/g)**	**SAMPLE LOCATION**
LRS-1	NA	81	Northwest sidewall (4 feet deep)
LRS-2	NA	135	Northeast sidewall (4 feet deep)
LRS-3	NA	112	Southeast sidewall (4 feet deep)
LRS-4	ND	125	Southwest sidewall (4 feet deep)
LRS-5	NA	4,840	Bottom of excavation (9.5 feet deep)
LRS-6	Ethylbenzene 0.03	4,030	Bottom of excavation (9.5 feet deep)

GROUNDWATER		
SAMPLE NUMBER	**TPH (ug/L)**	**SAMPLE LOCATION**
MW-1	ND	Monitoring well 2290W-01X
MW-2	ND	Monitoring well 2290W-02X
MW-3	12,000	Monitoring well 2290W-03X

NOTES:

1. Source: ATEC, 1993.
2. Analyses performed by Environmental Science Services

NA = Not analyzed.

ND = Not detected above Method Reporting Limit.

TPH = Total petroleum hydrocarbons, by Method 418.1

VOCs = Volatile organic compounds, by Method 8240

TABLE 4–1
TERRAPROBE SURVEY FIELD SCREENING RESULTS:
SUPPLEMENTAL SITE EVALUATION
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

PROBE NO.	SAMPLE NO.	SAMPLE DATE	SAMPLE MEDIUM	SAMPLE DEPTH (feet)	FIELD SCREENING TPH[1] (ug/g)	FIELD SCREENING TVO[2] (ppm)	COMMENTS
2290T–01X	T22900104	12/15/93	SOIL	4–5	<50	8.9	
	T22900109	12/15/93	SOIL	9–10	3,100	155.9	fuel odor; black stains
	T22900114	12/15/93	SOIL	14–15	150	128.3	fuel odor
2290T–02X	T22900204	12/15/93	SOIL	4–5	83	1.6	
	T22900209	12/15/93	SOIL	9–10	1,300	135.4	fuel odor
	T22900214	12/15/93	SOIL	14–15	<50	58.6	
2290T–03X	T22900309	12/15/93	SOIL	9–10	890	94.6	fuel odor
	T22900314	12/15/93	SOIL	14–15	51	25.1	fuel odor
2290T–04X	T22900404	12/15/93	SOIL	4–5	55	27.2	
	T22900409	12/15/93	SOIL	9–10	2,300	168.3	fuel odor
	T22900414	12/15/93	SOIL	14–15	200	98.6	fuel odor
2290T–05X	T22900504	12/15/93	SOIL	4–5	<50	14.8	
	T22900509	12/15/93	SOIL	9–10	690	158.9	fuel odor
	T22900514	12/15/93	SOIL	14–15	63	59	slight fuel odor

NOTES:
1. Total petroleum hydrocarbons by non–dispersive infrared (NDIR).
2. Total volatile organic compounds in soil–jar headspace, as measured by photoionization detector.

TABLE 4–2
SOIL BORING FIELD SCREENING RESULTS: SUPPLEMENTAL SITE EVALUATION
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

BORING NO.	WATER TABLE DEPTH (feet)	SAMPLE NO.	SAMPLE DATE	SAMPLE MEDIUM	SAMPLE DEPTH (feet)	FIELD SCREENING TPH[1] (ug/g)	FIELD SCREENING TVO[2] (ppm)	SENT TO LAB	COMMENTS
2290B–01X	8.7	BX22900110	01/05/94	SOIL	10–12	1,600	76.0	YES	heavy petroleum odor
		BX22900115	01/05/94	SOIL	15–17	470	32.4	YES	petroleum odor
		BX22900120	01/05/94	SOIL	20–22	<50	23.4	NO	slight petroleum odor

NOTES:
1. Total petroleum hydrocarbons by non–dispersive infrared (NDIR).
2. Total volatile organic compounds in soil–jar headspace, as measured by photoionization detector.

TABLE 4–3
ANALYTES DETECTED IN SOIL: SUPPLEMENTAL SITE EVALUATION[1]
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

ANALYTE	BORING	2290B–01X	2290B–01X
	DEPTH	10–12 FT	15–17 FT
VOLATILES (mg/kg)[2]			
METHYLENE CHLORIDE		0.035 B	0.043 B
ACETONE		0.078 B	0.078 B
ETHYLBENZENE		<0.009	0.013 J
SEMIVOLATILES (mg/kg)[3]			
NAPHTHALENE		3.8	0.64
2–METHYLNAPHTHALENE		17	3.5
ACENAPHTHENE		1.2	0.31 J
DIBENZOFURAN		0.89 J	0.2 J
DIETHYLPHTHALATE		0.2 J	<0.37
FLUORENE		1.6	0.39
N–NITROSODIPHENYLAMINE		<1.1	1.1
PHENANTHRENE		3.8	0.39
ANTHRACENE		1.6	<0.37
DI–N–BUTYLPHTHALATE		0.34 B,J	0.8 B
PYRENE		0.26 J	0.12 J
BIS(2–ETHYLHEXYL)PHTHALATE		2.6	0.26 J
PETROLEUM HYDROCARBONS (mg/kg)[4]			
TOTAL PETROLEUM HYDROCARBONS		1,460	500

NOTES:

[1] Data as reported by CompuChem Environmental Corporation; data have not been "blank–corrected".

[2] Volatile organic compounds, by Method 8240.

[3] Semivolatile organic compounds, by Method 8270.

[4] Total petroleum hydrocarbons, by Method 418.1.

mg/kg = milligrams per kilogram

B = Also found in associated method blank.

J = Estimated value, below sample quantitation limit.

< = less than detection limit shown

Table lists detected analytes only.

TABLE 4–4
ANALYTES DETECTED IN GROUNDWATER: SUPPLEMENTAL SITE EVALUATION[1]
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

ANALYTE — WELL NO.	2290W–01X	2290W–02X	2290W–03X
VOLATILES (ug/L)[2]			
METHYLENE CHLORIDE	330	310	600
2–BUTANONE	2 J	<28	<33
SEMIVOLATILES (ug/L)[3]			
NAPHTHALENE	<10	<10	10
2–METHYLNAPHTHALENE	<10	<10	8 J
ACENAPHTHENE	<10	<10	4 J
DIBENZOFURAN	<10	<10	3 J
FLUORENE	<10	<10	5 J
PHENANTHRENE	<10	<10	3 J
DI–N–BUTYLPHTHALATE	<10	<10	2 BJ
BIS(2–ETHYLHEXYL)PHTHALATE	3 J	1 J	9 J
TOTAL PETROLEUM HYDROCARBONS (ug/L)[4]			
TOTAL PETROLEUM HYDROCARBONS	< 250	< 250	< 250

NOTES:

[1] Data as reported by CompuChem Environmental Corporation; data have not been "blank–corrected."

[2] Volatile organic compounds, by Method 8240.

[3] Semivolatile organic compounds, by Method 8270.

[4] Total petroleum hydrocarbons, by Method 418.1.

ug/L = micrograms per liter
B = Also found in blank.
J = Estimated value, below sample quantitation limit.
< = less than detected limit shown

Table lists detected analytes only. Samples were collected on February 3, 1994.

TABLE 4-5
FIELD SCREENING AND LABORATORY ANALYTICAL RESULTS: OHM SOIL SAMPLING PROGRAM[1]
AREE 63BE - BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

BORING NO.	SAMPLE DEPTH (ft bgs)	TPH[2] (mg/kg)	
		FIELD[3]	OFF-SITE[4]
IB1	5-7	<42	-
	7-9	<42	-
	9-11	<42	<7.41
	11-12	<42	-
	12-13.5	<42	-
	14-15	<42	-
IB2	5-7	<42	-
	7-9	<42	-
	9-10	<42	<7.22
IB3	5-7	<42	-
	7-9	<42	-
	9-11	<42	<7.22
	11-13	<42	-
	13-14.9	<42	-
IB4	5-7	<42	-
	7-9	<42	-
	9-11	<42	-
	11-13	<42	-
	13-15	<42	12.6
	15-16.5	<42	-
IB5	5-7	<42	-
	7-9	50	-
	9-10	324	287
	10-11	<42	-
	11-13	<42	-
	13-15	<42	-
	15-16.3	<42	-
IB6	5-7	<42	-
	7-9	6 J	-
	9-11	1,632	-
	11-13	1,077	621
	13-15	89	-
	15-17	193	-
IB7	5-7	<42	-
	7-9	8 J	-
	9-11	221	-
	11-13	1,630	1,100
	13-15	60	-
	15-17	25 J	-
IB8	5-7	<42	-
	7-9	<42	-
	9-11	23 J	-
	11-13	122	140
	13-15	<42	-
	15-17	<42	-
IB9	5-7	<42	-
	7-9	<42	-
	9-11	<42	-
	11-13	915	-
	13-15	573	415
	15-17	101	-
	17-19	<42	-
IB10	5-7	<42	-
	7-9	518	-
	9-11	<42	-
	11-13	600	-
	13-15	721	431
	15-17	<42	-
	17-19	<42	-

[1] Samples collected by OHM Remediation Services Corp. (OHM, 1995)

[2] Total petroleum hydrocarbons.

[3] Screened on-site by OHM using non-dispersive infrared spectroscopy.

[4] Confirmed off-site using Method 418.1.

J = Qualifier indicating estimated concentration below practical quantitaion limit.

- = Not analyzed

TABLE 4-6
FIELD SCREENING RESULTS:
PHASE III SITE INVESTIGATION[1]
AREE 63BE - BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

BORING NO.	FIELD SAMPLE ID.	SAMPLE DATE	SAMPLE DEPTH (ft bgs)	TPH[2] (ppm)	SENT TO LAB	COMMENTS
2290W-11X	BX22901105	09/14/95	5-7	<55		
	BX22901110	09/18/95	10-12	<56	Yes	
2290W-12X	BX22901205	09/15/95	5-7	52	Yes	
	BX22901209	09/15/95	9-11	<52		
	BX22901214	09/15/95	14-16	<56		
2290W-13X	BX22901305	09/14/95	5-7	<54		
	BX22901309	09/14/95	9-11	<60	Yes	
	BX22901315	09/14/95	15-17	<56		
	BX22901320	09/14/95	20-22	<55		
	BX22901325	09/14/95	25-27	<55		
2290W-14X	BX22901405	09/18/95	5-7	<52		Slight creosote odor
	BX22901410	09/18/95	10-12	<54	Yes	Duplicate[3] and replicate[4] sent
2290B-21X	BX22902105	09/13/95	5-7	<54		
	BX22902110	09/13/95	10-12	<56	Yes	
2290B-22X	BX22902205	09/13/95	5-7	<52		
	BX22902209	09/13/95	9-11	<52	Yes	Duplicate and replicate sent
	BX22902211	09/13/95	11-13	<55		
	BX22902213	09/13/95	13-15	<56		
2290B-23X	BX22902305	09/13/95	5-7	<54		Creosote-like odor
	BX22902307	09/13/95	7-9	<53		
	BX22902309	09/13/95	9-11	1,900	Yes	Fuel-like odor
2290B-24X	BX22902405	09/13/95	5-7	63		
	BX22902410	09/14/95	10-12	<50		
	BX22902412	09/14/95	12-14	86	Yes	
	BX22902414	09/14/95	14-16	<56		
2290B-25X	BX22902505	09/20/95	5-7	<56		
	BX22902509	09/20/95	9-11	<53	Yes	
	BX22902511	09/20/95	11-11.9	<56		
2290B-26X	BX22902605	09/20/95	5-7	<53		
	BX22902607	09/20/95	7-9	<55		
	BX22902609	09/20/95	9-11	<56	Yes	

TABLE 4-6
FIELD SCREENING RESULTS: PHASE III SITE INVESTIGATION[1] AREE 63BE - BUILDING 2290 FORMER UST SITE NO FURTHER ACTION DECISION DOCUMENT DEVENS, MASSACHUSETTS

BORING NO.	FIELD SAMPLE ID.	SAMPLE DATE	SAMPLE DEPTH (ft bgs)	TPH[2] (ppm)	SENT TO LAB	COMMENTS
2290B-27X	BX22902705	09/20/95	5-7	<52		
	BX22902707	09/20/95	7-9	<52		
	BX22902709	09/20/95	9-11	<56	Yes	
2290B-28X	BX22902805	09/20/95	5-7	<53		
	BX22902809	09/20/95	9-11	<51	Yes	
	BX22902812	09/20/95	12-14	<56		

NOTES:

[1] Samples collected and analyzed by ABB-ES as part of the Phase III Site investigation at AREE 63BE.

[2] Total petroleum hydrocarbons analyzed in the field laboratory by nondispersive infrared (NDIR).

[3] Field duplicate sent to contract laboratory for analysis of TPH using NDIR (Method 418.1).

[4] Replicate sent to U.S. Army Corps of Engineers environmental laboratory for analysis of TPH using NDIR (Method 418.1).

TABLE 4-7
ANALYTES DETECTED IN SOIL:
PHASE III SITE INVESTIGATION[1]
AREE 63BE – BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

	BORING NO.	2290W-11X	2290W-12X	2290W-13X	2290W-14X	2290W-14X	2290B-21X	2290B-22X
	SAMPLE ID	BX22901110	BX22901205	BX22901309	BX22901410	BD22901410	BX22902110	BX22902209
	DATE	9/18/95	9/15/95	9/14/95	9/18/95	9/18/95	9/13/95	9/13/95
ANALYTE	DEPTH (feet)	10-12	5-11	9-11	10-12	10-12 (dup)	10-12	9-11
SEMIVOLATILES (ug/g)[2]								
Naphthalene		0.720 U	0.690 U	0.760 U	0.720 U	0.740 U	0.730 U	0.690 U
2-Methylnaphthalene		0.920 U	0.880 U	0.970 U	0.920 U	0.710 U	0.920 U	0.880 U
Fluorene		0.750 U	0.730 U	0.790 U	0.760 U	0.740 U	0.760 U	0.720 U
Phenanthrene		0.680 U	0.650 U	0.057 J	0.680 U	0.037 J	0.680 U	0.650 U
Di-n-butylphthalate		0.840 U	0.810 U	0.053 J	0.840 U	0.830 U	0.850 U	0.800 U
Fluoranthene		1.000 U	0.970 U	0.072 J	1.000 U	0.041 J	1.000 U	0.960 U
Pyrene		0.800 U	0.770 U	0.058 J	0.800 U	0.780 U	0.800 U	0.760 U
Bis(2-ethylhexyl)phthalate		0.820 U	0.790 U	0.081 J	0.820 U	0.800 U	0.830 U	0.780 U
OTHER (ug/g)								
Total Petroleum Hydrocarbons[3]		14.8	23.2	10.4	19.6	28	21.3	47.4

TABLE 4–7 (continued)
ANALYTES DETECTED IN SOIL:
PHASE III SITE INVESTIGATION[1]
AREE 63BE – BUILDING 2290 FORMER UST SITE
DEVENS, MASSACHUSETTS

	BORING NO.	2290B–22X	2290B–23X	2290B–24X	2290B–25X	2290B–26X	2290B–27X	2290B–28X
	SAMPLE ID	BD22902209	BX22902309	BX22902412	BX22902509	BX22902609	BX22902709	BX22902809
	DATE	9/13/95	9/13/95	9/14/95	9/20/95	9/20/95	9/20/95	9/20/95
ANALYTE	DEPTH (feet)	9–11 (dup)	9–11	12–14	9–11	9–11	9–11	9–11
SEMIVOLATILES (ug/g)[2]								
Naphthalene		0.670 U	0.500 J	0.720 U	0.700 U	0.730 U	0.720 U	0.670 U
2–Methylnaphthalene		0.850 U	3.800	0.920 U	0.890 U	0.930 U	0.910 U	0.860 U
Fluorene		0.700 U	0.740 J	0.760 U	0.730 U	0.760 U	0.750 U	0.700 U
Phenanthrene		0.034 J	1.300	0.680 U	0.660 U	0.690 U	0.670 U	0.630 U
Di–n–butylphthalate		0.780 U	0.840 U	0.840 U	0.820 U	0.240 J	0.830 U	0.790 U
Fluoranthene		0.940 U	0.060 J	1.000 U	0.980 U	1.000 U	1.000 U	0.940 U
Pyrene		0.740 U	0.200 U	0.800 U	0.770 U	0.810 U	0.790 U	0.750 U
Bis(2–ethylhexyl)phthalate		0.760 U	0.820 U	0.820 U	0.800 U	0.830 U	0.810 U	0.770 U
OTHER (ug/g)								
Total Petroleum Hydrocarbons[3]		48	1,680	34.7	16.3	24	16.3	23.5

NOTES:

[1] Samples were collected by ABB Environmental Services, Inc. and were analyzed by Compuchem Environmental Corp.

[2] Samples were analyzed for semivolatile organic compounds using Method 8270.

[3] Samples were analyzed for total petroleum hydrocarbons using nondispersive infrared (Method 418.1).

U = Compound not detected; listed value is practical quantitation limit.
J = Estimated value.
The only analytes listed are those that were detected in at least one sample.

TABLE 4-8
ANALYTES DETECTED IN GROUNDWATER SAMPLES, ROUND 1: PHASE III SITE INVESTIGATION[1]
AREE 63BE - BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

ANALYTE	WELL NO.	2290W-11X	2290W-12X	2290W-12X	2290W-13X	2290W-14X
	SAMPLE ID	MX2290111	MX2290121	MD2290121 (duplicate)	MX2290131	MX2290141
SEMIVOLATILES (ug/L)[2]						
Bis(2-ethylhexyl)phthalate		25 U	25 U	25 U	25 U	2 J
OTHER (mg/L)						
Total Petroleum Hydrocarbons[3]		0.40	0.90	0.90	0.80	1.70

NOTES:

[1] Samples collected October 25, 1995 by ABB Environmental Services, Inc. and analyzed by CompuChem Environmental Corp.

[2] Samples were analyzed for semivolatile organic compounds using Method 8270.

[3] Samples were analyzed for total petroleum hydrocarbons using nondispersive infrared (Method 418.1).

Data Qualifiers:
U = Compound was analyzed but not detected; listed value is practical quantitation limit.
J = Estimated value.

The only analytes listed are those that were detected in at least one sample; for complete analytical results, refer to Appendix D of the Draft Phase III Site Investigation Report (ABB-ES, 1996b).

TABLE 4–9
ANALYTES DETECTED IN GROUNDWATER SAMPLES, ROUND 2: PHASE III SITE INVESTIGATION[1]
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

ANALYTE						
WELL NO.	2290W–14X			2290W–14X		
SAMPLE ID	MX2290142			MX2290142 (duplicate)		
SAMPLE DATE	01/18/96			01/18/96		
Extractable Petroleum Hydrocarbons (mg/L)[3]						
C_9–C_{18} aliphatic	0.05	U		0.05	U	
C_{19}–C_{36} aliphatic	0.05	U		0.05	U	
C_{10}–C_{22} aromatic	0.05	U		0.05	U	
Naphthalene	0.01	U		0.01	U	
2–Methylnaphthalene	0.01	U		0.01	U	
Acenaphthalene	0.059	B	U	0.051	B	U
Acenaphthene	0.01	U		0.01	U	
Fluorene	0.01	U		0.01	U	
Phenanthrene	0.01	U		0.01	U	
Anthracene	0.01	U		0.01	U	
Fluoranthene	0.01	U		0.01	U	
Pyrene	0.01	U		0.01	U	
Benzo(a)anthracene	0.01	U		0.01	U	
Chrysene	0.01	U		0.01	U	
Benzo(b)fluoranthene	0.01	U		0.01	U	
Benzo(k)fluoranthene	0.01	U		0.01	U	
Benzo(a)pyrene	0.01	U		0.01	U	
Indeno(1,2,3–cd)pyrene	0.01	U		0.01	U	
Dibenzo(a,h)anthracene	0.01	U		0.01	U	
Benzo(g,h,i)perylene	0.01	U		0.01	U	
Extractable Petroleum Hydrocarbons[2]	0.05	U		0.05	U	
TPH (mg/L)[4]						
Total Petroleum Hydrocarbons (IR)	0.03	U		NA		

NOTES:
[1] Round 2 samples were collected by ABB Environmental Services, Inc. and were analyzed by IEA.
[2] EPH results do not reflect toxicologically weighted values.
[3] Samples were analyzed using the MADEP EPH Method.
[4] Samples were analyzed for TPH using nondispersive infrared (Method 418.1).

NA = Not analyzed.

For each sample, data qualifiers listed in first (unshaded) column after analyte concentrations were assigned by laboratory; data qualifiers listed in second (shaded) column after analyte concentrations were assigned by ABB–ES based on data quality evaluation.

Data Qualifiers:
U = Compound was analyzed but not detected; listed value is practical quantitation limit.
J = Estimated value.
B = Analyte also detected in associated blank.

TABLE 4–10
ANALYTES DETECTED IN GROUNDWATER SAMPLES, ROUND 3: PHASE III SITE INVESTIGATION[1]
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

ANALYTE	WELL NO.	2290W–11X	2290W–12X	2290W–13X	2290W–14X	2290W–14X
	SAMPLE ID	MX2290113	MX2290123	MX2290133	MX2290143	MD2290143 (duplicate)
	SAMPLE DATE	03/05/96	03/05/96	03/05/96	03/05/96	03/05/96
Extractable Petroleum Hydrocarbons (mg/L)[3]						
C_9-C_{18} aliphatic		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
$C_{19}-C_{36}$ aliphatic		0.02 U	0.02 U	0.03	0.26	0.02 U
$C_{10}-C_{22}$ aromatic		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Naphthalene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
2–Methylnaphthalene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Acenaphthalene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Acenaphthene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Fluorene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Phenanthrene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Anthracene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Fluoranthene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Pyrene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Benzo(a)anthracene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Chrysene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Benzo(b)fluoranthene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Benzo(k)fluoranthene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Benzo(a)pyrene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Indeno(1,2,3–cd)pyrene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Dibenzo(a,h)anthracene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Benzo(g,h,i)perylene		0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ	0.02 U UJ
Extractable Petroleum Hydrocarbons[2]		0.02 U UJ	0.02 U UJ	0.03	0.26	0.02 U UJ
TPH (mg/L)[4]						
Total Petroleum Hydrocarbons (IR)		1 U	1 U	1 U	1 U	1 U

NOTES:
[1] Round 3 samples were collected by ABB and were analyzed by Commonwealth Analytical.
[2] EPH results do not reflect toxicologically weighted values.
[3] Samples were analyzed using the MADEP EPH Method.
[4] Samples were analyzed using nondispersive infrared (Method 418.1).
NA = Not analyzed.
For each sample, data qualifiers listed in first (unshaded) column after analyte concentrations were assigned by laboratory; data qualifiers listed in second (shaded) column after analyte concentrations were assigned by ABB–ES based on data quality evaluation.
Data Qualifiers:
U = Compound was analyzed but not detected; listed value is practical quantitation limit.
J = Estimated value.
B = Analyte also detected in associated blank.

TABLE 4–11
ANALYTES DETECTED IN GROUNDWATER SAMPLES, ROUND 4: PHASE III SITE INVESTIGATION[1]
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

	WELL NO.	2290W–11X		2290W–12X		2290W–13X		2290W–14X		2290W–14X	
	SAMPLE ID	MX2290114		MX2290124		MX2290134		MX2290144		MD2290144 (duplicate)	
	SAMPLE DATE	03/12/97		03/12/97		03/12/97		03/12/97		03/12/97	
ANALYTE											
Extractable Petroleum Hydrocarbons (mg/L)[3]											
C_9–C_{18} aliphatic		0.070	UJ	0.070	UJ	0.070	UJ	0.085	JB	0.079	JB
C_{19}–C_{36} aliphatic		0.190	JB	0.140	JB	0.150	JB	0.240	JB	0.100	JB
C_{10}–C_{22} aromatic		0.150	UJ	0.140	UJ	0.210	JB	0.230	JB	0.240	JB
Naphthalene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
2–Methylnaphthalene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Acenaphthalene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Acenaphthene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Fluorene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Phenanthrene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Anthracene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Fluoranthene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Pyrene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Benzo(a)anthracene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Chrysene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Benzo(b)fluoranthene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Benzo(k)fluoranthene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Benzo(a)pyrene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Indeno(1,2,3–cd)pyrene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Dibenzo(a,h)anthracene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Benzo(g,h,i)perylene		0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ	0.002	UJ
Extractable Petroleum Hydrocarbons[3]		0.190	JB	0.140	JB	0.360	JB	0.555	JB	0.419	JB
TPH (mg/L)[4]											
Total Petroleum Hydrocarbons (IR)		1.6		2.0		1	U	2.4		1.1	

NOTES:

[1] Round 4 samples were collected by ABB and were analyzed by Commonwealth Analytical.

