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U.S. Army Environmental Center

NO FURTHER ACTION DECISION UNDER CERCLA

FORT DEVENS STUDY AREA 58
BUILDINGS 2648 AND 2650 FUEL OIL SPILLS

DATA ITEM A009

CONTRACT DAAA15-91-D-0008

U.S. ARMY ENVIRONMENTAL CENTER
ABERDEEN PROVING GROUND, MARYLAND

NOVEMBER 1995

PRINTED ON RECYCLED PAPER

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STUDY AREA 58
BUILDINGS 2648 AND 2650 FUEL OIL SPILLS

FORT DEVENS, MASSACHUSETTS

Prepared for:

U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland
Contract DAAA15-91-D-0008

Prepared by:

ABB Environmental Services, Inc.
Portland, Maine
Project No. 7053-12

NOVEMBER 1995

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EXECUTIVE SUMMARY

Study Area 58 (one of 13 Groups 2, 7, and Historic Gas Stations Study Areas) was identified in the Federal Facilities Agreement between the U.S. Environmental Protection Agency and the U.S. Department of Defense as a potential site of contamination. Investigations of Study Area 58 (Buildings 2648 and 2650 Fuel Oil Spills) at Fort Devens, Massachusetts have resulted in the decision that no further hazardous waste studies or remediation are required at this site.

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 on December 21, 1989. 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 Master Environmental Plan, an Enhanced Preliminary Assessment, and a Site Investigation, have been conducted which address Study Area 58.

Field investigation of Study Area 58 was initiated in 1992 in conjunction with the other 12 Groups 2, 7, and Historic Gas Stations Study Areas at Fort Devens. The Study Area 58 site investigation consisted of field analysis of soil samples collected from TerraProbe points to characterize the vertical and horizontal distribution of potential localized contaminants, the collection of subsurface soil samples for laboratory analysis and geologic classification, the installation of groundwater monitoring wells, and the collection of groundwater samples.

Nineteen subsurface soil samples were collected from 10 TerraProbe points located around the former heating oil underground storage tank excavation at Building 2648. One soil sample was collected from between 5 feet and 7 feet below ground surface from each TerraProbe point. Another soil sample was collected from nine of the 10 TerraProbe points at a depth of 9 feet or refusal (approximately 11 feet below ground surface). These samples were analyzed on-site for benzene, toluene, ethylbenzene, and xylenes and total petroleum hydrocarbons. Toluene, ethylbenzene, xylenes, and total petroleum hydrocarbons were detected in several samples indicating that some residual fuel contamination may be present outside of the former heating oil underground storage tank excavation.

Based on the results of the TerraProbe program, four soil borings (58M-92-01X through 58M-92-04X) were drilled (one upgradient and three downgradient) and four monitoring wells were installed. One soil sample was collected from each boring and analyzed for

Project Analyte List volatile organic compounds, total petroleum hydrocarbons, total organic carbon, and grain size. No volatile organic compounds or total petroleum hydrocarbons were detected in any of the subsurface soil samples collected from Study Area 58 except for low concentrations of acetone in soil borings 58M-92-01X and 58M-29-04X. Acetone is considered a common laboratory contaminant and does not appear to be a site contaminant.

Monitoring well 58M-92-01X was installed as part of this investigation at a location presumed to be upgradient of the former underground storage tank excavation, and wells 58M-92-02X through 58M-92-04X were installed at presumed downgradient locations. Wells 58M-92-01X and 58M-92-02X were screened across the till/bedrock interface, and wells 58M-92-03X and 58M-92-04X were screened in till. Two rounds of groundwater samples were collected from each of the four monitoring wells. The first round was collected in September 1992 and the second round was collected in January 1993. All of the groundwater samples were submitted for laboratory analysis of Project Analyte List volatile organic compounds, total petroleum hydrocarbon compounds, selected inorganics, and anions and cations. Round Two groundwater samples were also analyzed for total suspended solids.

Volatile organic compounds were detected in the Round One groundwater sample collected from 58M-92-01X, only. No volatile organic compounds were detected in the other three groundwater samples collected. Round Two groundwater sampling results indicate that volatile organic compounds were not present in any of the samples collected. Total petroleum hydrocarbons were not detected in any of the groundwater samples collected from Study Area 58 during either round. Inorganic analyte (calcium, magnesium, and potassium) concentrations were above the calculated Fort Devens groundwater background concentrations in all wells. These elevated inorganic concentrations are not likely associated with leaking underground storage tanks.

On the basis of findings at Study Area 58 and Preliminary Risk Evaluation performed, there is no evidence or reason to conclude that petroleum contamination due to the former heating oil underground storage tanks has caused significant environmental contamination or poses a threat to human health. The decision has been made to remove Study Area 58 from further consideration in the Installation Restoration Program.