[2] EPH results do not reflect toxicologically weighted values.

[3] Samples were analyzed using the MADEP EPH Method.

[4] Samples were analyzed using nondispersive infrared (Method 418.1).

NA = Not analyzed.

For each sample, data qualifiers listed in first (unshaded) column after analyte concentrations were assigned by laboratory; data qualifiers listed in second (shaded) column after analyte concentrations were assigned by ABB–ES based on data quality evaluation.

Data Qualifiers: U = Compound was analyzed but not detected; listed value is practical quantitation limit.
J = Estimated value.
B = Analyte also detected in associated blank.

TABLE 4-12
ANALYTES DETECTED IN GROUNDWATER SAMPLES, ROUND 5: PHASE III SITE INVESTIGATION[1]
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

	WELL NO.	2290W-11X	2290W-12X	2290W-13X	2290W-14X	2290W-14X
	SAMPLE ID	MX2290115	MX2290125	MX2290135	MX2290145	MD2290145 (duplicate)
	SAMPLE DATE	12/19/97	12/19/97	12/19/97	12/19/97	12/19/97
ANALYTE						
Extractable Petroleum Hydrocarbons (mg/L)[2,3]						
C_9-C_{18} aliphatic		0.038 U	0.037 U	0.035 U	0.036 U	0.037 U
$C_{19}-C_{36}$ aliphatic		0.051 U	0.049 U	0.047 U	0.048 U	0.049 U
$C_{11}-C_{22}$ aromatic		0.110 U	0.100 U	0.100 U	0.100 U	0.100 U
Polynuclear Aromatic Hydrocarbons with Selective Ion Monitoring (ug/L)[4]						
Naphthalene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Acenaphthylene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Acenaphthene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Fluorene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Phenanthrene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Anthracene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Fluoranthene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Pyrene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(a)anthracene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chrysene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(b)fluoranthene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(k)fluoranthene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(a)pyrene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Indeno(1,2,3-cd)pyrene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibenzo(a,h)anthracene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(g,h,i)perylene		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

NOTES:

[1] Round 5 samples were collected by ABB and were analyzed by Woods Hole Group Environmental Laboratories.

[2] EPH results do not reflect toxicologically weighted values.

[3] Samples were analyzed using the MADEP EPH Method.

[4] Samples were analyzed using Method 8270 with Selective Ion Monitoring (SIM).

NA = Not analyzed.

For each sample, data qualifiers listed in first (unshaded) column after analyte concentrations were assigned by laboratory; data qualifiers listed in second (shaded) column after analyte concentrations were assigned by ABB-ES based on data quality evaluation.

Data Qualifiers: U = Compound was analyzed but not detected; listed value is practical quantitation limit.
J = Estimated value.
B = Analyte also detected in associated blank.

TABLE 5–1
HUMAN HEALTH PRELIMINARY RISK EVALUATION OF ACCESSIBLE SUBSURFACE SOIL
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

ANALYTE	CONCENTRATION		FREQUENCY OF DETECTION	USEPA REGION III COMMERCIAL/INDUSTRIAL SOIL CONCENTRATION (ug/g)	MCP S–2/S–3 STANDARD [c] (ug/g)	MAXIMUM EXCEEDS GUIDELINE CONCENTRATION?
	AVERAGE (ug/g)	MAXIMUM (ug/g)				
SEMIVOLATILES (ug/g)						
Naphthalene	0.37	0.5 J	1/12	82,000	4/– –	No
2–Methylnaphthalene	0.73	3.8	1/12	NA	0.7/– –	Yes
Fluoranthene	0.27 [d]	0.27	3/12	82,000	600/– –	No
Fluorene	0.4	0.74 J	1/12	82,000	400/– –	No
Phenanthrene	0.37	1.3	4/12	NA	100/– –	No
Di–n–butylphthalate	0.24 J [d]	0.24 J	2/12	200,000	NA/– –	No
Pyrene	0.058 J [d]	0.058 J	1/12	61,000	500/– –	No
Bis(2–ethylhexyl)phthalate	0.081 J [d]	0.081 J	1/12	410	100/– –	No
PETROLEUM HYDROCARBONS (ug/g) [a]						
Total Petroleum Hydrocarbons (TPH) Depth <15 ft.	143	1,900	21/85	16,360	2,500/– –	No
Total Petroleum Hydrocarbons (TPH) Depth >15 ft.	44	193	3/12	16,360 [b]	– –/5,000	No
INORGANICS (ug/g)						
Not analyzed	– –	– –	– –	– –	– –	– –

Notes:

[a] For subsurface soil (<15 feet deep), TPH data include field screening results from eighty–five samples at twenty–two soil boring locations (at 4 to 15 foot depths); field screening results and ten excavation soil samples collected by OHM (at 5 to 15 foot depths). For isolated soil (>15 feet deep), TPH data consist of field screening results from one boring collected by ABB–ES (at 15 to 27 foot depths), and seven boring location collected by OHM (15 to 19 foot depths).
Volatiles and semivolatiles data include laboratory analyses of soil boring 2290B–01X.

[b] Calculated commercial/industrial soil concentration for diesel oil; see Section 2.4 for discussion.

[c] The lowest of the S–2/GW–1, S–2/GW–2, and S–2/GW–3 or the S–3/GW–1, S–3/GW–2, S–3/GW–3 soil standards.

[d] The maximum detected value was used because the average is greater than the maximum detected concentration due to elevated SQL's.

Shaded line indicates an exceedance of a screening guideline.

NA = not available
ug/g = micrograms per gram
– – = Not analyzed
J = estimated value, below sample quantitation limit

TABLE 5–2
HUMAN HEALTH PRELIMINARY RISK EVALUATION OF GROUNDWATER
AREE 63BE – BUILDING 2290 FORMER UST SITE
NO FURTHER ACTION DECISION DOCUMENT
DEVENS, MASSACHUSETTS

ANALYTE	CONCENTRATION [a] AVERAGE (ug/L)	CONCENTRATION [a] MAXIMUM (ug/L)	FREQUENCY OF DETECTION	DRINKING WATER STANDARD/GUIDELINE [b] (ug/L)	MCP GROUNDWATER STANDARD [c] ug/L	MAXIMUM EXCEEDS STANDARD/GUIDELINE?
SEMIVOLATILES (ug/L)						
Bis(2–ethylhexyl)phthalate [a]	2 J [d]	2 J	1/4	6	6	No
PETROLEUM HYDROCARBONS (ug/L)						
Extractable Petroleum Hydrocarbons (EPH) [e]						
C_{19} – C_{36} aliphatic	46	135 *	2/4	––	5,000 [f]	No
INORGANICS (ug/L)						
Not analyzed	––	––	––	––	––	––

Notes:

[a] Based on analytical data from Round 1 sampling Well Nos. 2290W–11X through 2290W–14X and duplicate at 2290W–12X.
[b] Includes the lowest of either the EPA or MA drinking water standards, or if no federal or state standard or guideline is available, the USEPA Region III tap water concentration.
[c] The lowest of the GW–1, GW–2 or GW–3 standards.
[d] The maximum detected value was used because the average is greater than the maximum detected concentration due to elevated SQL's.
[e] Based on analytical data from Round 3 samples from wells 2290W–11X through 2290W–14X and duplicate at 2290–14X. Samples were analyzed for extractable petroleum hydrocarbons (EPH).
[f] MADEP, "Revised Massachusetts Contingency Plan", 310 CMR 40.0000 et seq., October 1997.

* = Value represents the average of a sample and its duplicate.
NA = not available
ug/L = micrograms per liter
–– = Not analyzed
J = estimated value, below sample quantitation limit

APPENDIX A
LABORATORY REPORTS FOR ROUND 4 (REVISED) AND ROUND 5 GROUNDWATER ANALYSES

MEMORANDUM

TO: DOUG PIERCE
FROM: STEPHEN KNOLLMEYER
SUBJECT: REVISIONS TO SDG MXX290114
DATE: 4/18/97

Pursuant to my conversation with Tim Dame I am forwarding revised form I's of the EPH results for the SDG MXX290114. The revisions reflect the reporting of the blank contamination issue for the carbon range C10-C22. As discussed in our initial submittal we had dealt with the blank contamination issue by elevating the quantitation limit for this carbon range to twice the level found in the blank. The revised Form I's report the C10-C22 range results which were below the quantitation level and above the blank level of 160 μg/L. Any results above this concentration were reported with a "B" qualifier. As previously noted in the narrative, due to strict adherence to the method as written, the low surrogate results required that all the EPH data be reported as suspect and were therefore reported with a "J" qualifier.

Regarding the discussion of the concentration of the TPH standards, I want to clarify the concentration of the standards as indicated on the IR recorder paper. The concentration of the standard written on the IR paper indicates concentration in the freon extract and must be divided by 10 to achieve the concentration in mg/L. Therefore the low standard, 0.005 mg/mL is not a 5 mg/L standard, but is a 0.5 mg/L standard. Thus we are bracketing our detection limit by running a standard below our 1 mg/L reporting limit.

We are faxing the revised Form I's with this memo, and will forward a hard copy in tonight's mail.

J:\MEM\SLK\ABBEPH

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.
MX2290114

Lab Name: COMMONWEALTH ANALYTICAL
Contract: DACA3391D6
Project No.: 0713700
Work ID: NE753014
Location: Wakefield, MA
SDG: MX2290114
Matrix: (soil/water) WATER
Lab Sample ID: 970316701
Sample wt/vol: 1000 (g/mL) mL
Lab File ID: 013F0101[1], 017F0101[2]
Level: (low/med) LOW
Date Received: 3/13/97
Concentrated Extract Volume: 1000 (uL)
Date Extracted: 3/18/97
Injection Volume: 2.0 (uL)
Date Analyzed: 03/31/97[1], 03/26/97[2]
decanted: (Y/N): N
pH: 2
Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) μg/L	Q
	C_9 - C_{18} aliphatic[1]	70	UJ
	C_{19} - C_{36} aliphatic[1]	190	JB
	C_{10} - C_{22} aromatic[2]	150	UJ
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

REVISED

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.
MX2290124

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG: MX2290114

Matrix: (soil/water) WATER Lab Sample ID: 970316702

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 014F0101[1], 018F0101[2]

Level: (low/med) LOW Date Received: 3/13/97

Concentrated Extract Volume: 1000 (uL) Date Extracted: 3/18/97

Injection Volume: 2.0 (uL) Date Analyzed: 03/31/97[1], 03/26/97[2]

decanted: (Y/N): N pH: 2 Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) µg/L	Q
	C_9 - C_{18} aliphatic[1]	70	UJ
	C_{19} - C_{36} aliphatic[1]	140	JB
	C_{10} - C_{22} aromatic[2]	140	UJ
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

REVISED

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.
MX2290134

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG: MX2290114

Matrix: (soil/water) WATER Lab Sample ID: 970316703

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 015F0101[1], 019F0101[2]

Level: (low/med) LOW Date Received: 3/13/97

Concentrated Extract Volume: 1000 (uL) Date Extracted: 3/18/97

Injection Volume: 2.0 (uL) Date Analyzed: 03/31/97[1], 03/26/97[2]

decanted: (Y/N): N pH: 2 Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) μg/L	Q
	C_9 - C_{18} aliphatic[1]	70	UJ
	C_{19} - C_{36} aliphatic[1]	150	JB
	C_{10} - C_{22} aromatic[2]	210	JB
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

REVISED

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.

MX2290144

Lab Name: COMMONWEALTH ANALYTICAL
Contract: DACA3391D6

Project No.: 0713700
Work ID: NE753014
Location: Wakefield, MA
SDG: MX2290114

Matrix: (soil/water) WATER
Lab Sample ID: 970316704

Sample wt/vol: 1000 (g/mL) mL
Lab File ID: 016F0101[1], 020F0101[2]

Level: (low/med) LOW
Date Received: 3/13/97

Concentrated Extract Volume: 1000 (uL)
Date Extracted: 3/18/97

Injection Volume: 2.0 (uL)
Date Analyzed: 03/31/97[1], 03/26/97[2]

decanted: (Y/N): N
pH: 2
Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) µg/L	Q
	C_9 - C_{18} aliphatic[1]	85	JB
	C_{19} - C_{36} aliphatic[1]	240	JB
	C_{10} - C_{22} aromatic[2]	230	JB
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

REVISED

SAMPLE NO.

MD2290144

EPH ANALYSIS DATA SHEET

Lab Name: COMMONWEALTH ANALYTICAL   Contract: DACA3391D6

Project No.: 0713700   Work ID: NE753014   Location: Wakefield, MA   SDG: MX2290114

Matrix: (soil/water) WATER   Lab Sample ID: 970316705

Sample wt/vol: 1000 (g/mL) mL   Lab File ID: 017F0101[1], 021F0101[2]

Level: (low/med) LOW   Date Received: 3/13/97

Concentrated Extract Volume: 1000 (uL)   Date Extracted: 3/18/97

Injection Volume: 2.0 (uL)   Date Analyzed: 04/01/97[1], 03/26/97[2]

decanted: (Y/N): N   pH: 2   Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) µg/L	Q
	C_9 - C_{18} aliphatic[1]	79	JB
	C_{19} - C_{36} aliphatic[1]	100	JB
	C_{10} - C_{22} aromatic[2]	240	JB
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

REVISED

ABB Environmental
107 Audubon Road
Wakefield, MA

Sample Delivery Group (SDG) MX2290114

The following samples were analyzed as part of this SDG.

Client Sample ID	Lab Sample ID	Analyses
MX2290114	9703167-01	TPH, EPH
MX2290124	9703167-02	TPH, EPH
MX2290134	9703167-03	TPH, EPH
MX2290144	9703167-04	TPH, EPH
MD2290144	9703167-05	TPH, EPH

Authorized Signature

4/7/97

Stephen Knollmeyer Date

CommonwealthAnalytical

SDG NARRATIVE

ABB Environmental
107 Audubon Road
Wakefield, MA

Sample Delivery Group (SDG)

MX2290114

The following samples were analyzed as part of this SDG.

Client Sample ID	Lab Sample ID	Analyses
MX2290114	9703167-01	TPH, EPH
MX2290124	9703167-02	TPH, EPH
MX2290134	9703167-03	TPH, EPH
MX2290144	9703167-04	TPH, EPH
MD2290144	9703167-05	TPH, EPH

Objective:

Commonwealth Analytical (CA) is providing laboratory services to ABB Environmental (ABB). This SDG narrative describes the methods used, QA/QC performed, QC Deviations and any results that require explanation.

For this SDG, the analytical services provided include the analysis of well water samples collected for Total Petroleum Hydrocarbons (TPH) by EPA Method 418.1 and Extractable Petroleum Hydrocarbons (EPH) by MADEP Draft Method (August 1995).

The sections listed below describe the methods used for sample preparation and analysis, the Quality Control analyses and any QC Deviations. Attached to the narrative are the sample results and the results of all QA/QC analyses presented on EPA CLP forms. When necessary the EPA CLP forms have been modified to follow the methods being analyzed and to conform to the project-specific Work Plan.

The format of this package is as follows:

TABLE OF CONTENTS

Sample Preparation:

Method 418.1 Total Petroleum Hydrocarbons (TPHs) - TPH water samples were extracted using a liquid-liquid Seporatory funnel procedure with Freon 113 as the extracting solvent.

MADEP Draft Method Extractable Petroleum Hydrocarbons (EPHs) - For water samples (including Equipment Blanks) EPA Method 3510-Liquid/Liquid (L/L) Extraction was used to prepare the sample. A 1-L portion of sample (if not available a smaller volume) was taken for extraction and the pH was measured and recorded. The sample was poured into a Seporatory funnel and the sample was spiked with a 1-mL portion of the surrogate spiking mixture for EPHs and a 60-mL portion of MeCl2 was added to the Seporatory funnel. The Seporatory funnel was shaken for 1-2 minutes with periodic venting and repeated two more times with fresh portions of MeCl2. All three aliquots of MeCl2 were combined and passed through Sodium Sulfate to remove water. The extract was concentrated to a 1mL final volume and passed through a silica gel cartridge to fractionate the aliphatic and aromatic fractions.

Sample Analysis:

Method 418. Total Petroleum Hydrocarbons (TPHs) - Freon extracts were analyzed on a scanning Infra-Red Spectrophotometer. Absorbance (and transmittance) were measured and compared to the 5-pt. standard curve to calculate concentrations.

MADEP Draft Method Extractable Petroleum Hydrocarbons (EPHs) - An HP Model 5890 Gas Chromatograph (GC) with a Flame Ionization Detector (FID) was used to analyze for TPH. The GC was interfaced with an HP Model 5773A autoinjector system and the entire system was controlled by a Dell Pentium Computer running HP Chemstation Software.

Analytical Column: J&W DB-5MS 30m x 0.32mm ID with 0.25um film

Temperature Program: Initial temp. 45°C, hold for 1.0 min., ramp at 10°C/min to 280°C, hold for 17 min.

Total Run Time: 43 min.

Carrier Gas: Helium Grade 5

Quality Control Analyses

EPA Method 418.1 (TPH)

QC Analysis	Frequency	Acceptance Criteria
Initial Calibration	At start-up and when cont. cal fails	CURVE >0.990
Continuing Calibration	Mid-point std. 1X per batch of 10 samples	85 - 115 %R
LCS/LCSD	Per Batch of 10 samples or per SDG	78 - 118 %R, 17 %RPD
Control Charts	Updated daily	See above limits for: LCS/LCSD
MDL	Run yearly	Requires QA Specialist; Lab Director Approval

MADEP Draft Method (EPH)

QC Analysis	Frequency	Acceptance Criteria
Initial Calibration	At start-up and when cont. cal fails	CURVE >0.990
Laboratory Fortified Matrix (LFM)	Per Batch of 20 samples or per SDG	60 - 140 %R
Method Blank (MB)	1X per 12 hr period	All analytes <½ Det. Limit
Calibration Check Standard	Mid-point std. 1 every 10 samples	75 - 125 %R
MS\MSD	Per Batch of 20 samples or per SDG	60 - 140 %R, 25 %RPD
Surrogates	All samples and QC analyses - 3 compounds	60 - 140 %R
Control Charts	Updated weekly	See above limits for: LFM, MS/MSD and Surrogates
MDL	Run yearly	Requires QA Specialist; Lab Director Approval

Quality Control Deviations:

SDG specific Quality Control Deviations are listed below.

Sample Log-in
The temperature of the cooler for this SDG was 3.1 ^{0}C.

EPA Method 418.1 Total Petroleum Hydrocarbons (TPH)
All QC criteria was met.

MADEP Draft Method Extractable Petroleum Hydrocarbons (EPH)
The surrogate and spike recoveries were outside of the guidance limits of 60-140%R for nearly all of the samples in the SDG. While this is not uncommon with this method, strict adherence to the method necessitates reporting of the data as suspect. Therefore, the data have been reported with a "J" qualifier as estimated.

Due to the reporting level required in the draft method, blank contamination by peaks detected at or near the noise level is common in this analysis for the carbon ranges. Detection limits for these ranges were elevated above the blank level. Any sample values detected above this level were reported with a "B" qualifier as detected in the blank.

FORM 1

TOTAL PETROLUEM HYDROCARBON (418.1) ANALYSIS DATA SHEET

SAMPLE NO.

MX2290114

Lab Name: COMMONWEALTH ANALYTICAL

Contract: DACA3391D6

Project No.: 0713700

Work ID: NE753014

Location: Wakefield, MA

SDG #: MX2290114

Matrix: WATER (soil/water)

Lab Sample ID: 970316701

Sample wt/vol: (g/mL) 1.0 mL

Date Received: 3/13/97

Level: LOW (low/med)

Date Extracted: 3/13/97

% Moisture:

Date Analyzed: 3/13/97

Dilution Factor: 1.0

COMPOUND	CONCENTRATION (mg/L)	Q
Total Petroleum Hydrocarbons	1.6	

FORM 1

TOTAL PETROLUEM HYDROCARBON (418.1) ANALYSIS DATA SHEET

SAMPLE NO.

MX2290124

Lab Name: COMMONWEALTH ANALYTICAL   Contract: DACA3391D6

Project No.: 0713700   Work ID: NE753014   Location: Wakefield, MA   SDG #: MX2290114

Matrix: WATER (soil/water)   Lab Sample ID: 970316702

Sample wt/vol: (g/mL) 1.0 mL   Date Received: 3/13/97

Level: LOW (low/med)   Date Extracted: 3/13/97

% Moisture: ________   Date Analyzed: 3/13/97

Dilution Factor: 1.0

COMPOUND	CONCENTRATION (mg/L)	Q
Total Petroleum Hydrocarbons	2.0	

FORM 1

TOTAL PETROLUEM HYDROCARBON (418.1) ANALYSIS DATA SHEET

SAMPLE NO.

MX2290134

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG #: MX2290114

Matrix: WATER (soil/water) Lab Sample ID: 970316703

Sample wt/vol: (g/mL) 1.0 mL Date Received: 3/13/97

Level: LOW (low/med) Date Extracted: 3/13/97

% Moisture: ______ Date Analyzed: 3/13/97

Dilution Factor: 1.0

COMPOUND	CONCENTRATION (mg/L)	Q
Total Petroleum Hydrocarbons	1	U

FORM 1
TOTAL PETROLUEM HYDROCARBON (418.1) ANALYSIS DATA SHEET

SAMPLE NO.

MX2290144

Lab Name: COMMONWEALTH ANALYTICAL

Contract: DACA3391D6

Project No.: 0713700

Work ID: NE753014

Location: Wakefield, MA

SDG #: MX2290114

Matrix: WATER (soil/water)

Lab Sample ID: 970316704

Sample wt/vol: (g/mL) 1.0 mL

Date Received: 3/13/97

Level: LOW (low/med)

Date Extracted: 3/13/97

% Moisture:

Date Analyzed: 3/13/97

Dilution Factor: 1.0

COMPOUND	CONCENTRATION (mg/L)	Q
Total Petroleum Hydrocarbons	2.4	

FORM 1

TOTAL PETROLUEM HYDROCARBON (418.1) ANALYSIS DATA SHEET

SAMPLE NO.