1.0 INTRODUCTION

This decision document has been prepared to support a no further action decision at Study Area 58 - Buildings 2648 and 2650 Fuel Oil Spills (SA 58) at 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 consists of assessments of the environmental status of SAs, specifies necessary investigations, and provides recommendations for response actions with the objective of identifying priorities for environmental restoration at Fort Devens. SA 58 was identified in the MEP as a potential source of contamination. 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 also 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 PA report was completed in April 1992. In 1992, DOD, through USAEC, also initiated a Site Investigation (SI) for SA 58 along with the other 12 SAs in SA Groups 2, 7, and Historic Gas Station Sites at Fort Devens. The SI was conducted by ABB Environmental Services, Inc. (ABB-ES).

Under Public Law 101-510, the Defense Base Realignment and Closure Act of 1990, Fort Devens has been selected for cessation of operations and closure. An important aspect of BRAC actions is to determine environmental restoration requirements before property transfer can be considered. Studies at SA 58 were conducted to support this overall mission.

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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 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 surface elevations range from about 200 feet 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 has 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 primary mission of Fort Devens is to command, train, and provide logistical support for non-divisional troop units. The installation also supports that portion of the U.S. Army Intelligence School located at Fort Devens, for the Army Readiness Region, for Reserve Components, and for Army Reserve and National Guard in the New England area.

Fort Devens currently consists of three major land use areas: Main Post, South Post, and North Post (Figure 2-1).

The majority of the facilities on Fort Devens are located in the Main Post area, north of Massachusetts Highway 2. The Nashua River intersects the western edge of the Main Post. The Main Post provides 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 include community support activities (such as a shoppette, cafeteria, post exchange, commissary, bowling alley, golf course, and hospital), administrative buildings, classrooms and training facilities, maintenance facilities, and ammunition storage facilities. The Group 2 SAs, including SA 58, are located on the Main Post.

The South Post is located south of Massachusetts Highway 2 and contains individual training areas designated for troop training, range activities, and a drop zone. The Nashua River bounds the South Post on the Post's northeast side.

The North Post is directly north of the Main Post. The principal activities on the North Post are the Douglas E. Moore Army Airfield, and the installation Waste Water Treatment Plant.

2.2 REGIONAL GEOLOGY

Fort Devens is within the western boundary of the Seaboard Lowland Section of the New England-Maritime physiographic province (Jahns, 1953). Part of the installation lies within the Worcester County Plateau of the Central Uplands province (Koteff, 1966). The land surface is almost completely composed of unconsolidated glacial outwash deposits, resulting in few bedrock outcrops. The surficial deposits are underlain by a highly complex assemblage of intensely folded and faulted metasedimentary rocks with occasional igneous intrusions. The geomorphology of the region is dominated by glacial features such as outwash plains, kames, kame terraces, drumlins, and eskers.

2.3 REGIONAL HYDROGEOLOGY

Groundwater at Fort Devens occurs largely in the permeable glacial-deltaic outwash deposits of sand, gravel, and boulders. Well yields within these sediments are dependent upon the hydraulic characteristics of the aquifer and can range from 2 to over 300 gallons per minute (gpm). Small amounts of groundwater can be obtained from fractured bedrock with yields ranging from 2 to 10 gpm. Minor amounts of groundwater may be found in thin, permeable glacial lenses elsewhere on the 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, the terrain is dissected by numerous brooks with attendant wetlands. There are also several kettle ponds and one kettle lake located within the installation.

2.4 STUDY AREA DESCRIPTION AND HISTORY

SA 58, the Buildings 2648 and 2650 Fuel Oil Spills, is one of seven Group 2 SAs located on the Main Post. It is located between former Building 2647 and former Building 2649 which were located between Jackson Road and Lake George Street (to the west) on the Main Post (Figure 2-2). SA 58 is located on a physiographic upland, where the land surface slopes gently westward toward the valley of the Nashua River. Local bedrock has been mapped as the generally north-south striking Merrimack Formation, consisting of low grade (below biotite isograd) calcareous and ankeritic metasiltstone and phyllite and commonly deformed by kink banding (Russell and Allmendinger, 1975; G.R. Robinson, 1978). The rock unit is called Oakdale Formation by Zen (1983) and Robinson and Goldsmith (1991). The Merrimack (Oakdale) Formation crops out along strike south of SA 58, most visibly on Route 2, just east of the Jackson Gate installation exit.

The surficial geology of the Shirley map quadrangle, in which SA 58 is located, has not been mapped. The area is blanketed by unconsolidated surficial deposits of glacial and post-glacial origin. Bedrock is not exposed at SA 58, although it was reportedly encountered in the Building 2648 tank excavation. Russell and Allmendinger (1975) mapped thin (less than 10 feet) surficial cover south and west of SA 58, and Jahns (1953) mapped ground moraine (till) approximately 1,000 feet to the east. A complete description of the Main Post geology is presented in Section 2.0 of the SI Report (ABB-ES, 1993).

Two underground storage tanks (USTs) formerly containing heating oil were removed in August 1990 in conjunction with the partial demolition of Buildings 2648 and 2650 (Biang et al., 1992). An unreported volume of contaminated soil was removed from these UST sites at the time of tank excavations, and total volatile organic compounds (VOCs) in soil headspace were determined by photoionization detector to be 60 parts per million (ppm) in the excavation at Building 2648 and greater than 40 ppm in the excavation at Building 2650 (McHugh et al., 1990). The presence of Buildings 2648 and 2650 (which were not completely demolished until October 1990) prevented further soil excavation at the time of tank removal.

In April 1991 more contaminated soil was removed from Building 2650's UST excavation. Total VOCs in soil headspace in this excavation were 54 ppm and 70 ppm, and total petroleum hydrocarbon (TPHC) concentrations in soil in the excavation were 76 and 268 ppm (Jones, 1991; Alpha Analytical Laboratories, 1991). The total volume of contaminated soil removed from the Building 2650 excavation was approximately 250 cubic yards (Pierce, 1991). No field investigation was done at this site during the 1992 SI field program.

In April 1991 clay in the bottom of the west corner of the Building 2648 UST excavation was visibly contaminated and had total VOCs in soil headspace of 0.4 to 46 ppm. No samples were collected for TPHC analysis. The observed contaminated soil was not excavated, because of the presence of previously stockpiled soil (Kurz Associates, Inc., 1991). In September 1992, the open excavation at Building 2648 was backfilled with clean soil. In March 1993, all of the buildings in the 2600 series around SA 58 were demolished (see Figure 2-2).

3.0 RELATED INVESTIGATIONS

3.1 MASTER ENVIRONMENTAL PLAN

SA 58 was identified as a possible source for release of contaminants into the environment. The MEP recommended that groundwater monitoring wells be installed and groundwater sampled and analyzed for VOCs and TPHC.

3.2 ENHANCED PRELIMINARY ASSESSMENT

The 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. No additional findings or recommendations for SA 58 were provided in the PA.

3.3 SITE INVESTIGATION REPORT

The SI was initiated in June 1992 and included the 13 Groups 2 and 7 SAs listed in the MEP. These SAs are listed below.

- SA 13 Landfill No. 9
- SA 43 Historic Gas Stations (19 Sites)
- SA 45 Lake George Street Vehicle Wash Area
- SA 49 Building 3602 Leaking Underground Storage Tank (LUST) Site
- SA 56 Building 2417 LUST Site
- SA 57 Building 3713 Fuel Oil Spill
- **SA 58 Buildings 2648 and 2650 Fuel Oil Spills**
- SA 12 Landfill No. 8
- SA 14 Landfill No. 10
- SA 27 Waste Explosive Detonation Range (Hotel)
- SA 28 Waste Explosive Detonation Range (Training Area 14)
- SA 41 Unauthorized Dumping Area (Site A)
- SA 42 Popping Furnace

The SI was conducted by ABB-ES under contract with the USAEC. The Final Site Investigation Report was issued May 1993. The purpose of the SI was to verify the presence

or absence of environmental contamination and to determine whether further investigation or remediation was warranted.

The field sampling program for SA 58 focused on the UST excavation at former Building 2648. The program consisted of field analysis of soil samples collected from TerraProbe points to characterize the vertical and horizontal distribution of potential localized contaminants, the collection of subsurface soil samples for laboratory analysis and geologic classification, the installation of groundwater monitoring wells, and the collection of groundwater samples.

Nineteen subsurface soil samples were collected from ten TerraProbe points located around the UST excavation at Building 2648 (Figure 3-1). One soil sample was collected from between 5 feet and 7 feet below ground surface (bgs) from each TerraProbe point. Another soil sample was collected from nine of the 10 TerraProbe points at a depth of 9 feet or refusal (approximately 11 feet bgs). These samples were analyzed on-site for benzene, toluene, ethylbenzene, and xylene (BTEX) and TPHC. The TerraProbe points were situated both upgradient and downgradient of the tank location based on the inferred westward groundwater flow direction.

Based on the results of the TerraProbe program, four soil borings (58M-92-01X through 58M-92-04X) were drilled (one upgradient and three downgradient) and four monitoring wells were installed. One soil sample was collected from each boring and analyzed for Project Analyte List (PAL) VOCs, TPHC, total organic carbon, and grain size. The four soil borings at SA 58 encountered strongly weathered bedrock, characterized as incompetent gray shale, at depths ranging from 12.0 feet bgs (in boring 58M-92-01X) to 15.7 bgs (in boring 58M-92-04X). The bedrock was so weathered in boring 58M-92-01X that the hollow stem augers, used to advance the boring, were advanced 8 feet into the bedrock. This weathered bedrock is probably the "blue clay" observed at the bottom of the UST excavation (McHugh et al., 1990). Grain size analyses of samples from these borings indicated that the sand fraction ranges from 43.1 to 51.0 percent, the gravel fraction from 12.3 to 29.5 percent, and fines from 27.4 to 38.8 percent of the total sample volume. These soils are likely glacial tills. Boring logs for the four monitoring wells and grain size analyses results are provided in Appendices B and J, respectively, of the SI Report (ABB-ES, 1993).

Monitoring well 58M-92-01X was installed as part of this investigation at a location presumed to be upgradient of the UST excavation, and wells 58M-92-02X through 58M-92-04X were installed at presumed downgradient locations (Figure 3-2). Wells 58M-92-01X and 58M-92-02X were screened across the till/bedrock interface, and wells

58M-92-03X and 58M-92-04X were screened in till. Two rounds of groundwater samples were collected from each of the four monitoring wells. The first round was collected in September 1992 and the second round was collected in January 1993. All of the groundwater samples were submitted for laboratory analysis of PAL VOCs, TPHC, and PAL anions and cations. Round Two groundwater samples were also analyzed for total suspended solids (TSS).