MD2290144

Lab Name: COMMONWEALTH ANALYTICAL

Contract: DACA3391D6

Project No.: 0713700

Work ID: NE753014

Location: Wakefield, MA

SDG #: MX2290114

Matrix: WATER (soil/water)

Lab Sample ID: 970316705

Sample wt/vol: (g/mL) 1.0 mL

Date Received: 3/13/97

Level: LOW (low/med)

Date Extracted: 3/13/97

% Moisture:

Date Analyzed: 3/13/97

Dilution Factor: 1.0

COMPOUND	CONCENTRATION (mg/L)	Q
Total Petroleum Hydrocarbons	1.1	

FORM III
TPH (418.1) LABORATORY CONTROL SAMPLE /LABORATORY CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6 SDG: MX2290114

Project: 0713700 Work ID: NE753014 Location: Wakefield, MA

Matrix Spike/Matrix Spike Duplicate Sample ID: LCS

COMPOUND	SPIKE ADDED (mg/L)	SAMPLE CONCENTRATION (mg/L)	LCS CONCENTRATION (mg/L)	LCS % REC	#	QC. LIMITS REC.
TPH	5.0	ND	5.0	100		(78-118)

COMPOUND	SPIKE ADDED (mg/L)	LCSD CONCENTRATION (mg/L)	LCSD % REC	#	% RPD	#	QC LIMITS RPD	QC LIMITS REC.
TPH	5.0	5.0	100		0		≤17	(78-118)

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD:0 out of 1 outside limits
Spike Recovery: 0 out of 2 outside limits

Comments: ______________________

FORM IV

TPH (418.1) METHOD BLANK SUMMARY

SAMPLE ID

METHOD BLANK

Lab Name: COMMONWEALTH ANALYTICAL
Contract: DACA33691D6
SDG: MX2290114

Project: 0713700
Work ID: NE753014
Location: WAKEFIELD, MA

Instrument ID: IR1
Date Analyzed: 03/13/97

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

	SAMPLE ID	LAB SAMPLE ID
01	MX2290114	970316701
02	MX2290124	970316702
03	MX2290134	970316703
04	MX2290144	970316704
05	MD2290144	970316705
06	ZZZZZ	970308701
07		
08		
09		
10		
11		
12		
13		
14		
15		
16		
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COMMENTS:

FORM VI
TPH (418.1) INITIAL CALIBRATION

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6 SDG: MX2290114

Project: 0713700 Work ID: NE753014 Location: WAKEFIELD, MA

Instrument ID: IR1 Calibration Date: 3/13/97

COMPOUND	Correlation Coefficient
TPH	0.996

Correlation coefficient computed from:

STD 1: 0.005 mg/mL
STD 2: 0.01 mg/mL
STD 3: 0.025 mg/mL
STD 4: 0.05 mg/mL
STD 5: 0.10 mg/mL

All compounds must meet a .990 criteria.

FORM VII
TPH (418.1) CONTINUING CALIBRATION

Lab Name: COMMONWEALTH ANALYTICAL
Contract: DACA3391D6
SDG: MX2290114
Project: 0713700
Work ID: NE753014
Location: WAKEFIELD, MA

Instrument ID: IR1
Calibration Date: 3/13/97

CONTINUING CALIBRATION CHECK		
COMPOUND	PERCENT RECOVERY	CONTROL LIMITS
TPH	96%	85-115%

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.

METHOD BLANK

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG: MX2290114

Matrix: (soil/water) WATER Lab Sample ID: METHOD BLANK

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 009F0101[1], 013F0101[2]

Level: (low/med) LOW Date Received: 3/18/97

Concentrated Extract Volume: 1000 (uL) Date Extracted: 3/18/97

Injection Volume: 2.0 (uL) Date Analyzed: 03/31/97[1], 03/26/97[2]

decanted: (Y/N): N pH: 6 Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) µg/L	Q
	C_9 - C_{18} aliphatic[1]	33	J
	C_{19} - C_{36} aliphatic[1]	49	J
	C_{10} - C_{22} aromatic[2]	160	J
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.
MX2290114

Lab Name: COMMONWEALTH ANALYTICAL
Contract: DACA3391D6

Project No.: 0713700
Work ID: NE753014
Location: Wakefield, MA
SDG: MX2290114

Matrix: (soil/water) WATER
Lab Sample ID: 970316701

Sample wt/vol: 1000 (g/mL) mL
Lab File ID: 013F0101[1], 017F0101[2]

Level: (low/med) LOW
Date Received: 3/13/97

Concentrated Extract Volume: 1000 (uL)
Date Extracted: 3/18/97

Injection Volume: 2.0 (uL)
Date Analyzed: 03/31/97[1], 03/26/97[2]

decanted: (Y/N): N
pH: 2
Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) μg/L	Q
	C_9 - C_{18} aliphatic[1]	70	UJ
	C_{19} - C_{36} aliphatic[1]	190	JB
	C_{10} - C_{22} aromatic[2]	300	UJ
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.

MX2290124

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG: MX2290114

Matrix: (soil/water) WATER Lab Sample ID: 970316702

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 014F0101[1], 018F0101[2]

Level: (low/med) LOW Date Received: 3/13/97

Concentrated Extract Volume: 1000 (uL) Date Extracted: 3/18/97

Injection Volume: 2.0 (uL) Date Analyzed: 03/31/97[1], 03/26/97[2]

decanted: (Y/N): N pH: 2 Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) μg/L	Q
	C_9 - C_{18} aliphatic[1]	70	UJ
	C_{19} - C_{36} aliphatic[1]	140	JB
	C_{10} - C_{22} aromatic[2]	300	UJ
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.

MX2290134

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG: MX2290114

Matrix: (soil/water) WATER Lab Sample ID: 970316703

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 015F0101[1], 019F0101[2]

Level: (low/med) LOW Date Received: 3/13/97

Concentrated Extract Volume: 1000 (uL) Date Extracted: 3/18/97

Injection Volume: 2.0 (uL) Date Analyzed: 03/31/97[1], 03/26/97[2]

decanted: (Y/N): N pH: 2 Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) μg/L	Q
	C_9 - C_{18} aliphatic[1]	70	UJ
	C_{19} - C_{36} aliphatic[1]	150	JB
	C_{10} - C_{22} aromatic[2]	300	UJ
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.

MX2290144

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG: MX2290114

Matrix: (soil/water) WATER Lab Sample ID: 970316704

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 016F0101[1], 020F0101[2]

Level: (low/med) LOW Date Received: 3/13/97

Concentrated Extract Volume: 1000 (uL) Date Extracted: 3/18/97

Injection Volume: 2.0 (uL) Date Analyzed: 03/31/97[1], 03/26/97[2]

decanted: (Y/N): N pH: 2 Dilution Factor: 1.0

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

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) μg/L	Q
	C_9 - C_{18} aliphatic[1]	85	JB
	C_{19} - C_{36} aliphatic[1]	240	JB
	C_{10} - C_{22} aromatic[2]	300	UJ
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

FORM I
EPH ANALYSIS DATA SHEET

SAMPLE NO.
MD2290144

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG: MX2290114

Matrix: (soil/water) WATER Lab Sample ID: 970316705

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 017F0101[1], 021F0101[2]

Level: (low/med) LOW Date Received: 3/13/97

Concentrated Extract Volume: 1000 (uL) Date Extracted: 3/18/97

Injection Volume: 2.0 (uL) Date Analyzed: 04/01/97[1], 03/26/97[2]

decanted: (Y/N): N pH: 2 Dilution Factor: 1.0

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) µg/L	Q
	C_9 - C_{18} aliphatic[1]	79	JB
	C_{19} - C_{36} aliphatic[1]	100	JB
	C_{10} - C_{22} aromatic[2]	300	UJ
83-32-9	Acenaphthene[2]	2	UJ
208-96-8	Acenaphthylene[2]	2	UJ
120-12-7	Anthracene[2]	2	UJ
56-55-3	Benzo(a)Anthracene[2]	2	UJ
205-99-2	Benzo(b)Fluoranthene[2]	2	UJ
207-08-9	Benzo(k)Fluoranthene[2]	2	UJ
50-32-8	Benzo(a)Pyrene[2]	2	UJ
191-24-2	Benzo(g,h,i)Perylene[2]	2	UJ
218-01-9	Chrysene[2]	2	UJ
53-70-3	Dibenzo(a,h)Anthracene[2]	2	UJ
206-44-0	Fluoranthene[2]	2	UJ
86-73-7	Fluorene[2]	2	UJ
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	2	UJ
91-57-6	2-Methylnaphthalene[2]	2	UJ
91-20-3	Naphthalene[2]	2	UJ
85-01-8	Phenanthrene[2]	2	UJ
129-00-0	Pyrene[2]	2	UJ

FORM II
EPH SURROGATE RECOVERY

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6 SDG: MX2290114

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA

Level: (low/med) LOW

	SAMPLE NO.	SMC1	#	SMC2	#	TOT OUT
01	MX2290114	29	*	48	*	2
02	MX2290124	34	*	41	*	2
03	MX2290134	35	*	55	*	2
04	MX2290144	30	*	47	*	2
05	MD2290144	32	*	61		1
06	METHOD BLANK	28	*	52	*	2
07	LCS	25	*	62		1
08	LCSD	29	*	59	*	2
09	LFM	31	*	62		1
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		QC LIMITS
SMC1	= 2 Chloro-octadecane (COD)	60 - 140
SMC2	= P Ortho-terphenyl (OTP)	60 - 140

\# Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogate diluted out

FORM III
EPH LCS/LCSD RECOVERY

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG: MX2290114

Matrix Spike - Sample No.: LCS/LCSD

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC	#	QC LIMITS REC.
C_9 - aliphatic	25	ND	8.4	34	*	(60-140)
C_{14} - aliphatic	25	ND	8.2	33	*	(60-140)
C_{19} - aliphatic	25	ND	3.5	14	*	(60-140)
C_{20} - aliphatic	25	ND	3.8	15	*	(60-140)
C_{28} - aliphatic	25	ND	2.5	10	*	(60-140)
Acenaphthene	25	ND	13	52	*	(60-140)
Anthracene	25	ND	13	52	*	(60-140)
Chrysene	25	ND	3.2	13	*	(60-140)
Naphthalene	25	ND	9.3	37	*	(60-140)
Pyrene	25	ND	10	40	*	(60-140)

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC	#	% RPD	#	QC LIMITS RPD	QC LIMITS REC.
C_9 - aliphatic	25	9.4	38	*	11		25	(60-140)
C_{14} - aliphatic	25	6.8	27	*	19		25	(60-140)
C_{19} - aliphatic	25	6.1	24	*	54	*	25	(60-140)
C_{20} - aliphatic	25	5.9	24	*	43	*	25	(60-140)
C_{28} - aliphatic	25	4.1	16	*	48	*	25	(60-140)
Acenaphthene	25	6.7	27	*	64	*	25	(60-140)
Anthracene	25	8.4	34	*	43	*	25	(60-140)
Chrysene	25	3.4	13	*	6		25	(60-140)
Naphthalene	25	6.8	27	*	31	*	25	(60-140)
Pyrene	25	5.9	24	*	52	*	25	(60-140)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 7 out of 10 outside limits
Spike Recovery:20 out of 20 outside limits

Comments: ____________________

FORM III
EPH LFM RECOVERY

Lab Name: COMMONWEALTH ANALYTICAL   Contract: DACA3391D6

Project No.: 0713700   Work ID: NE753014   Location: Wakefield, MA   SDG: MX2290114

Matrix Spike - Sample No.: LFM

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC	#	QC LIMITS REC.
C_9 - aliphatic	25	ND	8.5	34	*	(60-140)
C_{14} - aliphatic	25	ND	6.0	24	*	(60-140)
C_{19} - aliphatic	25	ND	5.9	24	*	(60-140)
C_{20} - aliphatic	25	ND	10	40	*	(60-140)
C_{28} - aliphatic	25	ND	3.4	14	*	(60-140)
Acenaphthene	25	ND	8.9	36	*	(60-140)
Anthracene	25	ND	12	48	*	(60-140)
Chrysene	25	ND	3.2	13	*	(60-140)
Naphthalene	25	ND	6.2	25	*	(60-140)
Pyrene	25	ND	8.6	34	*	(60-140)

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery:10 out of 10 outside limits

Comments: ______

FORM IV
EPH METHOD BLANK SUMMARY

SAMPLE NO.

METHOD BLANK

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA SDG: MX229011

Lab File ID: 009F0101[1], 013F0101[2] Lab Sample ID: METHOD BLANK

Instrument ID: GC#2 Date Extracted: 3/18/97

Matrix: (soil/water) WATER Date Analyzed: 03/31/97[1], 03/26/97[2]

Level: (low/med) LOW Time Analyzed: 18:12[1], 10:12[2]

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID(S)	DATE(S) ANALYZED
01	LFM	LFM	010F0101[1], 014F0101[2]	03/31/97[1], 03/26/97[2]
02	LCS	LCS	011F0101[1], 015F0101[2]	03/31/97[1], 03/26/97[2]
03	LCSD	LCSD	012F0101[1], 016F0101[2]	03/31/97[1], 03/26/97[2]
04	MX2290114	970316701	013F0101[1], 017F0101[2]	03/31/97[1], 03/26/97[2]
05	MX2290124	970316702	014F0101[1], 018F0101[2]	03/31/97[1], 03/26/97[2]
06	MX2290134	970316703	015F0101[1], 019F0101[2]	03/31/97[1], 03/26/97[2]
07	MX2290144	970316704	016F0101[1], 020F0101[2]	03/31/97[1], 03/26/97[2]
08	MD2290144	970316705	017F0101[1], 021F0101[2]	04/01/97[1], 03/26/97[2]
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COMMENTS:

FORM VI
EPH INITIAL CALIBRATION DATA

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6 SDG: MX2290114

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA

Instrument ID: GC#2 Calibration Date(s): 03/31/97-03/31/97[1,2], 03/11/97-03/11/97[3]

Calibration Times: 11:26-16:21[1,2], 19:23-23:24[3]

COMPOUND	Correlation Coefficient
C_9 - C_{18} aliphatic[1]	1.000
C_{19} - C_{36} aliphatic[1]	0.998
C_{10} - C_{22} aromatic[2]	0.999
Acenaphthene[3]	0.999
Acenaphthylene[3]	0.999
Anthracene[3]	0.999
Benzo(a)Anthracene[3]	0.991
Benzo(b)Fluoranthene[3]	0.986*
Benzo(k)Fluoranthene[3]	0.992
Benzo(a)Pyrene[3]	0.990
Benzo(g,h,i)Perylene[3]	0.993
Chrysene[3]	0.992
Dibenzo(a,h)Anthracene[3]	0.990
Fluoranthene[3]	0.991
Fluorene[3]	0.999
Indeno(1,2,3-cd)Pyrene[3]	0.995
2-Methylnaphthalene[3]	0.999
Naphthalene[3]	0.999
Phenanthrene[3]	0.999
Pyrene[3]	0.992

1	2	3
STD 1: 002F0101	STD 1: 002F0201	STD 1: 002F0201
STD 2: 003F0101	STD 2: 003F0201	STD 2: 003F0201
STD 3: 004F0101	STD 3: 004F0201	STD 3: 004F0201
STD 4: 006F0101	STD 4: 005F0201	STD 4: 005F0201
STD 5: 007F0101	STD 5: 006F0201	STD 5: 006F0201
		STD 6: 007F0201

All compounds must meet a .990 criteria.
* Values outside of QC Limits

FORM VII
EPH OPENING STANDARD DATA

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6 SDG: MX2290114

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA

Instrument ID: GC#2 Lab File ID: 012F0101 Date Analyzed: 03/26/97

CAS No.	Compound	%R	#	Control Limits %R
	C_9 - C_{22} aromatic	106		75 - 125
83-32-9	Acenaphthene	109		75 - 125
208-96-8	Acenaphthylene	109		75 - 125
120-12-7	Anthracene	96		75 - 125
56-55-3	Benzo(a)Anthracene	101		75 - 125
205-99-2	Benzo(b)Fluoranthene	115		75 - 125
207-08-9	Benzo(k)Fluoranthene	119		75 - 125
50-32-8	Benzo(a)Pyrene	115		75 - 125
191-24-2	Benzo(g,h,i)Perylene	112		75 - 125
218-01-9	Chrysene	106		75 - 125
53-70-3	Dibenzo(a,h)Anthracene	125		75 - 125
206-44-0	Fluoranthene	84		75 - 125
86-73-7	Fluorene	108		75 - 125
193-39-5	Indeno(1,2,3-cd)Pyrene	106		75 - 125
91-57-6	2-Methylnaphthalene	109		75 - 125
91-20-3	Naphthalene	107		75 - 125
85-01-8	Phenanthrene	98		75 - 125
129-00-0	Pyrene	80		75 - 125

Column to be used to flag recovery values

* Values outside of contract required QC limits

FORM VII
EPH CLOSING STANDARD DATA

Lab Name: COMMONWEALTH ANALYTICAL Contract: DACA3391D6 SDG: MX2290114

Project No.: 0713700 Work ID: NE753014 Location: Wakefield, MA Instrument ID: GC#2

Lab File ID: 019F0101[1], 022F0101[2] Date Analyzed: 04/01/97[1], 03/26/97[2]

CAS No.	Compound	%R	#	Control Limits %R
	C_9 - C_{18} aliphatic[1]	104		75 - 125
	C_{19} - C_{36} aliphatic[1]	96		75 - 125
	C_9 - C_{22} aromatic[2]	98		75 - 125
83-32-9	Acenaphthene[2]	110		75 - 125
208-96-8	Acenaphthylene[2]	109		75 - 125
120-12-7	Anthracene[2]	93		75 - 125
56-55-3	Benzo(a)Anthracene[2]	79		75 - 125
205-99-2	Benzo(b)Fluoranthene[2]	83		75 - 125
207-08-9	Benzo(k)Fluoranthene[2]	86		75 - 125
50-32-8	Benzo(a)Pyrene[2]	85		75 - 125
191-24-2	Benzo(g,h,i)Perylene[2]	86		75 - 125
218-01-9	Chrysene[2]	81		75 - 125
53-70-3	Dibenzo(a,h)Anthracene[2]	101		75 - 125
206-44-0	Fluoranthene[2]	78		75 - 125
86-73-7	Fluorene[2]	107		75 - 125
193-39-5	Indeno(1,2,3-cd)Pyrene[2]	83		75 - 125
91-57-6	2-Methylnaphthalene[2]	112		75 - 125
91-20-3	Naphthalene[2]	111		75 - 125
85-01-8	Phenanthrene[2]	95		75 - 125
129-00-0	Pyrene[2]	74	*	75 - 125

Column to be used to flag recovery values

* Values outside of contract required QC limits

COOLER RECEIPT FORM

Contractor Cooler: yes
MRD Cooler #: 35L
Number of Coolers: 1

Workorder # 9703167

Project Name: NE 753014

Date Received: 3-13-97

USE OTHER SIDE OF THIS FORM TO NOTE DETAILS CONCERNING CHECK-IN PROBLEMS.

A. PRELIMINARY EXAMINATION PHASE: Date cooler was opened: 3-13-97

by (print) Ria Haworth (sign) Ria Haworth

1. Did cooler come with a shipping slip (air bill, etc.)? . . . . . . [✓ YES] NO
   If yes, enter carrier name & air bill number here: Fed X 689 6593 605
2. Were custody seals on outside of cooler? . . . . . . [✓ YES] NO
   How many & where: (2) wrapped each end of cooler seal date: 3-12-97 seal name: ESE
3. Were custody seals unbroken and intact at the date and time of arrival? . . . . . . [✓ YES] NO
4. Did you screen samples for radioactivity using the Geiger Counter? . . . . . . YES [✓ NO]
5. Were custody papers sealed in a plastic bag & taped inside to the lid? . . . . . . [✓ YES] NO
6. Were custody papers filled out properly (ink, signed, etc.)? . . . . . . [✓ YES] NO
7. Did you sign custody papers in the appropriate place? . . . . . . [✓ YES] NO
8. Was project identifiable from custody papers? . . . . . . [✓ YES] NO
   If YES, enter project name at the top of this form.
9. If required, was enough ice used? yes . . . Type of ice: Bagged ice . . . . . . [✓ YES] NO
10. Have designated person initial here to acknowlege receipt of cooler: RH (date) 3-13-97

B. LOG-IN PHASE: Date samples were logged-in: 3-13-97

by(print) Ria (sign) Ria Haworth

11. Describe type of packing in cooler: Bubble Wrap
12. Were all bottles sealed in separate plastic bags? . . . . . . [✓ YES] NO
13. Did all bottles arrive unbroken & were labels in good condition? . . . . . . [✓ YES] NO
14. Were all bottle labels complete (ID, date, time, signature, preservative, etc.)? . . . . . . [✓ YES] NO
15. Did all bottle labels agree with custody papers? . . . . . . [✓ YES] NO
16. Were correct containers used for the tests indicated? . . . . . . [✓ YES] NO
17. Were correct preservatives added to samples? . . . . . . [✓ YES] NO
18. Was a sufficient amount of sample sent for tests indicated? . . . . . . [✓ YES] NO
19. Were bubbles absent in VOA samples? If NO, list by QA#: YES NO N/A -
20. Was the project manager called and status discussed? . . . . . . [✓ YES] NO
    If YES, give details on the back of this form.
21. Who was called? Gianina Burnett By whom? Ria Haworth (date) 3/13/97

Chain of Custody Form

Commonwealth Analytical
53 Southampton Rd. Westfield, MA 01085
(413)572-3200 fax(413)572-3215

Client: ABB Environmental
Address: 107 Audubon Rd
wakefield Ma 01880
Phone: 617-245-6606

Job#/Proj. Manager: 07137-00 Doug Pierce
Work ID: NE753014
Contact: Doug Pierce
Collected by: DBDiom

Workorder # 9703 167
COC #

Analysis Requested
Check analysis and specify method and analytes in comments section.
For example:
500-series for drinking water
600-series for waste water
8000-series for haz/solid waste
Use comments section to further define.

Comments (Special Instructions)
① TPH (418.1)
② EPH

Requested Turn Around Time (✓)
24 hr. ☐ 1 wk. ☐ Other ☐
48 hr. ☐ 2 wk. ☐ Specify:

Special Detection Limits? (✓)
Yes ☐ No ☐
Specify:

Special QA/QC? (✓)
Yes ☐ No ☐
Specify:

Sample Type Codes
WW-Wellwater W-Wastewater SW-Surfacewater LW-Labwater
RW-Raw Water GW-Groundwater PW-Public Water SO-Soil
S-Solid SL-Sludge O-Oil A-Air Z-Other

Fraction	Sample ID (Use one line per container; For volatiles-one line/analysis)	Sample Type	Date / Time Collected	Grab(✓)	Comp(✓)	# containers	Plastic(P) or Glass(G)	Preservative: Na2S2O3	HNO3 to pH <2	H2SO4 to pH <2	HCl to pH<2	NaOH to pH>12	Other	4° C	pH	Volatiles	Semivolatiles	PCB & Pesticides	Metals	Cyanide	TCLP	Oil & Grease	Total Pet. Hyd. (TPH)	General Chemistry	Bacteriological	Other
01A	MX2290114	WW	3/12/97 0805	✓		1	G				X				/								①			
01B	MX2290114	WW	3/12/97 0805	✓		1	G				X				/											②
02A	MX2290124	WW	3/12/97 0755	✓		1	G				X				/								①			
02B	MX2290124	WW	3/12/97 0755	✓		1	G				X				/											②
03A	MX2290134	WW	3/12/97 0745	✓		1	G				X				/								①			
03B	MX2290134	WW	3/12/97 0745	✓		1	G				X				/											②
04A	MX2290144	WW	3/12/97 0735			1	G				X				/								①			
04B	MX2290144	WW	3/12/97 0735			1	G				X				/											②
05A	MD2290144	WW	3/12/97 0735			1	G				X				/								①			
05B	MD2290144	WW	3/12/97 0735			1	G				X				/											②

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
David B Dioml	3/12/97	0900	Ken Haworth	3/13/97	10:30
			3/13/97		
KH					

Method of shipment: Fed EX 6896593605
Laboratory: CA.

Cooler #: 35L
Temp. @ receipt: 3.1° C
Preservation pH checked
By: KH Date: 3/13/97

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Environmental Laboratories

375 Paramount Drive • Suite B
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Phone: 508-822-9300
Fax: 508-822-3288

Case Narrative

ETR: 39832
Client: ABB Environmental Services, Inc.
Project: Ft. Devens AOC 69W UST GW
Date Received: 12/22/97

All analyses were performed within holding time and with appropriate quality control measures except where noted. Blank correction of results is not performed in the laboratory for any parameter. Soil/sediment samples are reported on a dry weight basis unless otherwise noted.