Water elevations and aquifer hydraulic conductivities measured in the newly installed wells indicated local groundwater flows roughly northwest beneath the study area at an average rate of less than 2 ft/year (Figure 3-2).

3.4 PRELIMINARY RISK EVALUATION

Preliminary Risk Evaluations (PREs) were performed as part of the SI to help establish whether environmental contamination at SA 58 required further investigation or remediation. This section presents the general approach employed for the SI PREs; details of the Human Health and Ecological PREs for SA 58 are presented in Sections 5.0 and 6.0, respectively.

As detailed in Section 3.3, environmental investigations at SA 58 entailed sampling the following environmental media:

- Subsurface Soil
- Groundwater

Human Health PRE was conducted to evaluate contamination in subsurface soils and in groundwater.

3.4.1 Human Health Risk Evaluation

The Human Health PRE at SA 58 included the following elements:

- **Current and Future Land Use:** Current and foreseeable future land uses are particularly relevant with respect to the applicability of soil screening values used in the PRE. Two sets of soil screening values were used in the evaluation. One set, U.S. Environmental Protection Agency (USEPA) Region III risk-based concentrations for residential soil, was used when the

current and/or foreseeable future land use is residential. The other set, USEPA Region III risk-based concentrations for commercial/industrial soil, was used when the current and/or foreseeable future land use is commercial or industrial.

- **Comparison to Public Health Standards and Guidelines:** For soil and groundwater, human health standards and/or guidelines were used as screening criteria to evaluate the significance of the sampling data. To evaluate the concentrations of compounds detected in groundwater, federal and Massachusetts drinking water standards and guidelines were used. The USEPA's Region III risk-based concentrations were used to evaluate the results of the soil sampling program. The basis and applicability of these standards and guidelines are discussed below.

  USEPA Drinking Water Regulations. Federal drinking water standards (both final and proposed) are used to evaluate the significance of the groundwater sampling data. These standards were extracted at the time of the SI from the USEPA Office of Water's "Drinking Water Regulations and Health Advisories," November 1992.

  Massachusetts Drinking Water Standards and Guidelines. For some compounds, Massachusetts Department of Environmental Protection (MADEP) has promulgated drinking water standards that are more stringent than the federal drinking water standards. MADEP has also developed drinking water guidelines for compounds for which no federal standards exist.

  USEPA Office of Solid Waste and Emergency Response (OSWER) Lead Guidance (OSWER Directive: 9355.4-02). USEPA has set forth an interim soil cleanup level for total lead which is protective for direct contact exposure at residential settings. The interim guidance will be developed after the USEPA has developed a verified Cancer Potency Factor and/or a Reference Dose for lead.

  USEPA Region III Risk-Based Concentration Table. This table is used by USEPA Region III toxicologists as a risk-based screening tool for Superfund sites, as a benchmark for evaluating preliminary site investigation data and preliminary remediation goals. Although it has

no official status either as regulation or guidance, it is useful as a screening tool. The table is updated quarterly and therefore regularly incorporates new USEPA toxicity constants as they are developed. The First Quarter, 1993 was the current update used in the PRE at the time of the SI.

For the SA 58 Human Health PRE, Region III risk-based concentrations for tap water, commercial/industrial soil, and residential soil were used. Risk-based concentrations for tap water assume daily consumption of two liters of water for a residential lifetime of 30 years; these also assume exposure from the inhalation of volatiles from household water uses (including showering, laundering, and dish washing).

For soil, Region III risk-based concentrations have been developed for commercial/industrial soil exposure as well as for residential exposure. Risk-based concentrations for commercial/industrial soil assume that a worker ingests soil 250 days per year for 25 years, at an ingestion rate of 100 mg/day. Risk-based concentrations for residential soil assume that an individual ingests soil 350 days per year for a residential lifetime of 30 years, at an age-adjusted ingestion rate of 100 mg/day.

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4.0 CONTAMINATION ASSESSMENT

The SA 58 SI analytical results are discussed by medium in the following subsections. Raw laboratory analytical results are included in Appendix K of the SI Report (ABB-ES, 1993).

4.1 SOILS

Subsurface soils were sampled and analyzed both on site and at an off-site laboratory during the SI field investigation. These results are summarized in the following paragraphs.

4.1.1 Field Screening Results

The objective of the TerraProbe subsurface soil sampling and field analytical program was to determine the vertical and horizontal distribution of residual fuel contamination outside of the former UST excavation of Building 2648. A total of 19 subsurface soil samples from 10 TerraProbe locations (Figure 3-1) were collected and analyzed. Toluene, ethylbenzene, xylenes, and TPHC were detected in several samples indicating that some residual fuel contamination may be present outside of the former UST excavation. The field analytical results are presented in Table 4-1. Figures 4-1 and 4-2 show the distribution of contaminants detected.

4.1.2 Laboratory Results

The objective of the sampling program was to investigate the presence or absence of petroleum contamination in the upgradient and downgradient soils and groundwater at SA 58. The primary concern at SA 58 was that residual fuel-related contaminants detected during the TerraProbe program, in the soil around the excavation for Building 2648, were adversely impacting the groundwater quality downgradient of SA 58. Soil samples were collected from the soil borings installed upgradient and downgradient of Building 2648 and the former UST location (see Figure 3-2).

A total of four soil samples were collected, one sample from each of the four borings, in the saturated zone to evaluate contaminant migration at the water table. Each boring was completed as a monitoring well. No PAL VOCs or TPHC were detected in any of the subsurface soil samples collected from SA 58 except for low concentrations of acetone in

soil borings 58M-92-01X and -04X (Table 4-2; Figure 4-3). Acetone is considered a common laboratory contaminant and does not appear to be a site contaminant. Section 3.2.2 of the SI Report discusses the detection of this compound and the justification for exclusion of acetone as a potential site contaminant (ABB-ES, 1993).

Three soil samples were collected from the backfill material in the UST excavation at former Building 2648 and 2650 in March 1995. The soil samples were submitted for laboratory analysis consisting of TPHC, only. The results of the TPHC analysis showed concentrations that ranged from below the detection limit to 91.2 micrograms per gram ($\mu g/g$) in the 10-foot soil sample collected from 58B-95-01X located in the former UST excavation at former Building 2648 (see Table 4-2; Figure 4-3).

4.2 GROUNDWATER

Four groundwater monitoring wells were installed and two rounds of groundwater samples were collected to evaluate the groundwater quality at SA 58. Analytical results for both rounds are shown on Figure 4-4. VOCs were detected in the Round One groundwater sample collected from 58M-92-01X, only. No VOCs were detected in the other three groundwater samples collected. Round Two groundwater sampling results indicate that VOCs were not detected in any of the samples collected. TPHC was not detected in any of the groundwater samples collected from SA 58 during either round. Inorganic analyte (calcium, magnesium, and potassium) concentrations were detected above the calculated Fort Devens groundwater background concentrations (ABB-ES, 1993) in all wells. These elevated inorganic cation concentrations are likely the result of road de-icing compounds and not associated with leaking USTs. Each groundwater sample collected during Round Two was analyzed for TSS. TSS concentrations ranged from 132 milligrams per liter (mg/L) in 58M-92-04X to 1,080 mg/L in 58M-92-02X.

One groundwater sample was collected from 58M-92-01X in March 1995 to confirm the Round Two results collected during the 1992 SI. The groundwater sample was submitted for laboratory analysis consisting of PAL VOCs, only. The results of the laboratory analysis showed no detectable concentrations of PAL VOCs (see Table 4-3; Figure 4-4).

4.3 QUALITY CONTROL BLANKS

The quality control blanks analyzed during the Groups 2 and 7 SI included method blanks, trip blanks' and rinsate blanks. Method blanks were analyzed to determine if compound analytes were introduced at the laboratory. The purpose of trip and rinsate blanks was to

determine if cross contamination of samples occurred from shipment and storage and if decontamination activities impacted analyte concentrations, respectively. Data were generated by ESE Laboratories from soil and water samples collected from July through October 1992. Two field blanks of the USAEC approved source water were collected and analyzed prior to the start of the Groups 2 and 7 SI.

The following data is a presentation of Bis (2-ethylhexyl) phthalate (B2EHP) detects above Certified Reporting Limit (CRL) values in the SA Groups 2 and 7 method, rinsate, and field blanks and the frequency at which they were found.

B2EHP was found in only one method blank at a reported concentration of 0.9 μg/g. Phthalate esters are identified as common laboratory contaminants by the EPA[1].

B2EHP was the only Base Neutral/Acid Extractable organic (BNA) compound above the CRL detected in the field blanks. The concentrations at which it was found was 9.9 micrograms per liter (μg/L) and 53 μg/L for an average value of 32 μg/L. B2EHP was likely introduced as a laboratory contaminant during sample preparation.

B2EHP was not detected above the CRL in any of the four rinsate blanks collected during the Groups 2 and 7 SI.

For further information on Quality Control Blanks refer to Appendix E of the Groups 2 and 7 SI Report (ABB-ES, 1993).

[1] CLP Program State of Work, March 1990.

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5.0 PRELIMINARY HUMAN HEALTH RISK EVALUATION

A preliminary human health risk evaluation (PRE) was prepared for SA 58 to determine if the contaminants detected at this SA pose a risk to human receptors. For this PRE, the future use of SA 58 is assumed to be residential. Tables 5-1 and 5-2 present the statistics and human health standards and guidelines used in the PRE for SA 58 summarized below.

5.1 SOILS

As discussed in Section 3.5 (Preliminary Risk Evaluation Methodology) of the SI Report (ABB-ES, 1993), all soils collected from 3 to 15 feet in depth are classified as subsurface and are considered to be accessible under a commercial/industrial future use exposure scenario. Surficial soils (i.e., zero to 3 feet in depth), which would be accessible under a residential future use exposure scenario, were not sampled because the source of contamination was known to be an underground tank.