PAH-SIM Analysis:

Samples MX2290125 (39832-2), MX2290145 (39832-2) and MD2290145 (39832-3), each had one surrogate compound recovery below the Acceptable Range, viz., 2-fluorobiphenyl. One surrogate compound recovery outlier per fraction is allowed per protocol

The enclosed results of analyses are representative of the samples as received by the laboratory. Woods Hole Group makes no representations or certifications as to the method of sample collection, sample identification, or transporting/handling procedures used prior to the receipt of samples by Woods Hole Group. To the best of my knowledge, the information contained in this report is accurate and complete.

Approved by: Edith Hutchinson Date: 1/15/98
Woods Hole Group Environmental Laboratories

To Woods Hole Analytical

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT NO.	9144.07/9188.04
PROJECT NAME	Ft. Devens AOC 69W + UST GW
SAMPLERS (SIGNATURE)	J. Dame

Site ID ~~STA. NO.~~	DATE	TIME	COMP.	GRAB	Sample ID ~~STATION LOCATION~~	NO. OF CON-TAINERS	VOCs-8260	VPH	EPH w/confirmation 8270	EPH-fraction only	PAH-8270 Sim		39832 REMARKS INDICATE SOIL/WATER/AIR SEDIMENT/SLUDGE Groundwater
69W-94-12X	12/19/97	0915		X	MX2W12X5	14	6	6	2	–	–	do ms/msD if prior ms/msD not performed	
–	12/22/97	–	–	–	Trip Blank 12/22	4	2	2		–	–		
2290W-11X	12/19/97	1240		X	MX2290115	4	–	–	–	2	2	39832-1	Groundwater
2290W-12X	↓	1120		X	MX2290125	4	–	–	–	2	2	-2	↓
2290W-13X		1515		X	MX2290135	4	–	–	–	2	2	-3	
2290W-14X		1335		X	MX2290145	4	–	–	–	2	2	-4	
2290W-14X		1335		X	MD2290145	2	–	–	–	1	1	-5	

RELINQUISHED BY: (SIGNATURE) J. Dame	DATE/TIME 12/19/97 1700	RECEIVED BY: (SIGNATURE) Ed Butler	RELINQUISHED BY: (SIGNATURE) Ed Butler	DATE/TIME 12/22/97 1:15	RECEIVED BY: (SIGNATURE)
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR DISPOSAL BY: (SIGNATURE)	DATE/TIME	REMARKS 69W-94-12X Sample has EPH with PAH and confirmation of detects by 8270. All 2290W wells have EPH-Fractions only and PAH by GC/MS Sim.	

ABB Environmental Services, Inc.

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375 Paramount Drive • Suite B
Raynham, MA 02767-5154 • USA
Phone: 508-822-9300
Fax: 508-822-3288

EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

ETR Number: 39832

ABB Environmental Services

Lab ID Number: 39832-1

Project: Ft. Devens AOC 69W UST GW

Associated Blank: EW1223B1

Sample ID: MX2290115 [G] 12/19/97 @1240(Water)

Date Received	Date Prepared	Aromatic Test Date	Aromatic DF	Aromatic Analyst	Aliphatic Test Date	Aliphatic DF	Aliphatic Analyst	% Solids
12/22/97	12/23/97	01/07/98	1	NLJr	01/07/98	1	NLJr	N/A

Sample Amount Extracted: 780 mL

EXTRACTABLE PETROLEUM HYDROCARBON (EPH) in µg/L

Parameter	Results
C9-C18 Aliphatics	38 U
C19-C36 Aliphatics	51 U
C11-C22 Aromatics**	110 U

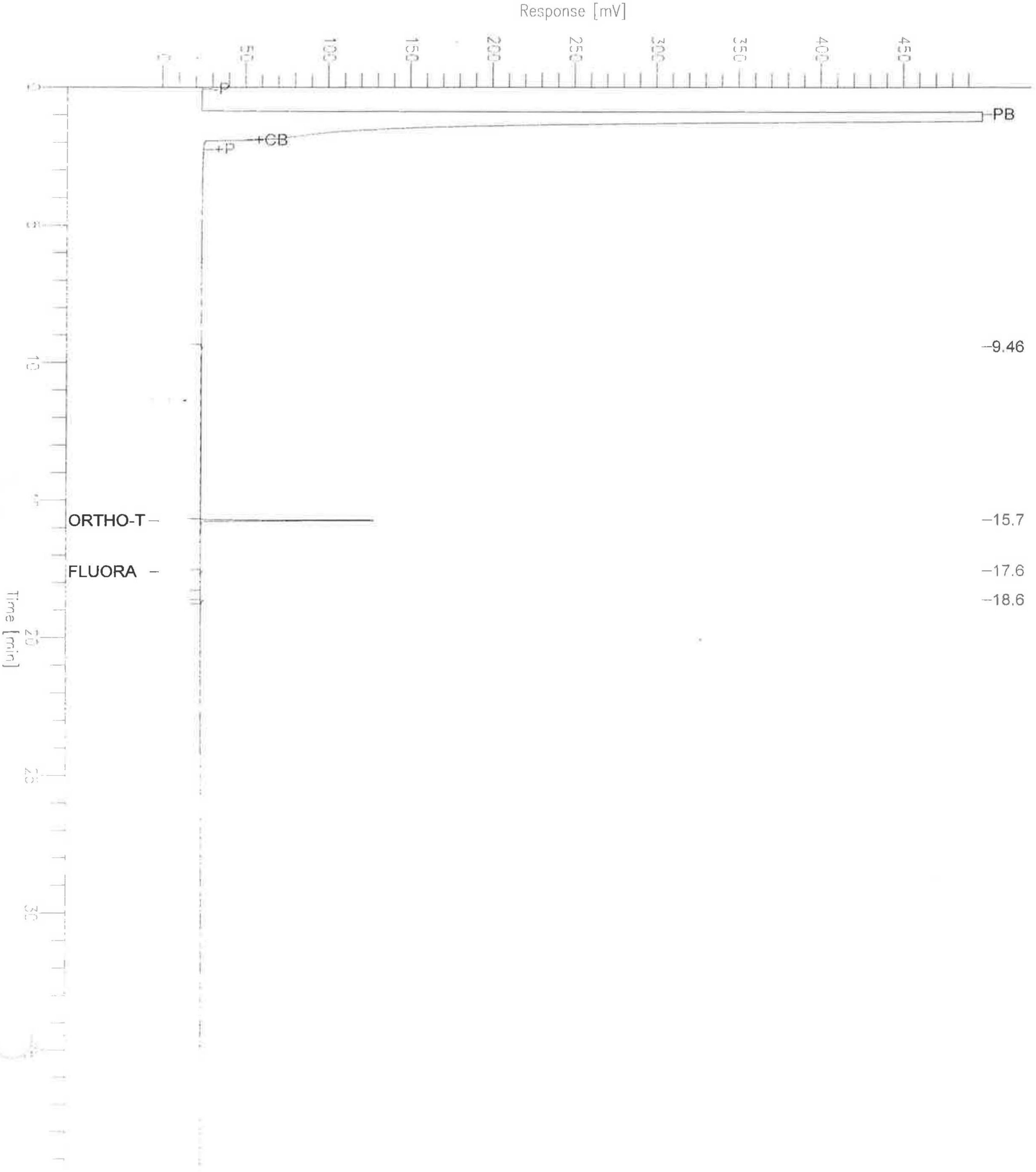
*** Excludes Targeted PAH Analytes.*

SURROGATE RECOVERIES

Surrogate	% Recovery	Acceptance Range
Chloro-octadecane(COD)	77	26% - 123%
Ortho-terphenyl(OTP)	74	39% - 96%

GC/FID Chromatogram

```
Sample Name : 39832-1                                              Sample #: 21                         Page 1 of 1
FileName    : T:\DATA\JANTPH\C106033.raw                           Date : 1/8/98  09:17 AM
Method      : TPHTST                                               Time of Injection: 1/7/98  05:45 PM
    t Time  : 0.00 min            End Time    : 39.39 min          Low Point : -1.39 mV        High Point : 498.61 mV
    e Factor:  -1.0               Plot Offset: -1 mV               Plot Scale: 500.0 mV
```



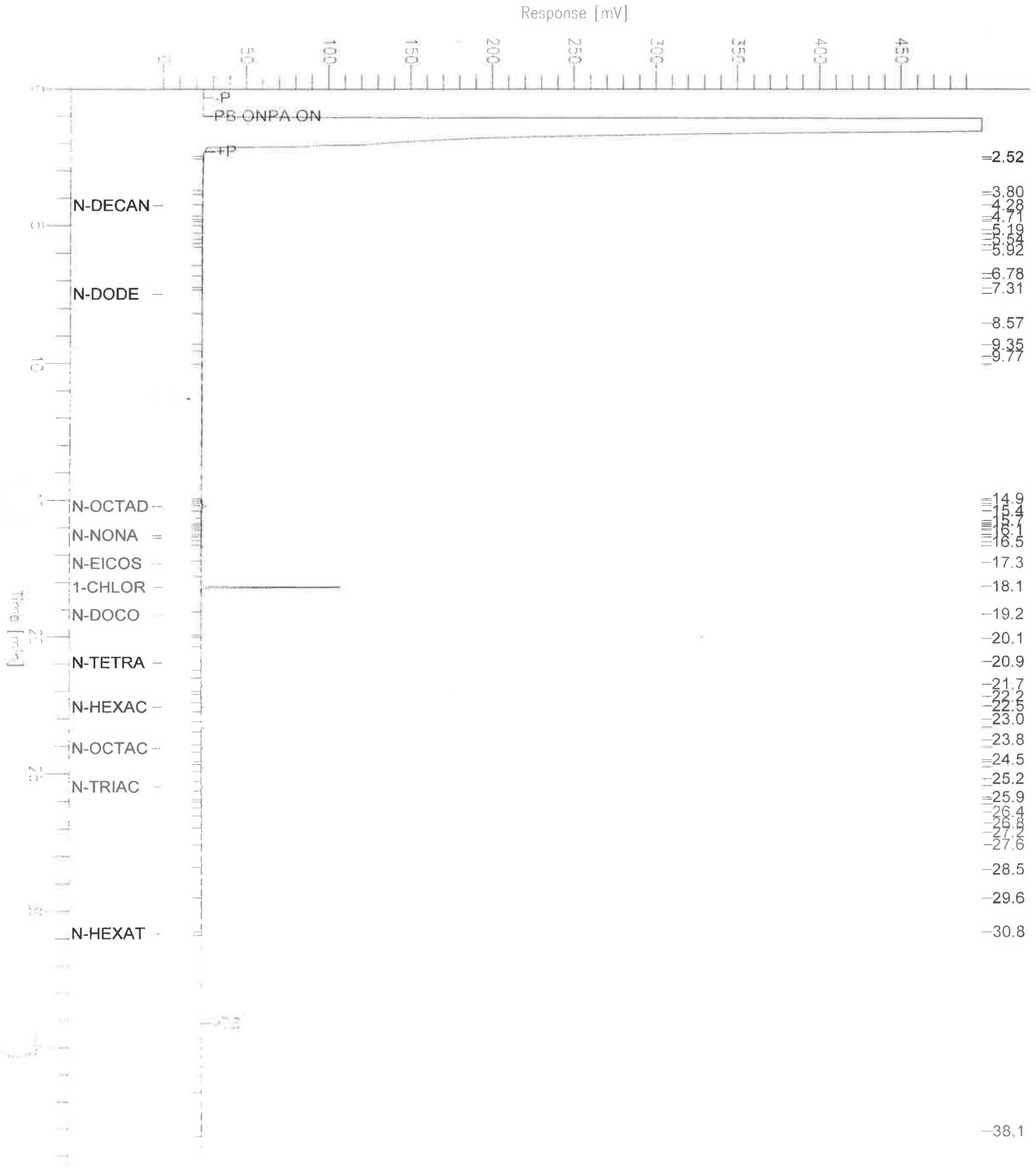
GC/FID Chromatogram

Sample Name : 39832-1
FileName : T:\DATA\JANTPH\D106033.raw
Method : TPHTST
t Time : 0.00 min
e Factor: 0.0
End Time : 39.39 min
Plot Offset: 0 mV

Sample #: 21
Date : 1/8/98 09:35 AM
Time of Injection: 1/7/98 05:45 PM
Low Point : 0.00 mV
Plot Scale: 500.0 mV

Page 1 of 1

High Point : 500.00 mV



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EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

ETR Number: 39832

ABB Environmental Services

Lab ID Number: 39832-2

Project: **Ft. Devens AOC 69W UST GW**

Associated Blank: **EW1223B1**

Sample ID: MX2290125 [G] 12/19/97 @1120(Water)

Date Received	Date Prepared	Aromatic Test Date	Aromatic DF	Aromatic Analyst	Aliphatic Test Date	Aliphatic DF	Aliphatic Analyst	% Solids
12/22/97	12/23/97	01/07/98	1	NLJr	01/07/98	1	NLJr	N/A

Sample Amount Extracted: 820 mL

EXTRACTABLE PETROLEUM HYDROCARBON (EPH) in µg/L

Parameter	Results
C9-C18 Aliphatics	37 U
C19-C36 Aliphatics	49 U
C11-C22 Aromatics**	100 U

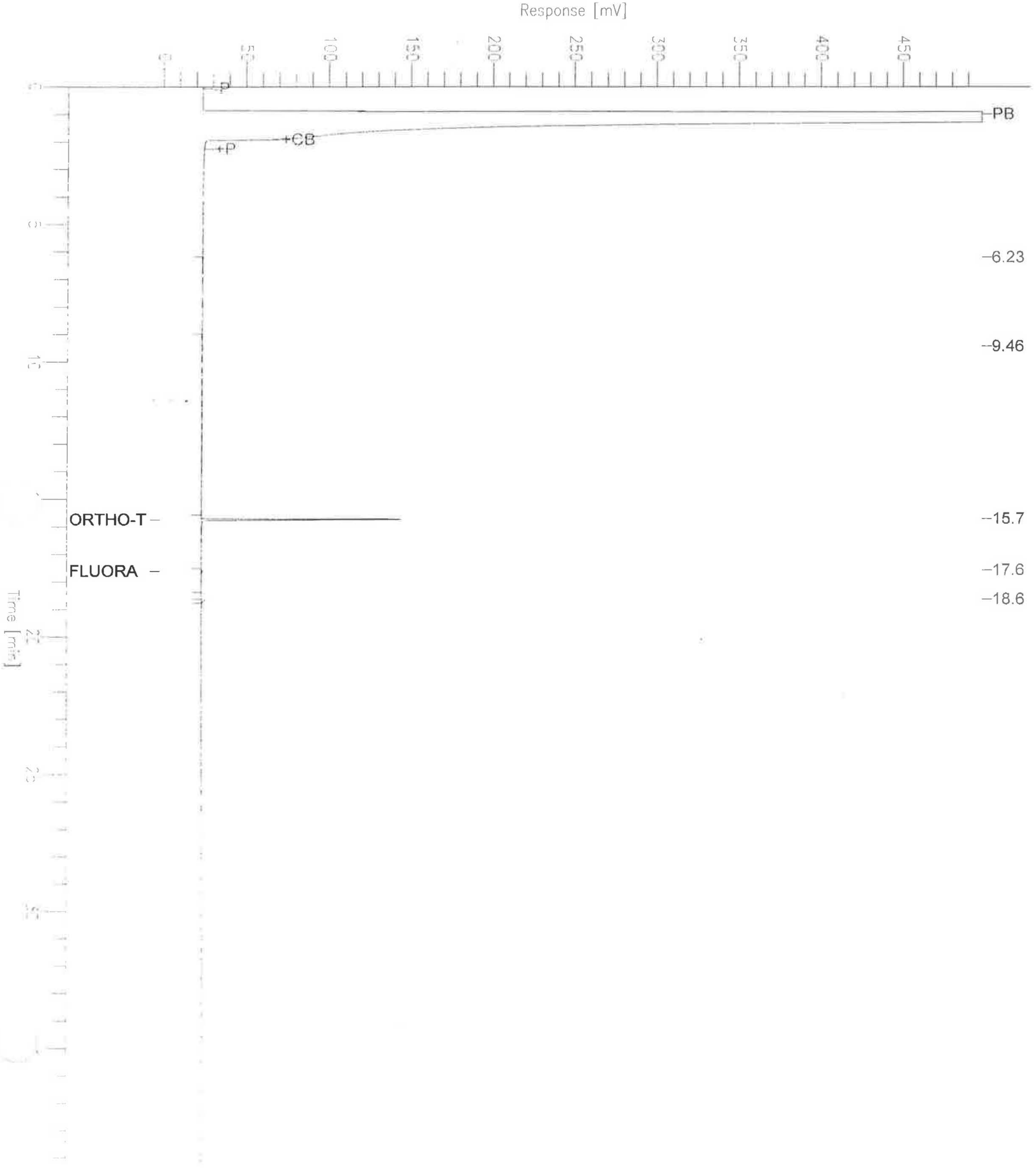
*** Excludes Targeted PAH Analytes.*

SURROGATE RECOVERIES

Surrogate	% Recovery	Acceptance Range
Chloro-octadecane(COD)	78	26% - 123%
Ortho-terphenyl(OTP)	84	39% - 96%

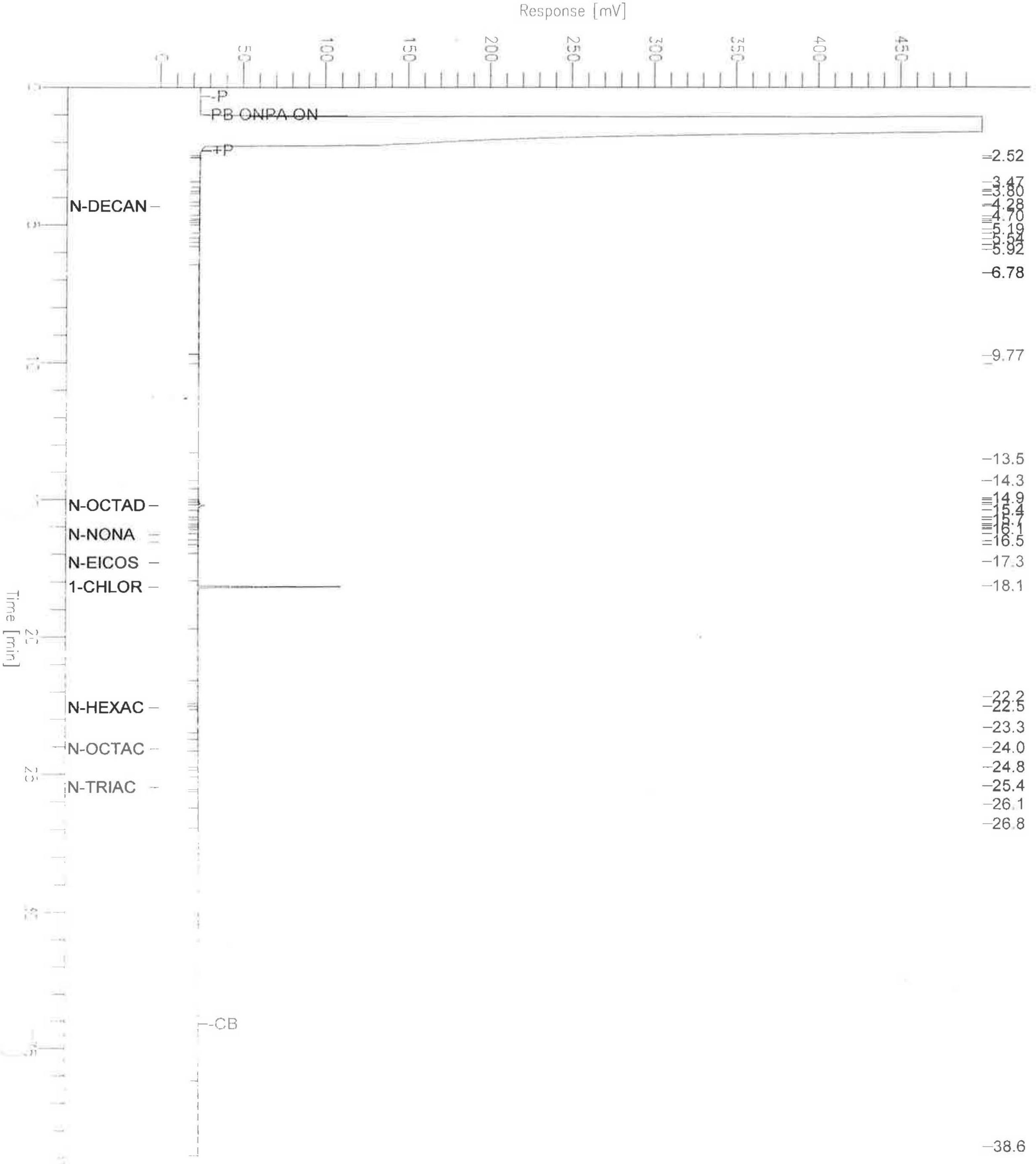
GC/FID Chromatogram

```
Sample Name : 39832-2                                            Sample #: 22                     Page 1 of 1
FileName    : T:\DATA\JANTPH\C106034.raw                         Date : 1/8/98  09:17 AM
Method      : TPHTST                                             Time of Injection: 1/7/98  06:31 PM
   t Time   : 0.00 min          End Time    : 39.39 min          Low Point : -1.41 mV          High Point : 498.59 mV
     Factor:  -1.0              Plot Offset: -1 mV               Plot Scale: 500.0 mV
```



GC/FID Chromatogram

```
Sample Name : 39832-2                                       Sample #: 22                    Page 1 of 1
FileName    : T:\DATA\JANTPH\D106034.raw                    Date : 1/8/98  09:35 AM
Method      : TPHTST                                        Time of Injection: 1/7/98  06:31 PM
    t Time  : 0.00 min          End Time    : 39.39 min     Low Point : 0.00 mV          High Point : 500.00 mV
    e Factor:   0.0             Plot Offset: 0 mV           Plot Scale: 500.0 mV
```



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EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

ETR Number: 39832

ABB Environmental Services

Lab ID Number: 39832-3

Project: **Ft. Devens AOC 69W UST GW**

Associated Blank: **EW1223B1**

Sample ID: MX2290135 [G] 12/19/97 @1515(Water)

Date Received	Date Prepared	Aromatic Test Date	Aromatic DF	Aromatic Analyst	Aliphatic Test Date	Aliphatic DF	Aliphatic Analyst	% Solids
12/22/97	12/23/97	01/07/98	1	NLJr	01/07/98	1	NLJr	N/A

Sample Amount Extracted: 850 mL

EXTRACTABLE PETROLEUM HYDROCARBON (EPH) in µg/L

Parameter	Results
C9-C18 Aliphatics	35 U
C19-C36 Aliphatics	47 U
C11-C22 Aromatics**	100 U