Table 5-1 presents summary statistics on subsurface soil boring data at SA 58 and USEPA Region III commercial/industrial soil risk-based concentrations (USEPA, 1993) for comparison. At SA 58, ABB-ES drilled four soil borings and collected subsurface soil samples from each boring for laboratory chemical analysis. Subsurface soil at SA 58 is represented by samples 58M-92-01X through 58M-92-04X. The soil samples were collected in the saturated zone to evaluate contaminant migration across the water table. No VOCs or TPHC were detected in any of the subsurface soil samples collected from SA 58 except for trace concentrations of ACET at 58M-92-01X. ACET is considered a common laboratory contaminant and does not appear to be an SA contaminant.

Table 4-1 presents the field analytical results for the 19 subsurface soil samples collected and screened at the 10 Terraprobe locations. VOCs and TPHC were used as the primary organic compound indicators for the study area soils. The aromatic VOCs toluene (MEC6H5) (2.5 ppb maximum), ethylbenzene (ETC6H5) (4.0 parts per billion (ppb) maximum), and xylenes (XYLEN) (13 ppb maximum) were detected in four subsurface soil samples from the TerraProbe program, probably derived from fuel oil releases. The maximum concentrations of BTEX compounds detected in the Terraprobe samples are below the USEPA Region III commercial/industrial soil concentrations.

The maximum TPHC concentrations by field analysis in the 19 TerraProbe soil samples ranged from less than 55 μg/g to 328 μg/g. To evaluate the health risk associated with TPHC in soil, ABB-ES developed risk-based concentrations for petroleum products. These concentrations were calculated using the same exposure assumptions as those used by USEPA toxicologists in the USEPA Region III Risk-Based Concentration Table, First Quarter, 1993 for commercial/industrial soils and residential soils. A dose response value for marine diesel used in the calculation is a provisional value developed by USEPA Environmental Criteria and Assessment Office (USEPA, 1992). USEPA suggests using the reference dose value for diesel oil as a surrogate for No. 2 fuel oil, the type of oil stored in the former heating oil USTs. The table below presents the calculated risk-based concentration for No. 2 fuel oil:

Analyte	Residential Soil (μg/g)	Commercial/Industrial Soil (μg/g)
No. 2 Fuel Oil	630	8,180

The maximum detected TPHC concentration in soil at SA 58 (328 μg/g) is well below the risk-based commercial/industrial and residential soil concentrations. The TPHC levels indicate that contamination from fuel spillage has been adequately removed during tank excavation and is not migrating in the unsaturated soil.

5.2 GROUNDWATER

Table 5-2 presents summary statistics on groundwater associated with SA 58 and drinking water standards or guidelines for comparison. Four groundwater monitoring wells were installed at SA 58 to evaluate the groundwater quality (58M-92-01X through 58M-92-04X). The data reported in Table 5-2 are based on unfiltered samples. Four organic compounds were detected in the groundwater associated with SA 58: benzene (C6H6), MEC6H5, trichloroethene (TRCLE), and trichlorofluoromethane (CCL3F). The maximum detected concentrations of the organic compounds were below their respective drinking water standard or guideline.

An assessment of the inorganic data for SA 58 groundwater shows that there is some inorganic analyte contamination directly surrounding the SA. When comparing groundwater concentrations to the statistical background, the inorganic data for SA 58 groundwater shows that there are several compound exceedances: calcium, magnesium, and potassium. No

drinking water standards or guidelines exist for these analytes; they are all essential nutrients.

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6.0 PRELIMINARY ECOLOGICAL RISK EVALUATION

A preliminary ecological risk evaluation was not prepared for SA 58 because the contaminants detected at this SA appear to be confined to subsurface soil, and are not anticipated to impact any ecological receptors.

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7.0 CONCLUSIONS

The primary concern at SA 58 was that residual fuel-related contaminants detected in the soil around the excavation for Building 2648 were adversely impacting the groundwater quality downgradient of SA 58. The field investigation at SA 58 identified VOCs and TPHC (possibly indicative of residual petroleum contamination) in TerraProbe soil samples collected from the vadose zone. Soil samples collected in the saturated zone, however, did not contain PAL VOCs or TPHC. The lack of contaminants detected in soil samples collected from the saturated zone up and downgradient of the former UST location suggests that any contaminant migration at the water table has not significantly impacted soil quality at SA 58. The two VOCs detected the soil boring samples at trace concentrations are likely laboratory contaminants. The results of the March 1995 UST excavation backfill samples show that some residual TPHC contamination exists in the backfill material, but the concentrations are well below the MCP Method 1 S-1/GW-1 standard of 500 μg/g.

Groundwater samples collected in the vicinity of SA 58 contained VOCs, but only at the upgradient well location and only in the first of two sampling rounds; elevated inorganics (calcium, magnesium and potassium) were detected in groundwater from all well locations. Based on the inferred groundwater flow direction, the VOCs detected in the Round One groundwater sample from 58M-92-01X may be originating from an upgradient source. Because no VOCs were detected downgradient, the contaminants are likely to be localized and of limited lateral extent. In addition, VOCs were not detected in Round Two groundwater sampling results. The inorganic analytes detected in each of the wells are not likely due to releases from the USTs. The results of the March 1995 groundwater sample indicated that no VOCs are present in the groundwater upgradient of former Building 2648.

Because the investigation focused on the subsurface, no ecological PRE was conducted. The human health PRE indicated that there was no unacceptable risk associated with exposure to contaminants identified in soil and groundwater at the study area. Based on the results of the PRE, no further action is recommended for SA 58.

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8.0 DECISION

On the basis of the findings at SA 58, there is no evidence or reason to conclude that petroleum contamination from the former UST has caused significant environmental contamination or pose a threat to human health or the environment. The decision has been made to remove SA 58 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. CHAMBERS
BRAC Environmental Coordinator

2 Nov 95
Date

U.S. ENVIRONMENTAL PROTECTION AGENCY

JAMES P. BYRNE
Fort Devens Remedial Project Manager

11/2/95
Date

[X] Concur

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

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

D. LYNNE WELSH
Section Chief, Federal Facilities - CERO

11/2/95
Date

[X] Concur

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

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ABB-ES	ABB Environmental Services, Inc.
B2EHP	Bis (2-ethylhexyl) phthalate
bgs	below ground surface
BNA	Base Neutral/Acid Extractable organic
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, and xylenes
C6H6	benzene
CCL3F	trichlorofluoromethane
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRL	Certified Reporting Limit
DOD	U.S. Department of Defense
ETC6H5	ethylbenzene
gpm	gallons per minute
IRP	Installation Restoration Program
MADEP	Massachusetts Department of Environmental Protection
MEC6H5	toluene
MEP	Master Environmental Plan
mg/day	milligrams per day
mg/L	milligrams per liter
MSL	mean sea level
OSWER	USEPA Office of Solid Waste and Emergency Response
PA	Enhanced Preliminary Assessment
PAL	Project Analyte List
ppb	parts per billion
ppm	part per million
PRE	Preliminary Risk Evaluation
SA	Study Area

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

SI	site investigation
TPHC	total petroleum hydrocarbon compounds
TRCLE	trichloroethene
TSS	total suspended solids
µg/g	micrograms per gram
µg/L	micrograms per liter
USAEC	U.S. Army Environmental Center
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
XYLEN	xylenes

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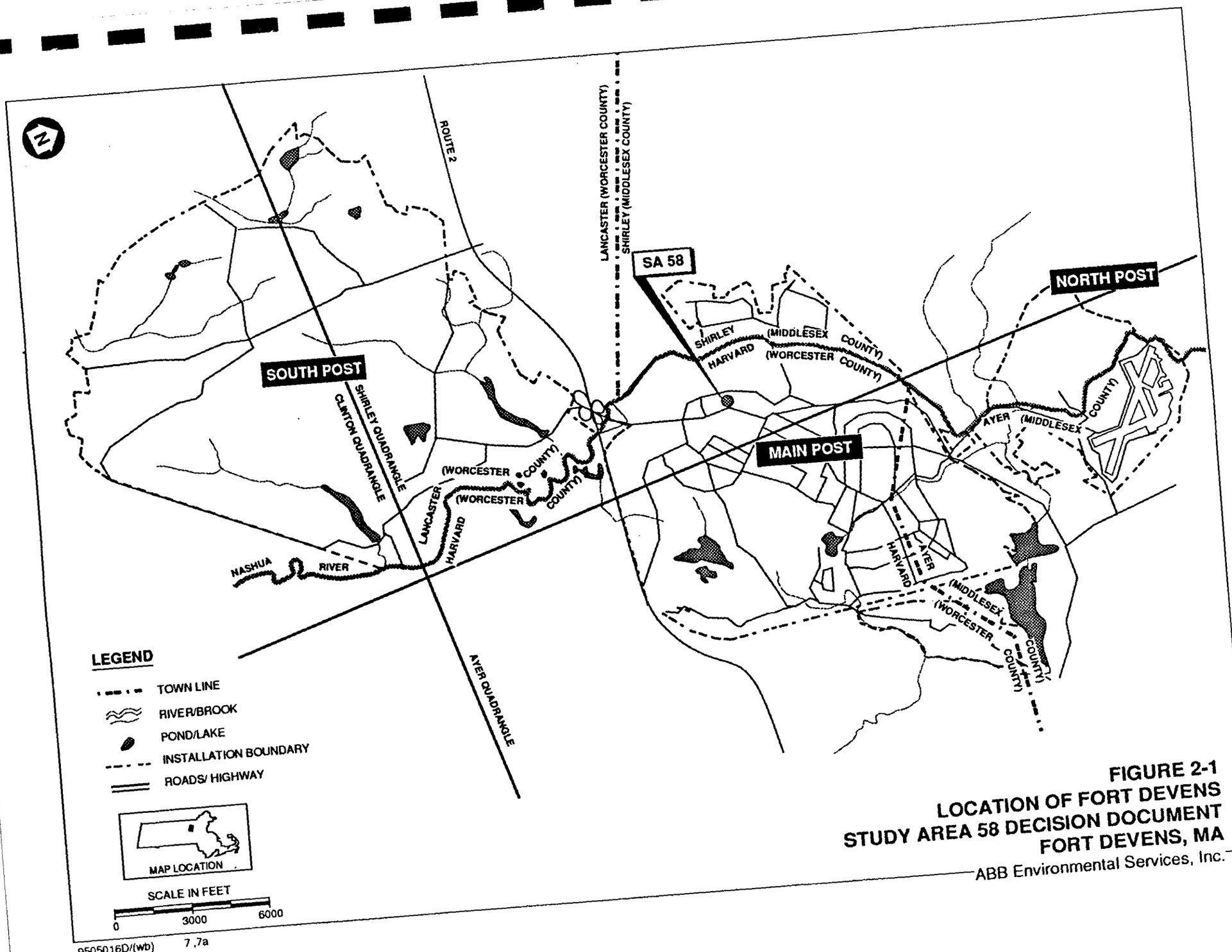