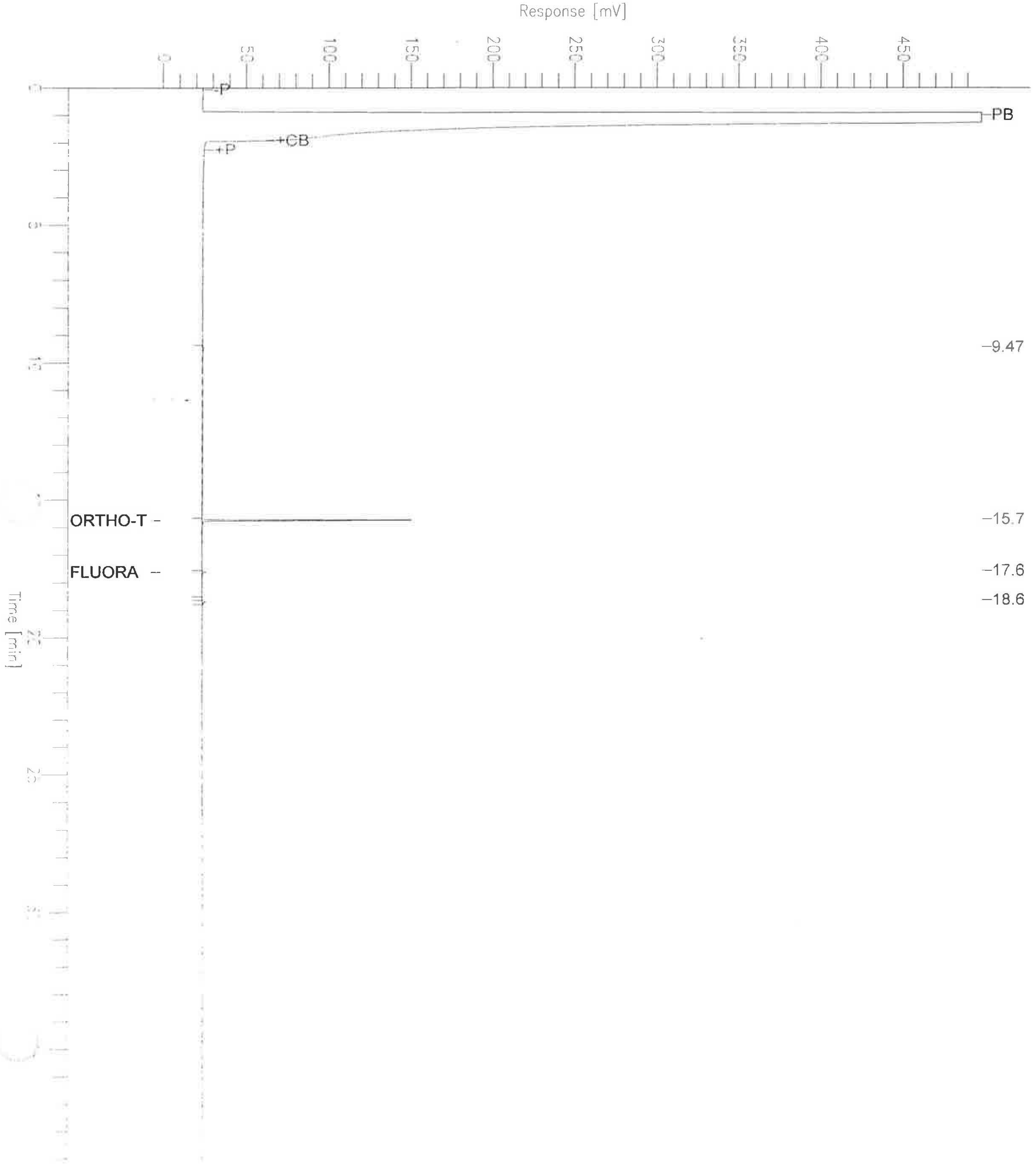
*** Excludes Targeted PAH Analytes.*

SURROGATE RECOVERIES

Surrogate	% Recovery	Acceptance Range
Chloro-octadecane(COD)	78	26% - 123%
Ortho-terphenyl(OTP)	77	39% - 96%

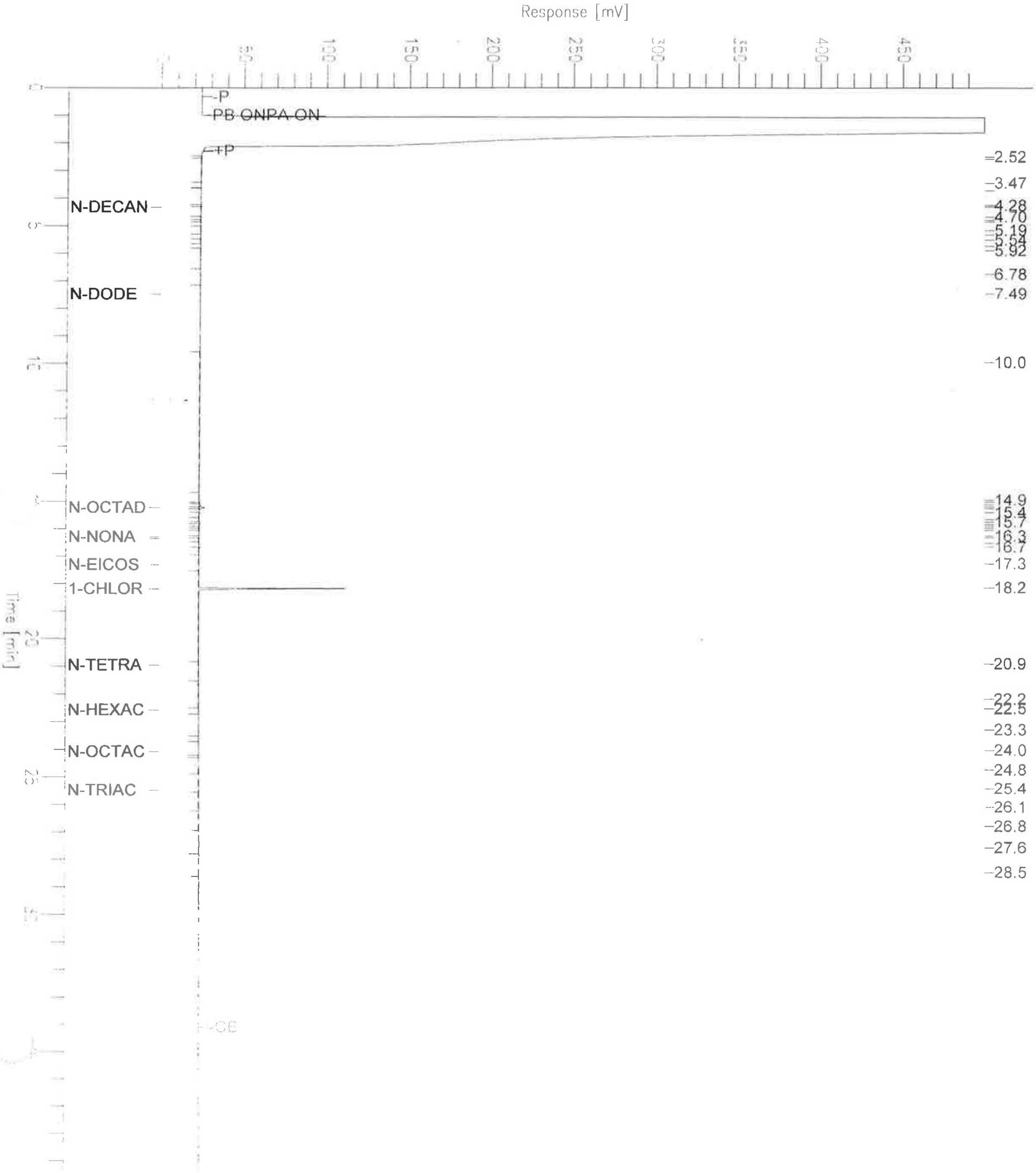
GC/FID Chromatogram

```
Sample Name : 39832-3                                   Sample #: 28                    Page 1 of 1
FileName    : T:\DATA\JANTPH\C106040.raw                Date : 1/8/98  09:19 AM
Method      : TPHTST                                    Time of Injection: 1/7/98  11:07 PM
  t Time    : 0.00 min        End Time    : 39.39 min   Low Point : -1.38 mV       High Point : 498.62 mV
  e Factor:  -1.0             Plot Offset: -1 mV        Plot Scale: 500.0 mV
```



GC/FID Chromatogram

```
Sample Name : 39832-3                                          Sample #: 28                         Page 1 of 1
FileName    : T:\DATA\JANTPH\D106040.raw                       Date : 1/8/98  09:37 AM
Method      : TPHTST                                           Time of Injection: 1/7/98  11:07 PM
   t Time   : 0.00 min          End Time   : 39.39 min         Low Point : 0.00 mV          High Point : 500.00 mV
   e Factor:   0.0              Plot Offset: 0 mV              Plot Scale: 500.0 mV
```



EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

ETR Number: 39832

ABB Environmental Services

Lab ID Number: 39832-4

Project: **Ft. Devens AOC 69W UST GW**

Associated Blank: **EW1223B1**

Sample ID: MX2290145 [G] 12/19/97 @1335(Water)

Date Received	Date Prepared	Aromatic Test Date	Aromatic DF	Aromatic Analyst	Aliphatic Test Date	Aliphatic DF	Aliphatic Analyst	% Solids
12/22/97	12/23/97	01/07/98	1	NLJr	01/07/98	1	NLJr	N/A

Sample Amount Extracted: 840 mL

EXTRACTABLE PETROLEUM HYDROCARBON (EPH) in µg/L

Parameter	Results
C9-C18 Aliphatics	36 U
C19-C36 Aliphatics	48 U
C11-C22 Aromatics**	100 U

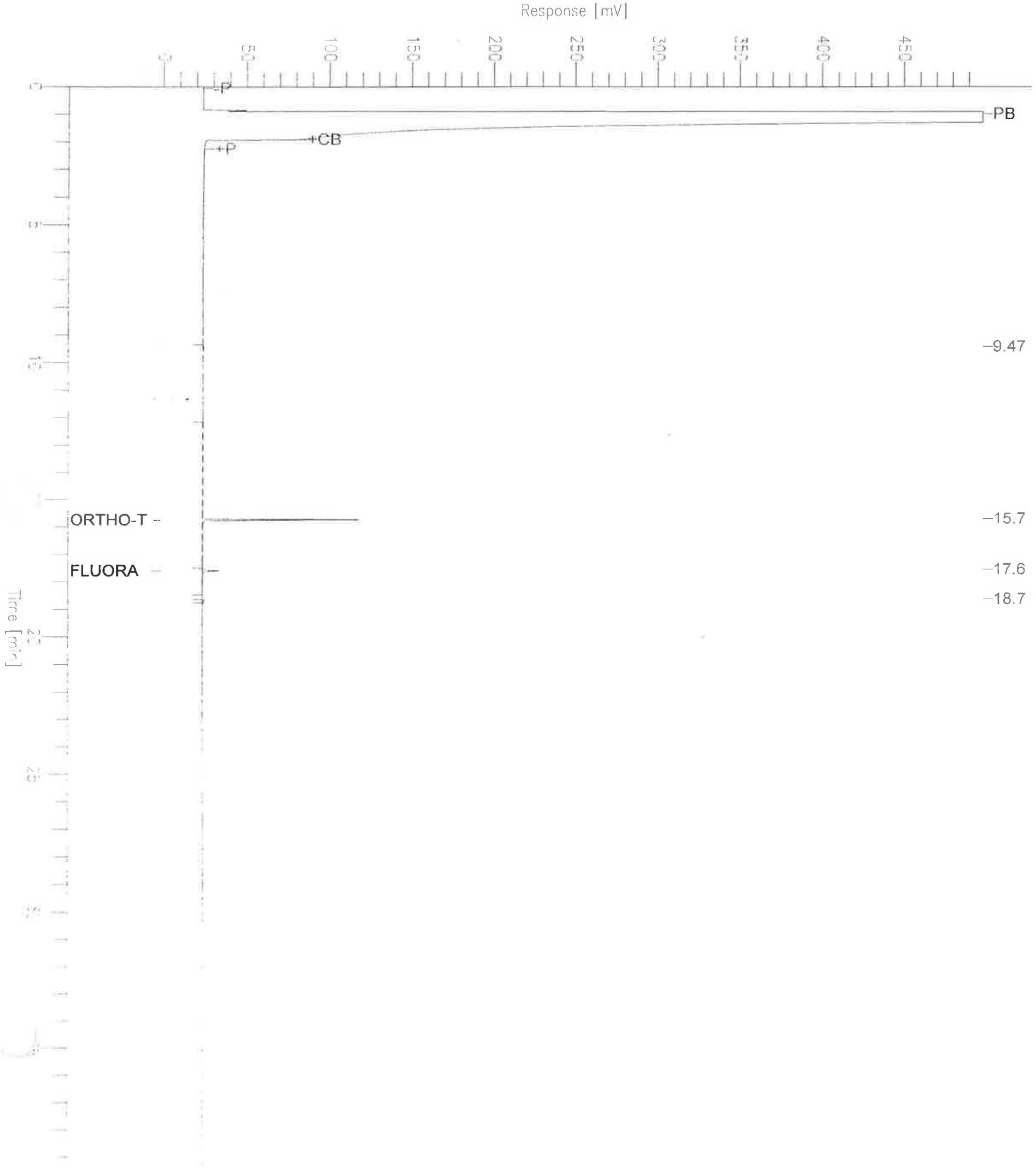
*** Excludes Targeted PAH Analytes.*

SURROGATE RECOVERIES

Surrogate	% Recovery	Acceptance Range
Chloro-octadecane(COD)	52	26% - 123%
Ortho-terphenyl(OTP)	61	39% - 96%

GC/FID Chromatogram

```
Sample Name : 39832-4                                          Sample #: 29                    Page 1 of 1
FileName    : T:\DATA\JANTPH\C106041.raw                       Date : 1/8/98  09:19 AM
Method      : TPHTST                                           Time of Injection: 1/7/98  11:53 PM
      Time  : 0.00 min           End Time    : 39.39 min       Low Point : -1.39 mV         High Point : 498.61 mV
      Factor:  -1.0              Plot Offset: -1 mV            Plot Scale: 500.0 mV
```



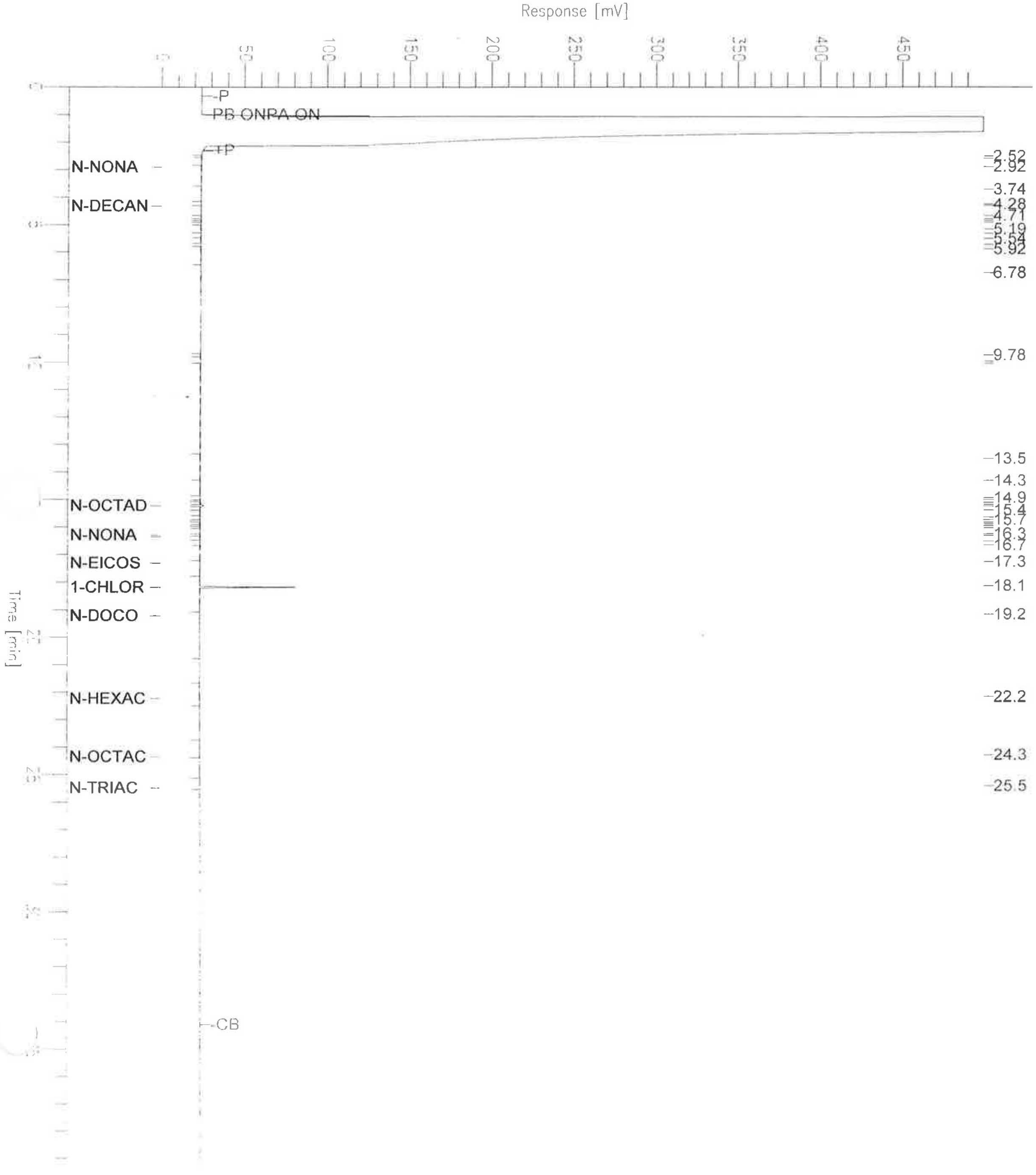
GC/FID Chromatogram

Sample Name : 39832-4
FileName : T:\DATA\JANTPH\D106041.raw
Method : TPHTST
: Time : 0.00 min
e Factor: 0.0
End Time : 39.39 min
Plot Offset: 0 mV

Sample #: 29
Date : 1/8/98 09:37 AM
Time of Injection: 1/7/98 11:53 PM
Low Point : 0.00 mV
Plot Scale: 500.0 mV

Page 1 of 1

High Point : 500.00 mV



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Fax: 508-822-3288

EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

ETR Number: 39832

ABB Environmental Services

Lab ID Number: 39832-5

Project: **Ft. Devens AOC 69W UST GW**

Associated Blank: **EW1223B1**

Sample ID: MD2290145 [G] 12/19/97 @1335(Water)

Date Received	Date Prepared	Aromatic Test Date	Aromatic DF	Aromatic Analyst	Aliphatic Test Date	Aliphatic DF	Aliphatic Analyst	% Solids
12/22/97	12/23/97	01/08/98	1	NLJr	01/08/98	1	NLJr	N/A

Sample Amount Extracted: 810 mL

EXTRACTABLE PETROLEUM HYDROCARBON (EPH) in µg/L

Parameter	Results
C9-C18 Aliphatics	37 U
C19-C36 Aliphatics	49 U
C11-C22 Aromatics**	100 U

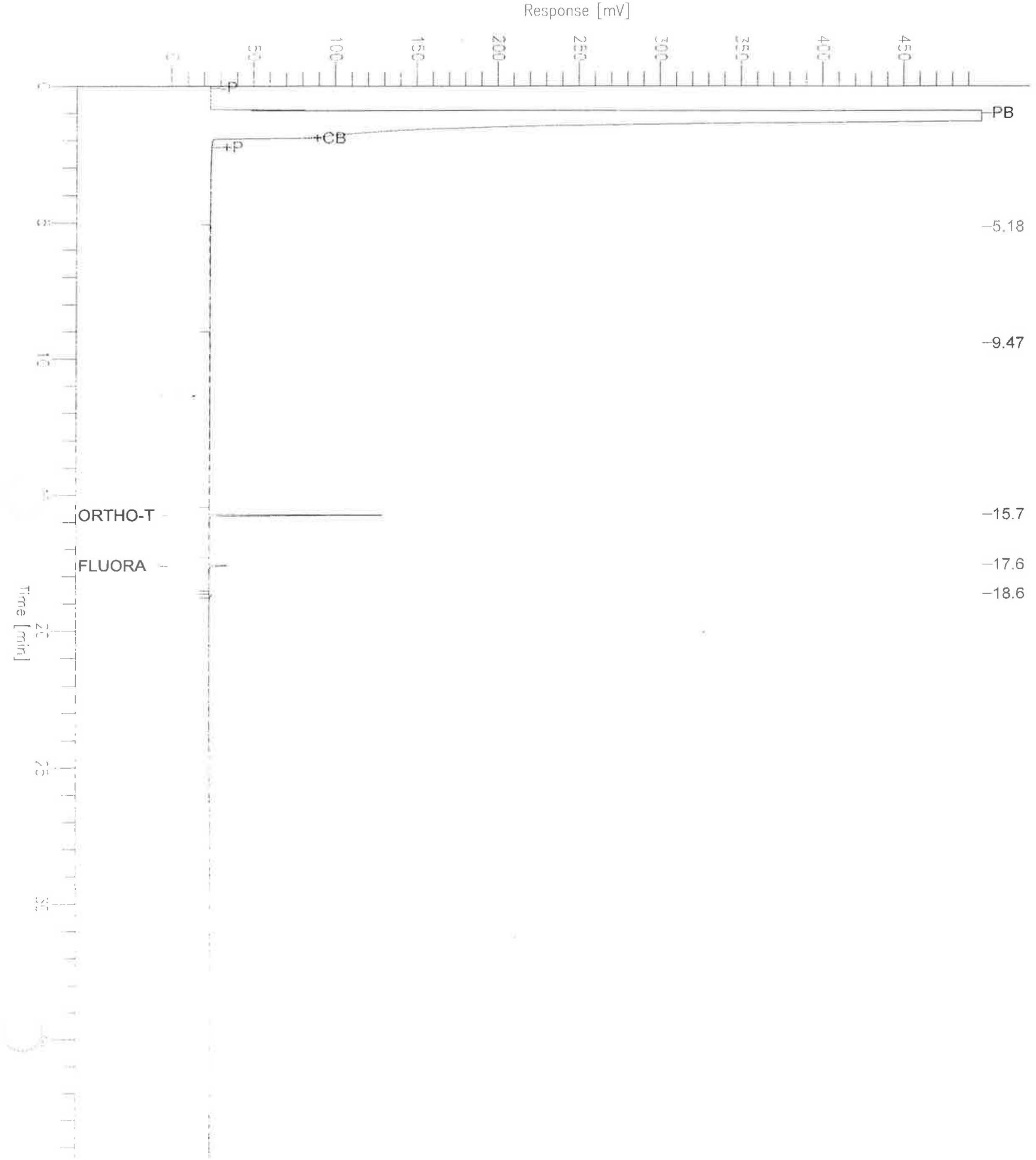
*** Excludes Targeted PAH Analytes.*

SURROGATE RECOVERIES

Surrogate	% Recovery	Acceptance Range
Chloro-octadecane(COD)	58	26% - 123%
Ortho-terphenyl(OTP)	64	39% - 96%

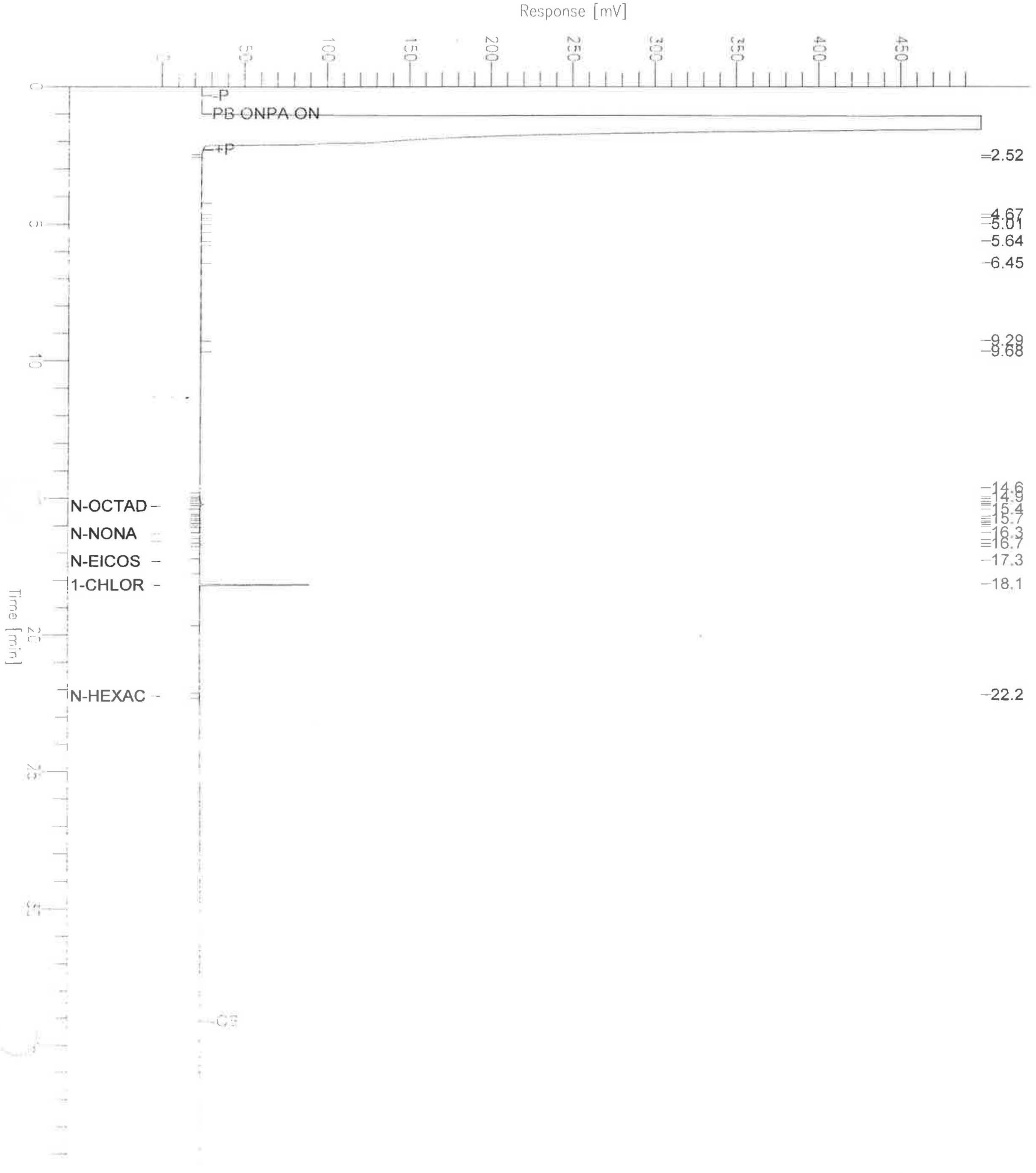
GC/FID Chromatogram

```
Sample Name : 39832-5                                          Sample #: 30                    Page 1 of 1
FileName    : T:\DATA\JANTPH\C106042.raw                       Date : 1/8/98  09:20 AM
Method      : TPHTST                                           Time of Injection: 1/8/98  12:39 AM
   t Time   : 0.00 min          End Time    : 39.39 min        Low Point : -1.41 mV        High Point : 498.59 mV
   e Factor:  -1.0              Plot Offset: -1 mV             Plot Scale: 500.0 mV
```



GC/FID Chromatogram

```
Sample Name : 39832-5                                           Sample #: 30                    Page 1 of 1
FileName    : T:\DATA\JANTPH\D106042.raw                        Date : 1/8/98  09:37 AM
Method      : TPHTST                                            Time of Injection: 1/8/98  12:39 AM
  t Time    : 0.00 min          End Time    : 39.39 min         Low Point : 0.00 mV         High Point : 500.00 mV
  e Factor:   0.0               Plot Offset: 0 mV               Plot Scale: 500.0 mV
```



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Phone: 508-822-9300
Fax: 508-822-3288

EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

Quality Control Report

Lab ID Number: EW1223B1

Sample ID: Method Blank

Date Received	Date Prepared	Aromatic Test Date	Aromatic DF	Aromatic Analyst	Aliphatic Test Date	Aliphatic DF	Aliphatic Analyst	% Solids
N/A	12/23/97	01/07/98	1	NLJr	01/07/98	1	NLJr	N/A

EXTRACTABLE PETROLEUM HYDROCARBON (EPH) in µg/L

Parameter	Results
C9-C18 Aliphatics	30 U
C19-C36 Aliphatics	40 U
C11-C22 Aromatics**	85 U

*** Excludes Targeted PAH Analytes.*

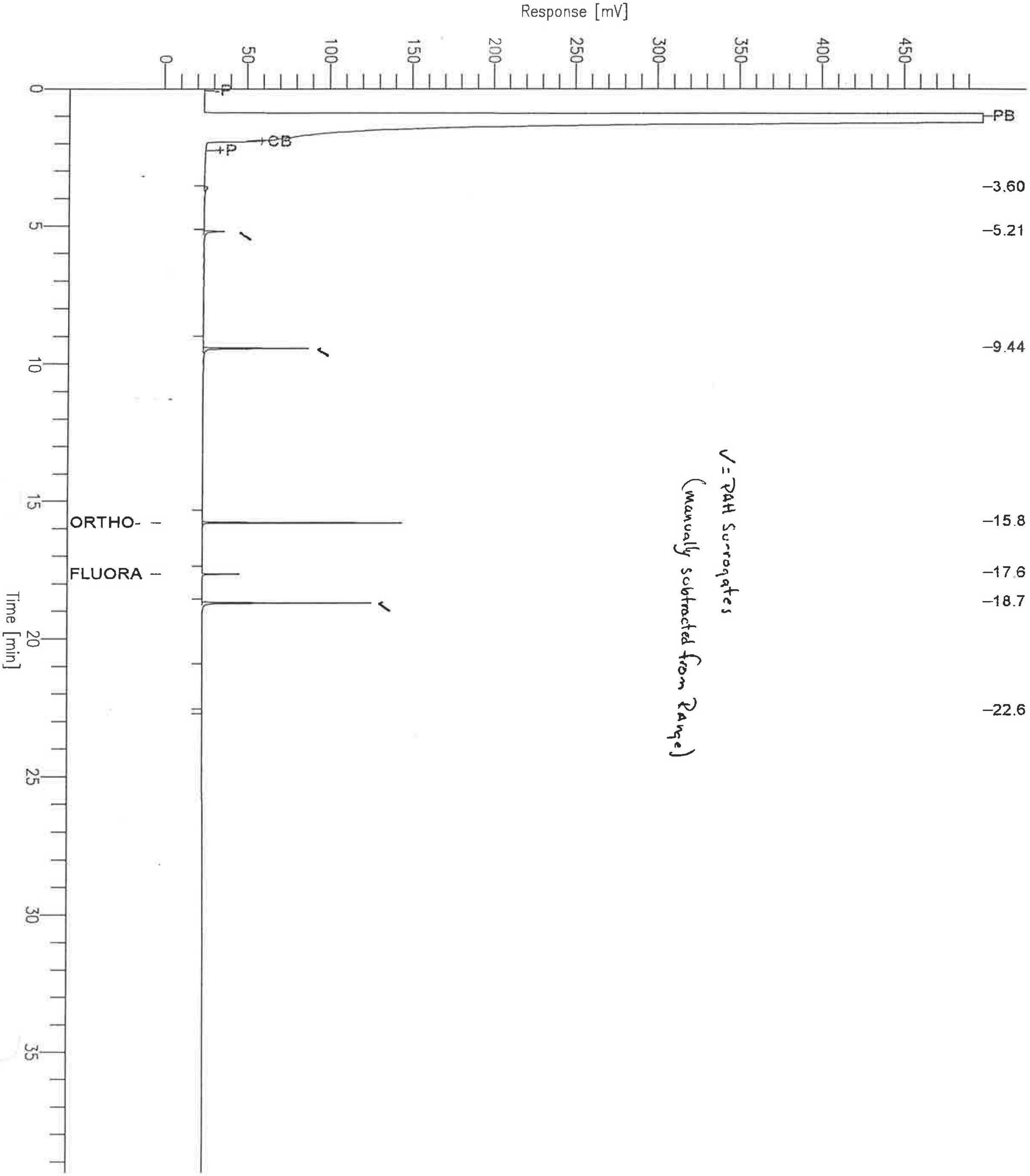
SURROGATE RECOVERIES

Surrogate	% Recovery	Acceptance Range
Chloro-octadecane(COD)	67	26% - 123%
Ortho-terphenyl(OTP)	76	39% - 96%

GC/FID Chromatogram

Sample Name : EW1223B1
FileName : T:\DATA\JANTPH\C105005B.RAW
Method :
art Time : 0.00 min
ale Factor: -1.0
End Time : 39.39 min
Plot Offset: -1 mV

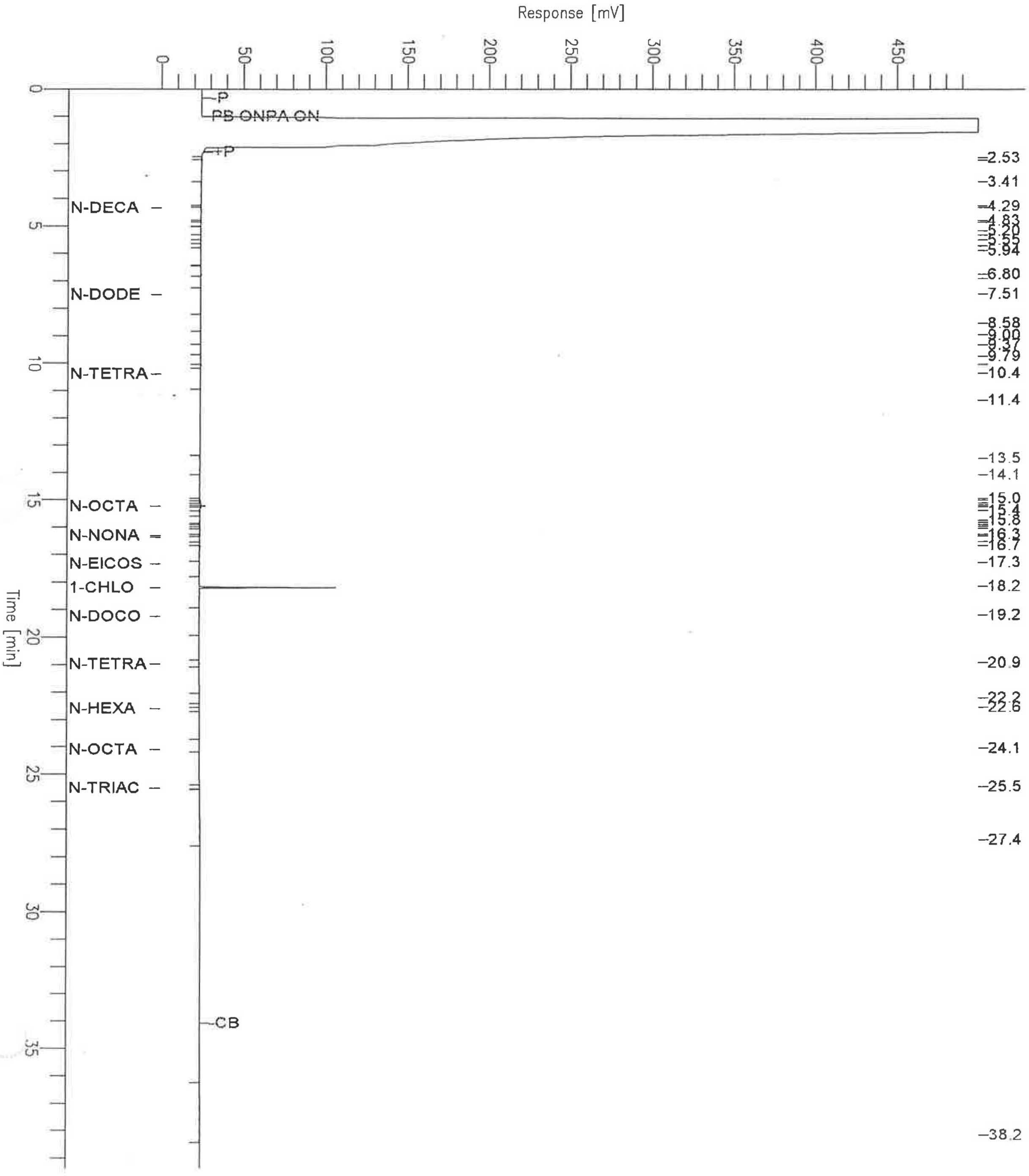
Sample #: 3
Page 1 of 1
Date : 1/15/98 03:08 PM
Time of Injection: 1/7/98 04:00 AM
Low Point : -1.14 mV
High Point : 498.86 mV
Plot Scale: 500.0 mV



✓ = PAH Surrogates
(manually subtracted from Range)

GC/FID Chromatogram

```
Sample Name : EW1223B1                                         Sample #: 3                         Page 1 of 1
FileName    : T:\DATA\JANTPH\D105005B.RAW                      Date : 1/15/98  03:08 PM
Method      :                                                  Time of Injection: 1/7/98  04:00 AM
 art Time   : 0.00 min          End Time    : 39.39 min        Low Point : 0.00 mV          High Point : 500.00 mV
 ale Factor:   0.0              Plot Offset: 0 mV              Plot Scale: 500.0 mV
```



EXTRACTABLE PETROLEUM HYDROCARBON (EPH) by GC/FID
Laboratory Control Spike

Sample ID: EW1223L1

Fraction	Date Analyzed	Time Analyzed	Result File ID	Instrument ID	Analyst
AROMATIC:	1/7/98	5:32 AM	T:\DATA\JANTPH\C105007E.RST	HP-TPH	NLJr
ALIPHATIC:	1/7/98	5:32 AM	T:\DATA\JANTPH\D105007E.RST	HP-TPH	NLJr

EXTRACTABLE PETROLEUM HYDROCARBONS in µg/L

Parameter	Actual Conc.	Amt. Spiked	% Recovery	QC Limits
n-nonane (C_9)	18	50	37	12 - 78
n-decane (C_{10})	26	50	53	21 - 92
n-dodecane (C_{12})	33	50	65	24 - 97
n-tetradecane (C_{14})	36	50	72	38 - 97
n-hexadecane (C_{16})	40	50	79	39 - 102
n-octadecane (C_{18})	48	50	97	41 - 118
n-nonadecane (C_{19})	44	50	89	39 - 113
n-eicosane (C_{20})	49	50	97	45 - 122
n-docosane (C_{22})	50	50	99	45 - 118
n-tetracosane (C_{24})	50	50	100	43 - 123
n-hexacosane (C_{26})	49	50	99	45 - 125
n-octacosane (C_{28})	49	50	98	44 - 127
n-triacontane (C_{30})	51	50	101	40 - 134
n-hexatriacontane (C_{36})	60	50	120	21 - 153

Surrogate	% Recovery	Acceptable Range
1-chlorooctadecane	94	26 - 123

Parameter	Actual Conc.	Amt. Spiked	% Recovery	QC Limits	
Naphthalene	104	150	70	26 - 77	
2-Methylnaphthalene	40	50	80	29 - 84	
Acenapthylene	119	150	79	31 - 87	
Acenaphthene	116	150	78	32- 89	
Fluorene	129	150	86	40 - 99	
Phenanthrene	153	150	102	47 -111	
Anthracene	208	150	139	56 - 123	*
Fluoranthene	163	150	109	56 - 125	
Pyrene	164	150	109	56 - 127	
Benzo(a)anthracene	184	150	122	59 - 132	
Chrysene	157	150	104	59 - 131	
Benzo(b)fluoranthene	180	150	120	54 - 138	
Benzo(k)fluoranthene	148	150	99	55 - 130	
Benzo(a)pyrene	168	150	112	58 - 130	
Indeno(1,2,3-cd)pyrene**	331	300	110	52 - 131	
Dibenzo(a,h)anthracene**	331	300	110	52 - 131	
Benzo(g,h,i)perylene	175	150	117	56 - 137	

Surrogate	% Recovery	Acceptable Range
Ortho-Terphenyl	99	39 - 96

*** These compounds co-elute, values reported reflect their sum.*

* - See Narrative

Woods Hole Group

Environmental Laboratories

375 Paramount Drive • Suite B
Raynham, MA 02767-5154 • USA
Phone: 508-822-9300
Fax: 508-822-3288

TOTAL EXTRACTABLE HYDROCARBON (EPH) by GC/FID
Fractionation Check Solution Recovery

Sample ID: **FCS0105-1**

Fraction:	Date Analyzed	Time Analyzed	Analyst	Result File ID	Instrument ID
AROMATIC:	1/7/98	7:04 AM	NLJr	T:\DATA\JANTPH\C105009A.RST	HP-TPH
ALIPHATIC:	1/7/98	7:04 AM	NLJr	T:\DATA\JANTPH\D105009A.RST	HP-TPH

Alkanes/Cycloalkanes in mg/L (ppm)

Parameter	Actual Conc.	Amt. Spiked	% Recovery	QC Limits
n-nonane (C_9)	24	50	48	12 - 78
n-decane (C_{10})	27	50	53	21 - 92
n-dodecane (C_{12})	27	50	54	24 - 97
n-tetradecane (C_{14})	27	50	54	38 - 97
n-hexadecane (C_{16})	28	50	55	39 - 102
n-octadecane (C_{18})	30	50	60	41 - 118
n-nonadecane (C_{19})	28	50	55	39 - 113
n-eicosane (C_{20})	30	50	60	45 - 122
n-docosane (C_{22})	30	50	60	45 - 118
n-tetracosane (C_{24})	30	50	60	43 - 123
n-hexacosane (C_{26})	29	50	59	45 - 125
n-octacosane (C_{28})	29	50	59	44 - 127
n-triacontane (C_{30})	30	50	59	40 - 134
n-hexatriacontane (C_{36})	33	50	65	21 - 153

Surrogate	% Recovery	Acceptable Range
1-chlorooctadecane	49	26 - 123

Aromatics/Alkenes in mg/L (ppm)

Parameter	Actual Conc.	Amt. Spiked	% Recovery	QC Limits
Naphthalene	19	50	38	26 - 77
2-Methylnaphthalene	24	50	48	29 - 84
Acenapthylene	27	50	53	31 - 87
Acenaphthene	26	50	53	32 - 89
Fluorene	28	50	57	40 - 99
Phenanthrene	32	50	64	47 - 111
Anthracene	46	50	93	56 - 123
Fluoranthene	34	50	67	56 - 125
Pyrene	34	50	67	56 - 127
Benzo(a)anthracene	38	50	76	59 - 132
Chrysene	31	50	63	59 - 131
Benzo(b)fluoranthene	37	50	75	54 - 138
Benzo(k)fluoranthene	27	50	54	55 - 130
Benzo(a)pyrene	33	50	67	58 - 130
Indeno(1,2,3-cd)pyrene**	62	100	62	52 - 131
Dibenzo(a,h)anthracene**	62	100	62	52 - 130
Benzo(g,h,i)perylene	27	50	54	56 - 137

Surrogate	% Recovery	Acceptable Range
Ortho-Terphenyl	54	39-96

*** These compounds co-elute, values reported reflect their sum.*

EPA Method 8270 Polynuclear Aromatic Hydrocarbons
by Selective Ion Monitoring

ABB Environmental Services **ETR Number: 39832**

Project: **Ft. Devens AOC 69W UST GW** **Lab ID Number: 39832-1**

Associated Blank: SW1223B1

Sample ID: MX2290115 [G] 12/19/97 @1240(Water)

Date Received	Date Extracted	Date Analyzed	Analyzed By	Dilution Factor	Sample Amount	Matrix	% Solids
12/22/97	12/23/97	8 Jan 1998 6:14	CLG	2	780mL	WATER	N/A

Compound	CONCENTRATION UNITS: µg/L
Naphthalene	0.2 U
Acenapthylene	0.2 U
Acenaphthene	0.2 U
Fluorene	0.2 U
Phenanthrene	0.2 U
Anthracene	0.2 U
Fluoranthene	0.2 U
Pyrene	0.2 U
Benzo(a)anthracene	0.2 U
Chrysene	0.2 U
Benzo(b)fluoranthene	0.2 U
Benzo(k)fluoranthene	0.2 U
Benzo(a)pyrene	0.2 U
Indeno(1,2,3-cd)pyrene	0.2 U
Dibenzo(a,h)anthracene	0.2 U
Benzo(g,h,i)perylene	0.2 U

ADDITIONAL COMPOUNDS

2-Methylnaphthalene	0.2 U

Surrogate	% Recovery	Acceptable Range
Nitrobenzene-d5	56%	35-114%
2-Fluorobiphenyl	55%	43-116%
p-Terphenyl-d14	64%	33-141%

Key:
U - Analyzed but not found.
J - Estimated value, below quantitation limit.
B - Found in associated blank as well as sample.
N/A = Not Applicable.

Quantitation Report

```
Data File : C:\HPCHEM\1\DATA\39832-1R.D                     Vial: 16
Acq On    :  8 Jan 1998   6:14                          Operator: CLG
Sample    : 39832-1                                     Inst    : GC/MS SVO
Misc      : 780,mL,SW1223B1,2,12/23/97                  Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Jan  9 14:10 1998                Quant Results File: PAH1203.RES

Method         : C:\HPCHEM\1\METHODS\PAH1203.M (RTE Integrator)
Title          : 8270 PAH SIM
Last Update    : Wed Dec 03 15:46:36 1997
Response via   : Initial Calibration
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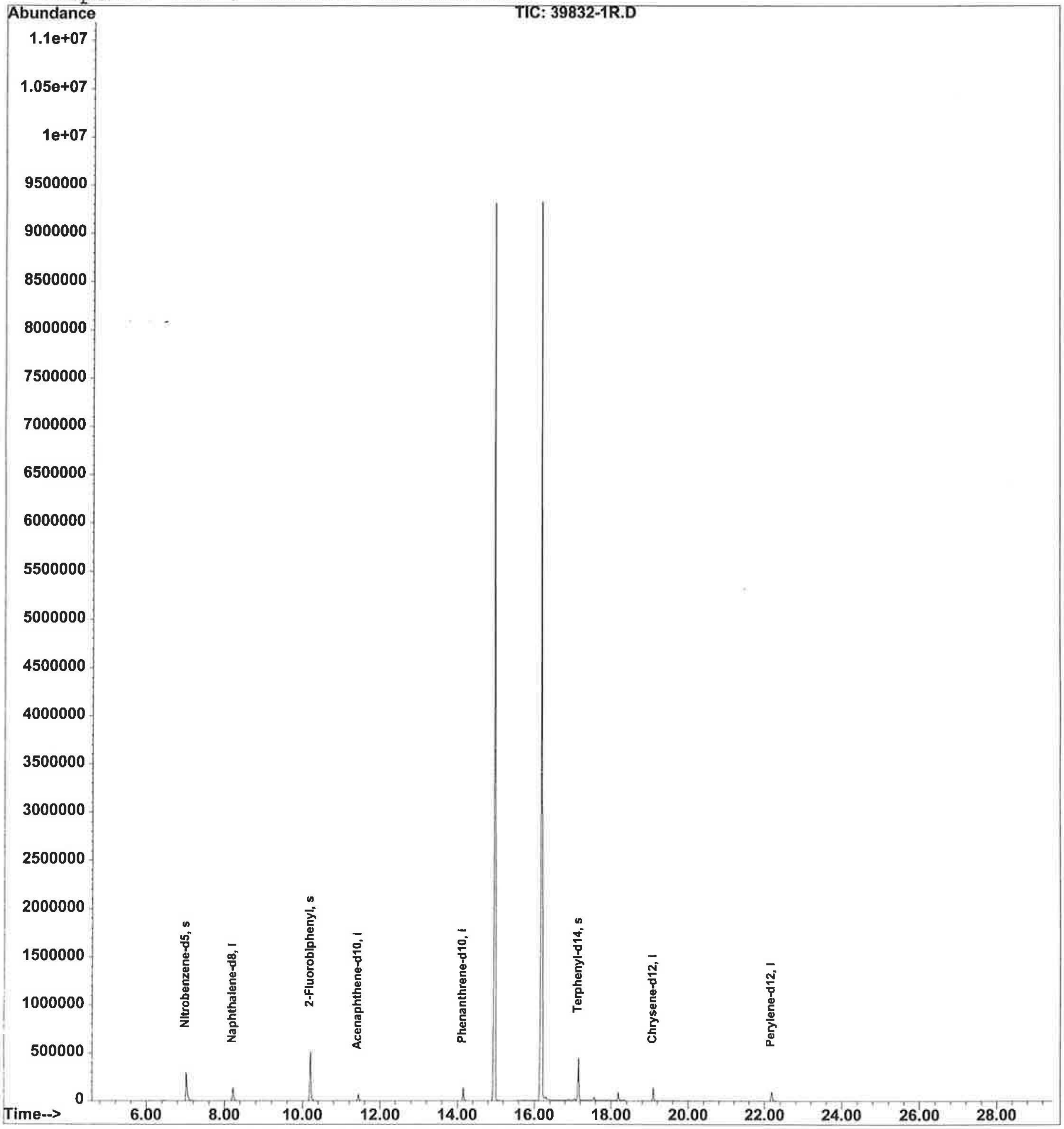


EPA Method 8270 Polynuclear Aromatic Hydrocarbons
by Selective Ion Monitoring

ABB Environmental Services **ETR Number: 39832**

Project: **Ft. Devens AOC 69W UST GW** **Lab ID Number: 39832-2**

Associated Blank: SW1223B1

Sample ID: MX2290125 [G] 12/19/97 @1120(Water)

Date Received	Date Extracted	Date Analyzed	Analyzed By	Dilution Factor	Sample Amount	Matrix	% Solids
12/22/97	12/23/97	8 Jan 1998 6:50	CLG	2	820mL	WATER	N/A

Compound	CONCENTRATION UNITS: µg/L
Naphthalene	0.2 U
Acenapthylene	0.2 U
Acenaphthene	0.2 U
Fluorene	0.2 U
Phenanthrene	0.2 U
Anthracene	0.2 U
Fluoranthene	0.2 U
Pyrene	0.2 U
Benzo(a)anthracene	0.2 U
Chrysene	0.2 U
Benzo(b)fluoranthene	0.2 U
Benzo(k)fluoranthene	0.2 U
Benzo(a)pyrene	0.2 U
Indeno(1,2,3-cd)pyrene	0.2 U
Dibenzo(a,h)anthracene	0.2 U
Benzo(g,h,i)perylene	0.2 U
ADDITIONAL COMPOUNDS	
2-Methylnaphthalene	0.2 U

Surrogate	% Recovery	Acceptable Range
Nitrobenzene-d5	41%	35-114%
2-Fluorobiphenyl	40% *	43-116%
p-Terphenyl-d14	59%	33-141%

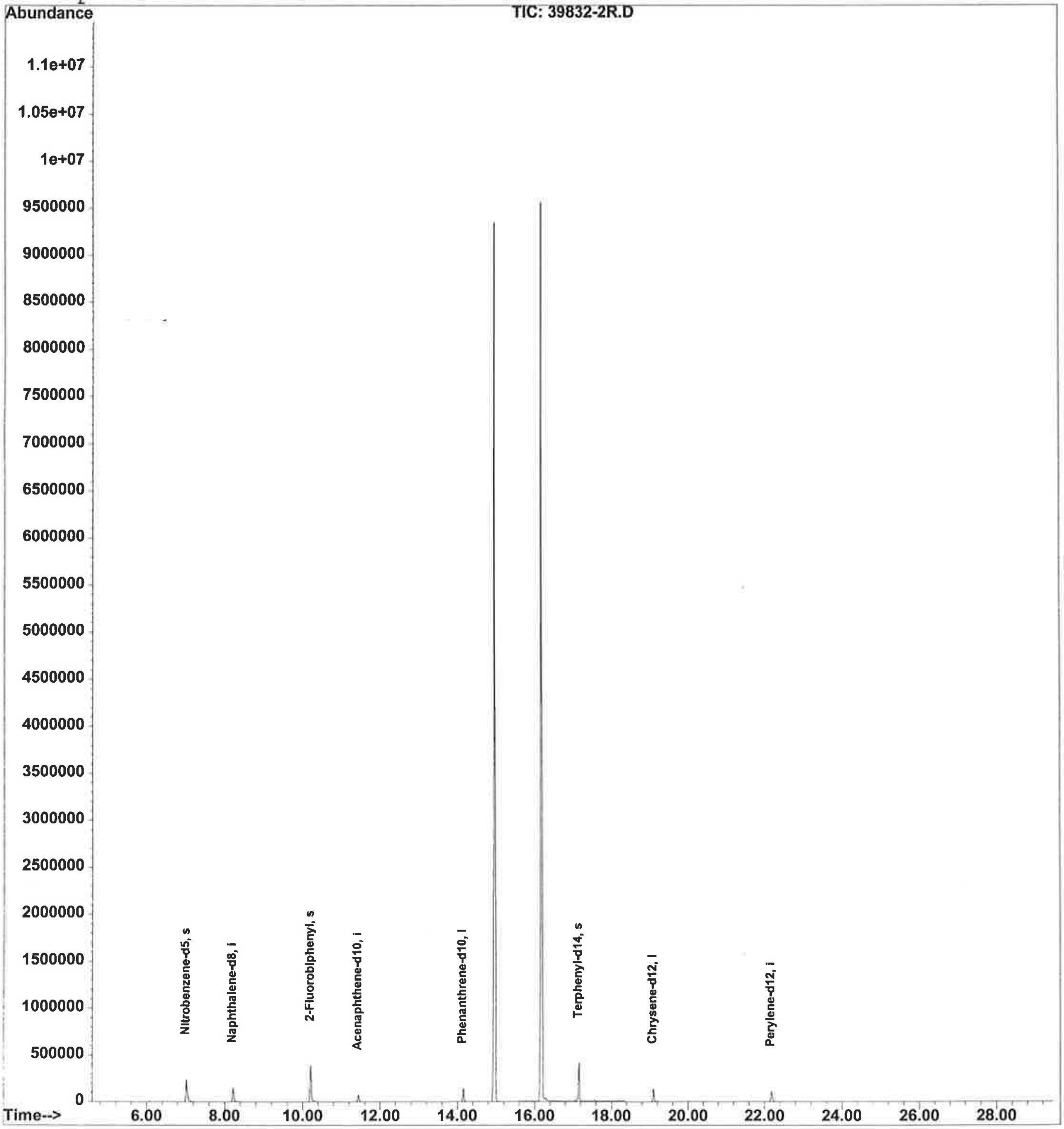
*** = Surrogate values outside control limit**

Key:
U - Analyzed but not found.
J - Estimated value, below quantitation limit.
B - Found in associated blank as well as sample.
N/A = Not Applicable.

Quantitation Report

```
Data File : C:\HPCHEM\1\DATA\39832-2R.D                     Vial: 17
Acq On    :  8 Jan 1998   6:50                          Operator: CLG
Sample    : 39832-2                                     Inst    : GC/MS SVO
Misc      : 820,mL,SW1223B1,2,12/23/97                  Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Jan  9 14:10 1998                 Quant Results File: PAH1203.RES

Method         : C:\HPCHEM\1\METHODS\PAH1203.M (RTE Integrator)
Title          : 8270 PAH SIM
Last Update    : Wed Dec 03 15:46:36 1997
Response via   : Initial Calibration
```



EPA Method 8270 Polynuclear Aromatic Hydrocarbons by Selective Ion Monitoring

ABB Environmental Services **ETR Number: 39832**

Project: **Ft. Devens AOC 69W UST GW** **Lab ID Number: 39832-3**

Associated Blank: SW1223B1

Sample ID: MX2290135 [G] 12/19/97 @1515(Water)

Date Received	Date Extracted	Date Analyzed	Analyzed By	Dilution Factor	Sample Amount	Matrix	% Solids
12/22/97	12/23/97	8 Jan 1998 7:27	CLG	2	850mL	WATER	N/A

Compound	CONCENTRATION UNITS: µg/L
Naphthalene	0.2 U
Acenapthylene	0.2 U
Acenaphthene	0.2 U
Fluorene	0.2 U
Phenanthrene	0.2 U
Anthracene	0.2 U
Fluoranthene	0.2 U
Pyrene	0.2 U
Benzo(a)anthracene	0.2 U
Chrysene	0.2 U
Benzo(b)fluoranthene	0.2 U
Benzo(k)fluoranthene	0.2 U
Benzo(a)pyrene	0.2 U
Indeno(1,2,3-cd)pyrene	0.2 U
Dibenzo(a,h)anthracene	0.2 U
Benzo(g,h,i)perylene	0.2 U
ADDITIONAL COMPOUNDS	
2-Methylnaphthalene	0.2 U

Surrogate	% Recovery	Acceptable Range
Nitrobenzene-d5	46%	35-114%
2-Fluorobiphenyl	44%	43-116%
p-Terphenyl-d14	56%	33-141%

Key:

U - Analyzed but not found.
J - Estimated value, below quantitation limit.
B - Found in associated blank as well as sample.
N/A = Not Applicable.

Quantitation Report

```
Data File : C:\HPCHEM\1\DATA\39832-3R.D                  Vial: 18
Acq On    :  8 Jan 1998   7:27                        Operator: CLG
Sample    : 39832-3                                   Inst    : GC/MS SVO
Misc      : 850,mL,SW1223B1,2,12/23/97                Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Jan  9 14:12 1998               Quant Results File: PAH1203.RES

Method         : C:\HPCHEM\1\METHODS\PAH1203.M (RTE Integrator)
Title          : 8270 PAH SIM
Last Update    : Wed Dec 03 15:46:36 1997
Response via   : Initial Calibration
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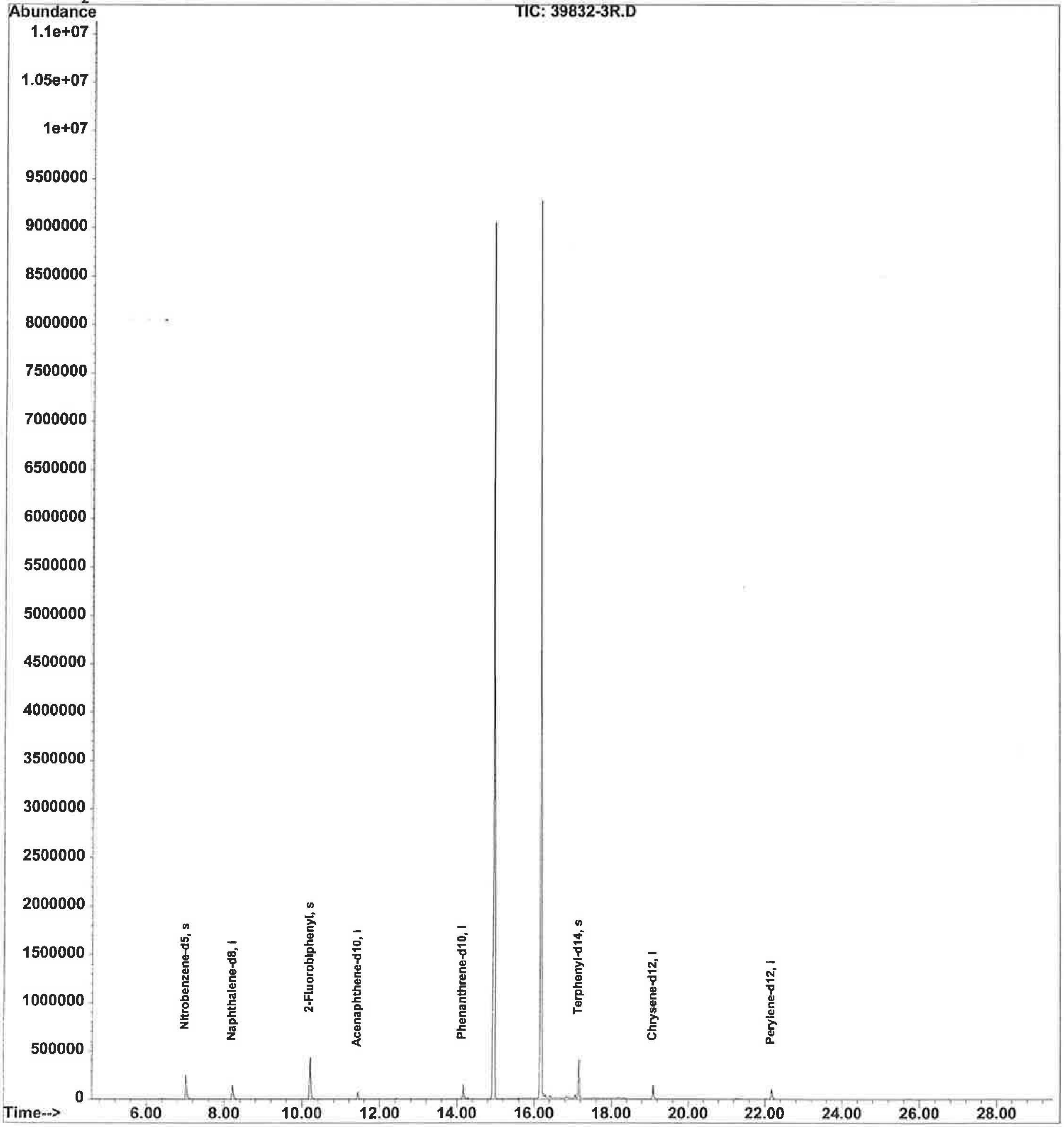

EPA Method 8270 Polynuclear Aromatic Hydrocarbons by Selective Ion Monitoring

ABB Environmental Services **ETR Number: 39832**

Project: **Ft. Devens AOC 69W UST GW** **Lab ID Number: 39832-4**

Associated Blank: SW1223B1

Sample ID: MX2290145 [G] 12/19/97 @1335(Water)

Date Received	Date Extracted	Date Analyzed	Analyzed By	Dilution Factor	Sample Amount	Matrix	% Solids
12/22/97	12/23/97	8 Jan 1998 8:03	CLG	2	840mL	WATER	N/A

Compound	**CONCENTRATION UNITS:** **µg/L**
Naphthalene	0.2 U
Acenapthylene	0.2 U
Acenaphthene	0.2 U
Fluorene	0.2 U
Phenanthrene	0.2 U
Anthracene	0.2 U
Fluoranthene	0.2 U
Pyrene	0.2 U
Benzo(a)anthracene	0.2 U
Chrysene	0.2 U
Benzo(b)fluoranthene	0.2 U
Benzo(k)fluoranthene	0.2 U
Benzo(a)pyrene	0.2 U
Indeno(1,2,3-cd)pyrene	0.2 U
Dibenzo(a,h)anthracene	0.2 U
Benzo(g,h,i)perylene	0.2 U
ADDITIONAL COMPOUNDS	
2-Methylnaphthalene	0.2 U

Surrogate	% Recovery	Acceptable Range
Nitrobenzene-d5	41%	35-114%
2-Fluorobiphenyl	38% *	43-116%
p-Terphenyl-d14	43%	33-141%

*** = Surrogate values outside control limit**

Key:
U - Analyzed but not found.
J - Estimated value, below quantitation limit.
B - Found in associated blank as well as sample.
N/A = Not Applicable.

```
                        Quantitation Report

Data File : C:\HPCHEM\1\DATA\39832-4R.D                    Vial: 19
Acq On    :  8 Jan 1998   8:03                          Operator: CLG
Sample    : 39832-4                                     Inst    : GC/MS SVO
Misc      : 840,mL,SW1223B1,2,12/23/97                  Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Jan  9 14:23 1998                 Quant Results File: PAH1203.RES

Method          : C:\HPCHEM\1\METHODS\PAH1203.M (RTE Integrator)
Title           : 8270 PAH SIM
Last Update     : Wed Dec 03 15:46:36 1997
Response via    : Initial Calibration
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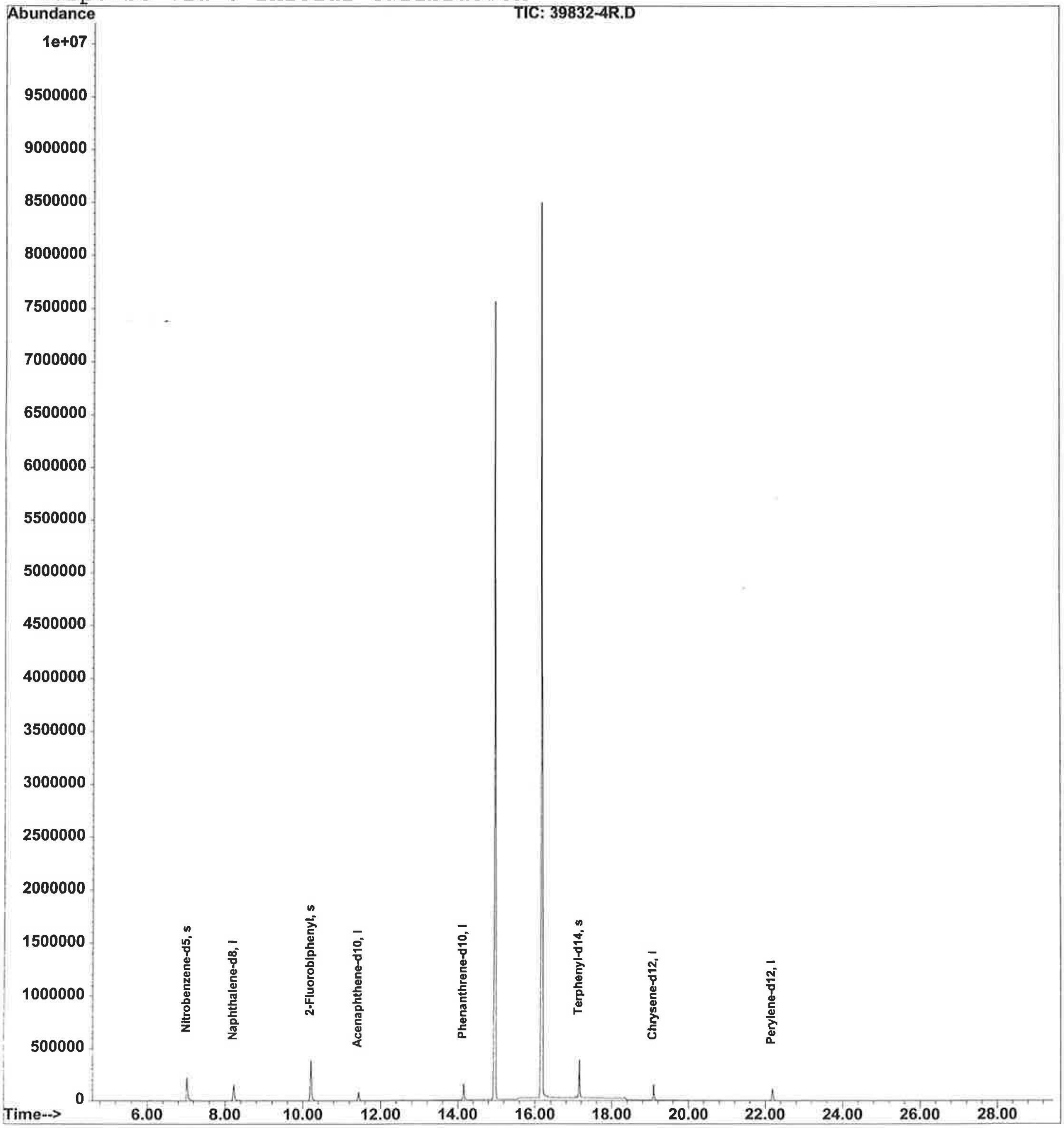

Woods Hole Group

Environmental Laboratories

375 Paramount Drive • Suite B
Raynham, MA 02767-5154 • USA
Phone: 508-822-9300
Fax: 508-822-3288

EPA Method 8270 Polynuclear Aromatic Hydrocarbons by Selective Ion Monitoring

ABB Environmental Services **ETR Number:** 39832

Project: Ft. Devens AOC 69W UST GW **Lab ID Number:** 39832-5

Associated Blank: SW1223B1

Sample ID: MD2290145 [G] 12/19/97 @1335(Water)

Date Received	Date Extracted	Date Analyzed	Analyzed By	Dilution Factor	Sample Amount	Matrix	% Solids
12/22/97	12/23/97	8 Jan 1998 8:39	CLG	2	810mL	WATER	N/A

Compound	CONCENTRATION UNITS: µg/L
Naphthalene	0.2 U
Acenapthylene	0.2 U
Acenaphthene	0.2 U
Fluorene	0.2 U
Phenanthrene	0.2 U
Anthracene	0.2 U
Fluoranthene	0.2 U
Pyrene	0.2 U
Benzo(a)anthracene	0.2 U
Chrysene	0.2 U
Benzo(b)fluoranthene	0.2 U
Benzo(k)fluoranthene	0.2 U
Benzo(a)pyrene	0.2 U
Indeno(1,2,3-cd)pyrene	0.2 U
Dibenzo(a,h)anthracene	0.2 U
Benzo(g,h,i)perylene	0.2 U
ADDITIONAL COMPOUNDS	
2-Methylnaphthalene	0.2 U

Surrogate	% Recovery	Acceptable Range
Nitrobenzene-d5	37%	35-114%
2-Fluorobiphenyl	33% *	43-116%
p-Terphenyl-d14	50%	33-141%

*** = Surrogate values outside control limit**

Key:
U - Analyzed but not found.
J - Estimated value, below quantitation limit.
B - Found in associated blank as well as sample.
N/A = Not Applicable.

Quantitation Report

```
Data File : C:\HPCHEM\1\DATA\39832-5R.D                      Vial: 20
Acq On    :  8 Jan 1998   8:39                            Operator: CLG
Sample    : 39832-5                                       Inst    : GC/MS SVO
Misc      : 810,mL,SW1223B1,2,12/23/97                    Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Jan  9 14:14 1998                   Quant Results File: PAH1203.RES

Method         : C:\HPCHEM\1\METHODS\PAH1203.M (RTE Integrator)
Title          : 8270 PAH SIM
Last Update    : Wed Dec 03 15:46:36 1997
Response via   : Initial Calibration
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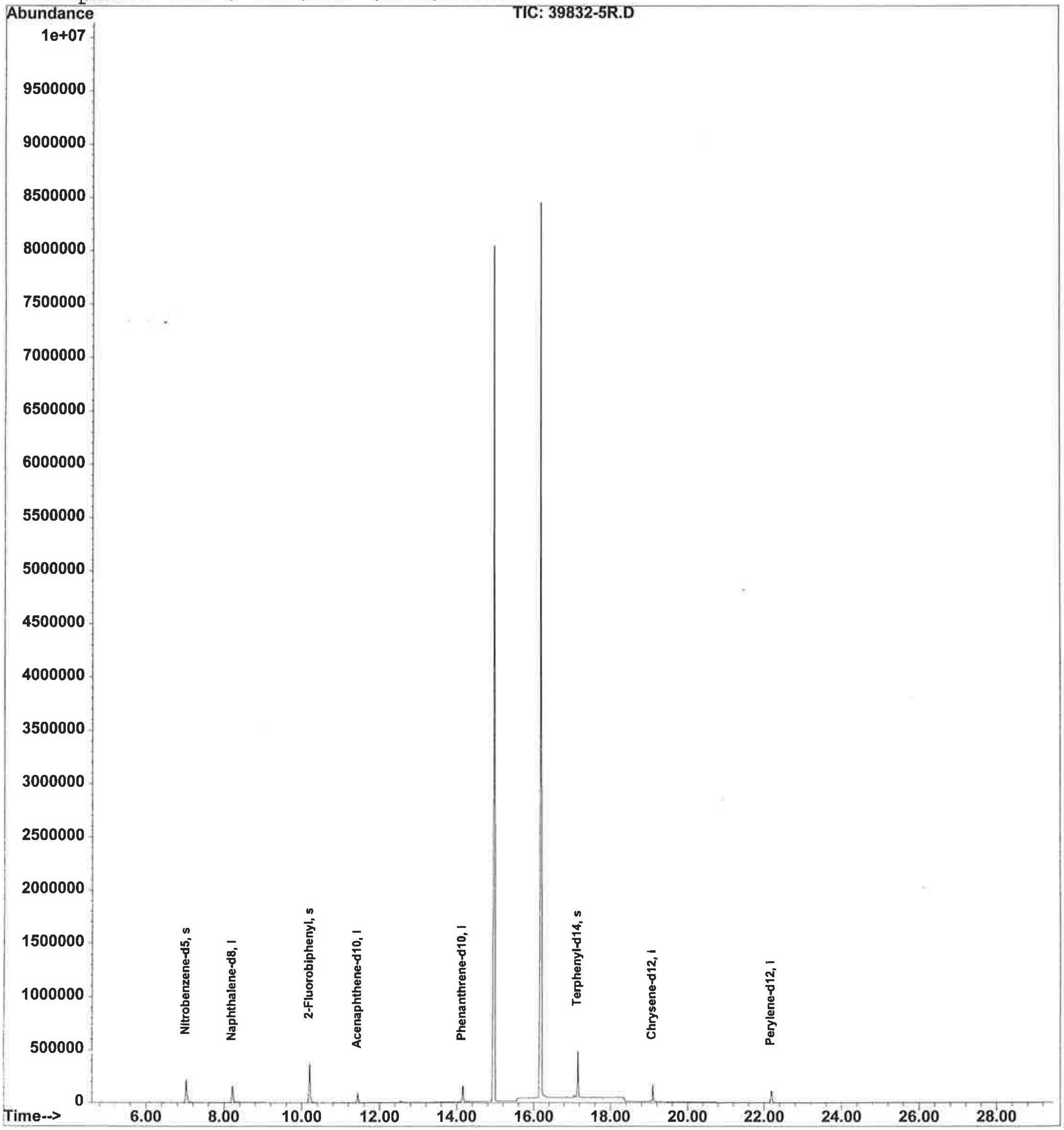

Woods Hole Group

Environmental Laboratories

375 Paramount Drive • Suite B
Raynham, MA 02767-5154 • USA
Phone: 508-822-9300
Fax: 508-822-3288

EPA Method 8270 Polynuclear Aromatic Hydrocarbons
by Selective Ion Monitoring

Quality Control Report

Lab ID Number: SW1223B1
Associated Blank: N/A

Sample ID: Method Blank

Date Received	Date Extracted	Date Analyzed	Analyzed By	Dilution Factor	Sample Amount	Matrix	% Solids
N/A	12/23/97	6 Jan 1998 12:45	CLG	1	1000mL	WATER	N/A

CONCENTRATION UNITS: **µg/L**

Compound	
Naphthalene	0.1 U
Acenapthylene	0.1 U
Acenaphthene	0.1 U
Fluorene	0.1 U
Phenanthrene	0.1 U
Anthracene	0.1 U
Fluoranthene	0.1 U
Pyrene	0.1 U
Benzo(a)anthracene	0.1 U
Chrysene	0.1 U
Benzo(b)fluoranthene	0.1 U
Benzo(k)fluoranthene	0.1 U
Benzo(a)pyrene	0.1 U
Indeno(1,2,3-cd)pyrene	0.1 U
Dibenzo(a,h)anthracene	0.1 U
Benzo(g,h,i)perylene	0.1 U

ADDITIONAL COMPOUNDS

2-Methylnaphthalene	0.1 U

Surrogate	% Recovery	Acceptable Range
Nitrobenzene-d5	66%	35-114%
2-Fluorobiphenyl	60%	43-116%
p-Terphenyl-d14	61%	33-141%

Key:
U - Analyzed but not found.
J - Estimated value, below quantitation limit.
N/A = Not Applicable.

Quantitation Report

```
Data File : C:\HPCHEM\1\DATA\SW1223B1.D                    Vial: 1
Acq On    :  6 Jan 1998  12:45                         Operator: CLG
Sample    : SW1223B1                                   Inst    : GC/MS SVO
Misc      : 1000,mL,N/A,1,12/23/97                     Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Jan  7 14:54 1998               Quant Results File: PAH1203.RES

Method         : C:\HPCHEM\1\METHODS\PAH1203.M (RTE Integrator)
Title          : 8270 PAH SIM
Last Update    : Wed Dec 03 15:46:36 1997
Response via   : Initial Calibration
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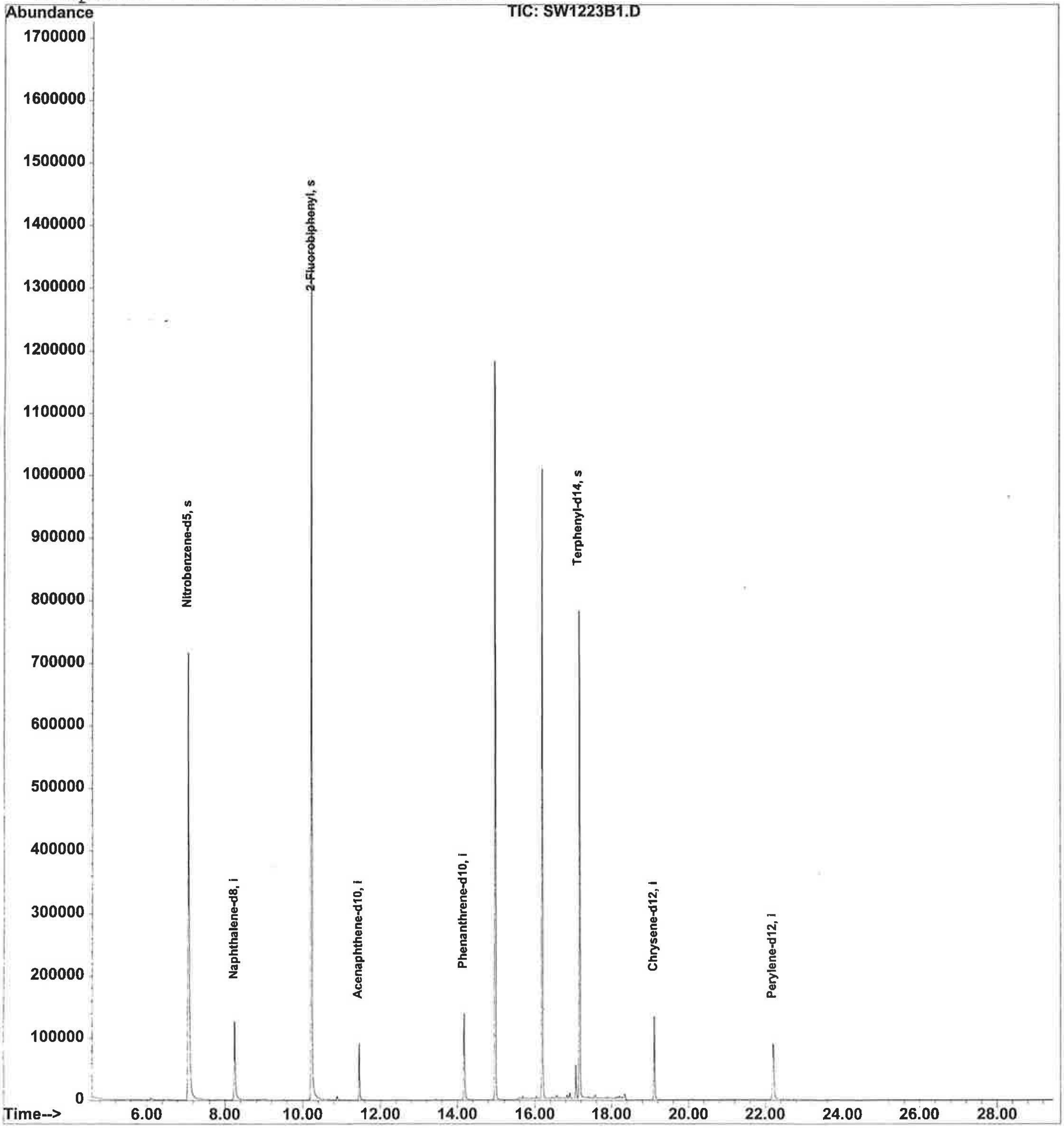


Woods Hole Group
Environmental Laboratories

375 Paramount Drive • Suite B
Raynham, MA 02767-5154 • USA
Phone: 508-822-9300
Fax: 508-822-3288

EPA Method 8270 Polynuclear Aromatic Hydrocarbons
by Selective Ion Monitoring
LABORATORY CONTROL SPIKE

Quality Control Report

Lab ID Number: SW1223L1

Sample ID: Laboratory Control Spike

Date Received	Date Extracted	Date Analyzed	Analyzed By	Dilution Factor	Matrix	Associated Blank	% Solids
N/A	12/23/97	6 Jan 1998 13:21	CLG	1	WATER	SW1223B1	N/A

Compound	Results in ug/L	% Recovery
Naphthalene	3.2	64%
Acenapthylene	3.4	68%
Acenaphthene	3.4	68%
Fluorene	3.5	70%
Phenanthrene	3.9	78%
Anthracene	2.9	58%
Fluoranthene	3.2	64%
Pyrene	3.4	68%
Benzo(a)anthracene	3.6	72%
Chrysene	2.8	56%
Benzo(b)fluoranthene	3.6	72%
Benzo(k)fluoranthene	2.7	54%
Benzo(a)pyrene	3.3	66%
Indeno(1,2,3-cd)pyrene	3.6	72%
Dibenzo(a,h)anthracene	3.3	66%
Benzo(g,h,i)perylene	3.4	68%

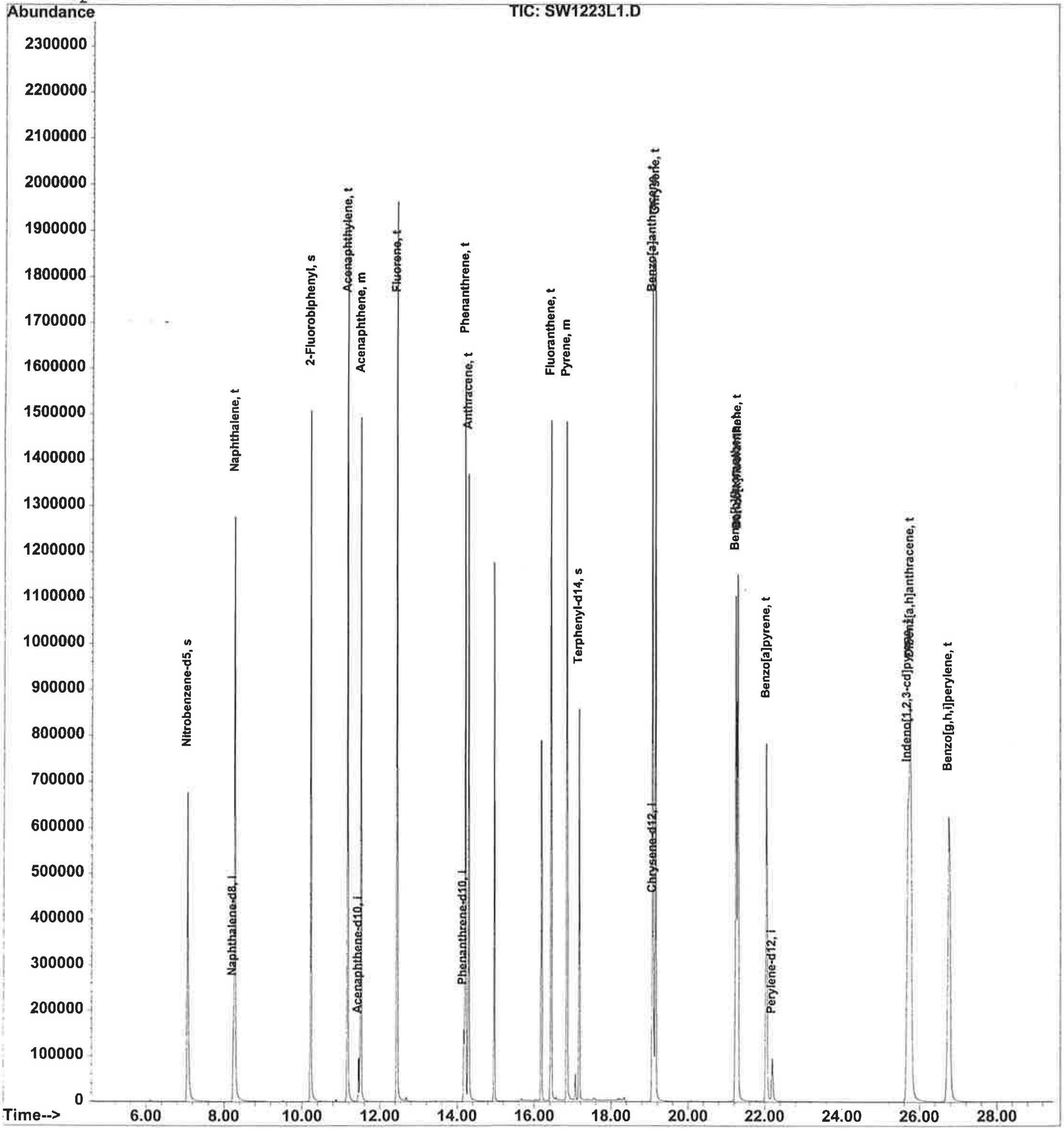
Surrogate	% Recovery	Acceptable Range
Nitrobenzene-d5	63	35-114%
2-Fluorobiphenyl	55	43-116%
p-Terphenyl-d14	55	33-141%

Key:
U - Analyzed but not found.
J - Estimated value, below quantitation limit.
N/A = Not Applicable.

Quantitation Report

```
Data File : C:\HPCHEM\1\DATA\SW1223L1.D                    Vial: 2
Acq On    :  6 Jan 1998  13:21                         Operator: CLG
Sample    : SW1223L1                                   Inst    : GC/MS SVO
Misc      : 1000,mL,SW1223B1,1,12/23/97                Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Jan  7 14:53 1998                 Quant Results File: PAH1203.RES

Method        : C:\HPCHEM\1\METHODS\PAH1203.M (RTE Integrator)
Title         : 8270 PAH SIM
Last Update   : Wed Dec 03 15:46:36 1997
Response via  : Initial Calibration
```



APPENDIX B
CHEMICAL QUALITY ASSURANCE REPORT, ROUND 5 GROUNDWATER ANALYSES

CENAE-EP-GE

7 April 1998
Mr. Lubianez/ll/78311

MEMORANDUM FOR Chief, Engineering Management Branch

SUBJECT: Study Area 63 BE at Fort Devens, MA, Chemical Quality Assurance Report (CQAR) No. E0756-032398

1. Enclosed is the transmittal for SAB.

2. The CENAE-EP-GE POC is David J. Lubianez, 978-318-8311.

Encl

H. FARRELL MCMILLAN, P.E.
Chief, Geotechnical Engineering and
Water Management Branch

CF:
CENWO-HX-C (Dr. Georgian) (w/encl)
✓Mr. Applebee - Engr Mgmt Br (w/encl)
Ms. Wojtas - GWMB (w/encl)
Mr. Lubianez - GWMB (w/encl)
GWMB Files (w/o encl)
Engr/Plng Div Files (w/o encl) (disk-Lubianez-fd63be.cqa)

STUDY AREA 63 BE
FORT DEVENS, MA

CHEMICAL QUALITY ASSURANCE REPORT
No. E0756-032398

PREPARED BY
THE
ENVIRONMENTAL ENGINEERING
AND
GEOLOGY SECTION
ENGINEERING/PLANNING DIVISION

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

MARCH 23, 1998

STUDY AREA 63 BE
FORT DEVENS, MA

CHEMICAL QUALITY ASSURANCE REPORT
No. E0756-032398

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STUDY AREA 63 BE
FORT DEVENS, MA

CHEMICAL QUALITY ASSURANCE REPORT
No. E0756-032398

Executive Summary

QA samples from one shipment for Study Area 63 BE, Fort Devens, MA, Contract No. DACA33-91-D-0006, D.O. No. 0025 were analyzed by the QA laboratory, resulting in a total of 20 determinations.

QA analyses were performed by Intertek Testing Services Environmental Laboratories, Colchester, VT (see Table 2 for analyses performed by the QA lab). The primary laboratory was Woods Hole Group, Environmental Laboratories, Raynham, MA.

Results from the analysis of QA samples were compared with results from analysis of the corresponding primary samples (Reference 3a). The primary and QA samples agreed overall in 100% of the comparison in that no detectable quantities were reported by either laboratory. There were no major or minor data discrepancies between results from the primary and QA samples. Refer to Table 1 for a QA split sample data comparison summary.

TABLE 1
QUALITY ASSURANCE SPLIT SAMPLE DATA COMPARISON SUMMARY

Project: Study Area 63 BE, Fort Devens, MA

Test Parameter	Overall Agreement (1)		Quantitative Agreement (2)	
	Number	Percent	Number	Percent
EPH	20/20	100	N/A	N/A
Total	20/20	100	N/A	N/A

NOTES:

(1) Represents the number and percentage agreement of all determinations including analytes not detected by either laboratory.

(2) Represents the number and percentage agreement of only those determinations where an analyte was detected by at least one laboratory.

TABLE 2

QA ANALYSES PERFORMED

Sample ID	Matrix	Sample Date	Analysis
MR2290 145	WATER	12/19/98	EPH

STUDY AREA 63 BE
FORT DEVENS, MA

CHEMICAL QUALITY ASSURANCE REPORT
No. E0756-032398

QA Findings

1. QA sample shipping and chain-of-custody deficiencies.

One shipment of QA samples was received by the QA laboratory on 12/23/97. The sample was received in good condition and proper sample handling protocols were followed.

A copy of the chain-of-custody document is appended to this report for reference.

2. Data comparison for extractable petroleum hydrocarbons (EPH).

There were 20 determinations. There was 100% agreement in that there were no detected values reported by either laboratory. Since the QA lab did not perform a separate 8270 analysis for the target PAH compounds, target analyte values from the QA laboratory EPH analysis were compared with target analyte values from the primary laboratory's analysis of the sample by method 8270 (SIM).

One outlier was noted in the primary laboratory's LCS for the EPH analysis. One low surrogate spike recovery outlier (2-fluorobiphenyl) was noted in three samples. All other QC data were in control.

All QA laboratory QC data were in control except for a slightly low LCS recovery for the EPH carbon range C9-C18.

3. References.

a. Data Report for Study Area 63BE, Fort Devens, MA, prepared by ABB Environmental Services, dated 2 February 1998, received 4 February 1998.

b. EM 200-1-6, Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects, dated 10 October 1997.

APPENDIX A
KEY TO COMMENTS ON DATA COMPARISON TABLES

0 - Data agrees if any one of the following apply:

- both values are less than respective detection limit (N<MDL)
- N_1<MDL_1 and N_2>MDL_2 but <MDL_1*
- both values are above respective detection limit (N>MDL) and difference between two values satisfies conditions below

For **all** analyses in a **water** matrix and for **metals** analysis in **soil**:
$\leq$2X difference

For **all** other **soil** analyses:
$\leq$4X difference

1 - Minor contamination by laboratory contaminant
2 - Not tested by both laboratories
3 - Minor data discrepancy, disagreement not serious, if any one of the following apply:

- N_1<MDL_1 and N_2>MDL_2 and the difference between values N_2* does not exceed the upper limit (described below) defining a minor data discrepancy
- both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For **all** analyses in a **water** matrix and for **metals** analysis in
soil:
2X<difference$\leq$3X

For **all** other **soil** analyses:
4X<difference$\leq$5X

4 - Major data discrepancy, disagreement serious, if any one of the following apply:

- N_1<MDL_1 and N_2>MDL_2 and the difference between values N_2 and MDL_1* exceeds the limit (described below) defining a major data discrepancy
- both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For **all** analyses in a **water** matrix and for **metals** analysis in
soil:
>3X difference

For **all** other **soil** analyses:
>5X difference

MDL = Method Detection Limit
N = Analytical result
* - not all < values are MDLs. Values which are not MDLs will be noted.

Key to data qualifiers:

B - detected in method blank
DO - Diluted out
E - Exceeds upper limit of calibration range
J - estimated value, above MDL but below practical quantitation limit
NA - Not analyzed
ND - Not detected
NR - Not reported

APPENDIX B

DATA COMPARISON TABLES

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: FORT DEVENS AREA 63BE

QA SAMPLE NO.:	344944	PRIMARY LAB ID NO.:	39832-4
QA FIELD ID:	MR2290 145	CONTRACTOR'S FIELD ID:	MX2290145
QA ANALYSIS DATE:	1/13/98	PRIMARY LAB'S ANALYSIS DATE:	1/8/98
ANALYSIS METHOD:	MA-DEP EPH	ANALYSIS METHOD:	MA-DEP-EPH*
QA LABORATORY:	ITS	PRIMARY LABORATORY:	WOODS HOLE

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 12/19/98
UNITS: ug/L

PARAMETER	QA LAB RL	RESULTS QA LAB	PRIMARY LAB RL	RESULTS PRIMARY LAB	COMPARISON CODE
Naphthalene	< 5.1		< 0.2		0
2-Methylnaphthalene	< 5.1		< 0.2		0
Acenaphthylene	< 5.1		< 0.2		0
Acenaphthene	< 5.1		< 0.2		0
Fluorene	< 5.1		< 0.2		0
Phenanthrene	< 5.1		< 0.2		0
Anthracene	< 5.1		< 0.2		0
Fluoranthene	< 5.1		< 0.2		0
Pyrene	< 5.1		< 0.2		0
Benzo(a)anthracene	< 5.1		< 0.2		0
Chrysene	< 5.1		< 0.2		0
Benzo(b)fluoranthene	< 5.1		< 0.2		0
Benzo(k)fluoranthene	< 5.1		< 0.2		0
Benzo(a)pyrene	< 5.1		< 0.2		0
Dibenz(a,h)anthracene	< 5.1		< 0.2		0
Benzo(g,h,i)perylene	< 5.1		< 0.2		0
Indeno(1.2.3-cd)pyrene	< 5.1		< 0.2		0

EPH Totals

C9-C18 Aliphatics	< 31		< 36		0
C19-C36 Aliphatics	< 41		< 48		0
C10-C22 Aromatics	< 87		< 100		0

SURROGATE RECOVERIES (%)

	QA	PRIMARY	
o-terphenyl (60-140)	118	61	o-terphenyl (39-96)
chlorooctadecane (60-140)	96	52	chlorooctadecane (26-123)

* - PRIMARY LAB RESULTS FOR THE PAH TARGET ANALYTES ARE TAKEN FROM 8270 ANALYSIS

SEE APPENDIX A FOR KEY TO COMMENTS

APPENDIX C

CUSTODY DOCUMENTATION

QA Project # EC 56

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJECT NO. 7144.03 ~~9188.04~~ (MR)

PROJECT NAME: Devens UST GW sampling

SAMPLERS (SIGNATURE): Jim Dame - ABB-ES + Nancy E. Rota

Site ID ~~STA. NO.~~	DATE	TIME	COMP.	GRAB	SAMPLE ID ~~STATION LOCATION~~	NO. OF CONTAINERS	SAMPLE TYPE: EPH	SAMPLE TYPE: PAHs by 8270 Sim	REMARKS: INDICATE SOIL/WATER/AIR SEDIMENT/SLUDGE
2290W-14X	12/19/97	1335		X	m$\overset{R}{X}$2290 145	2	1	1	groundwater

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Nancy E. Rota	12/22/97 1600				

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
				12/23/97 0830	Shannon [illegible]

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR DISPOSAL BY: (SIGNATURE)	DATE/TIME	REMARKS
				~~CO # not available at Time of Shipment~~ (MR) -EPH w/PAHS reported - PAH by 8270 with SIM

ABB Environmental Services, Inc.

- FedEx Airbill # 327 5272 445

OH-62