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FIGURE 2-1
LOCATION OF FORT DEVENS
STUDY AREA 58 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

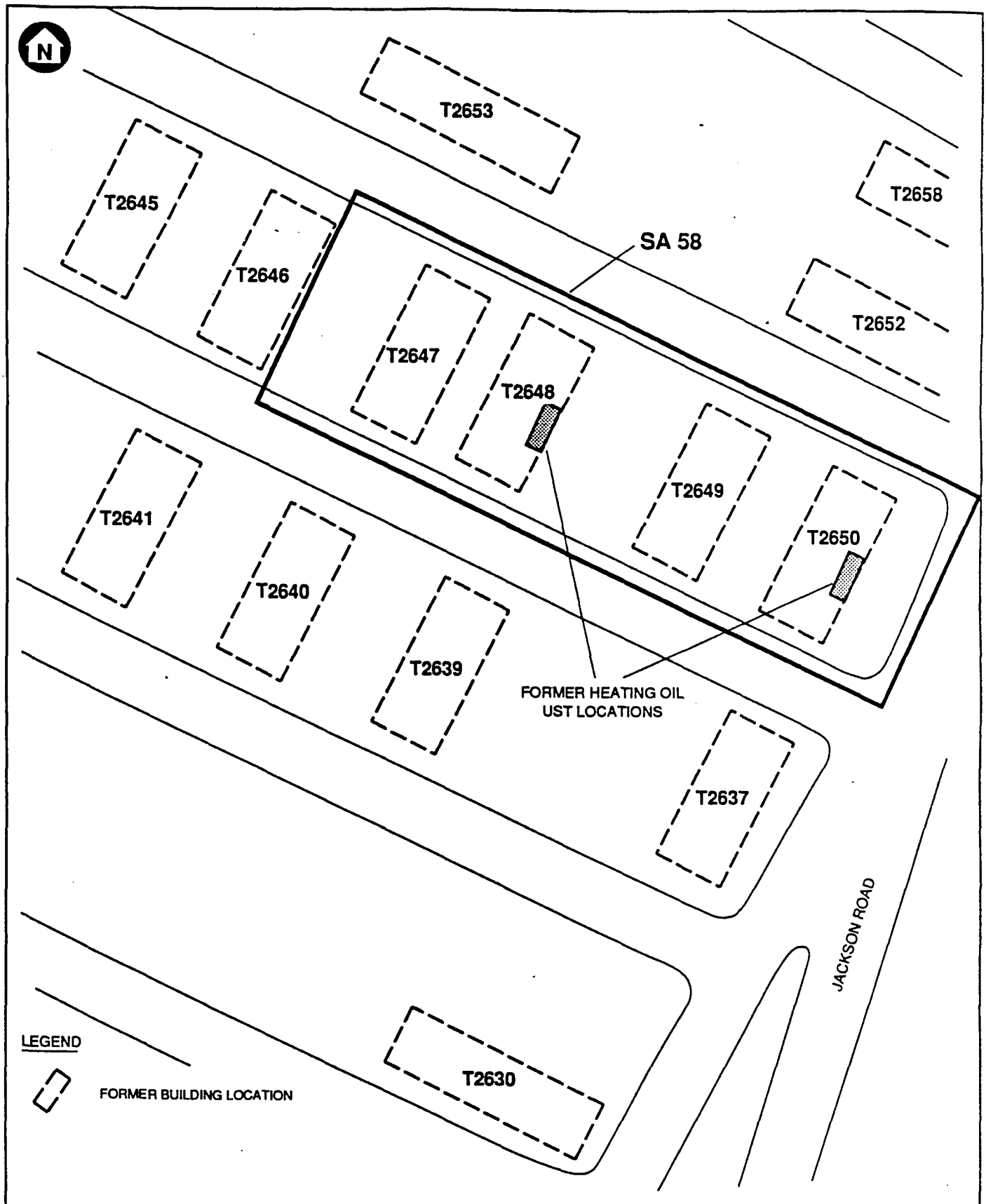

FIGURE 2-2
LOCATION OF SA 58
STUDY AREA 58 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

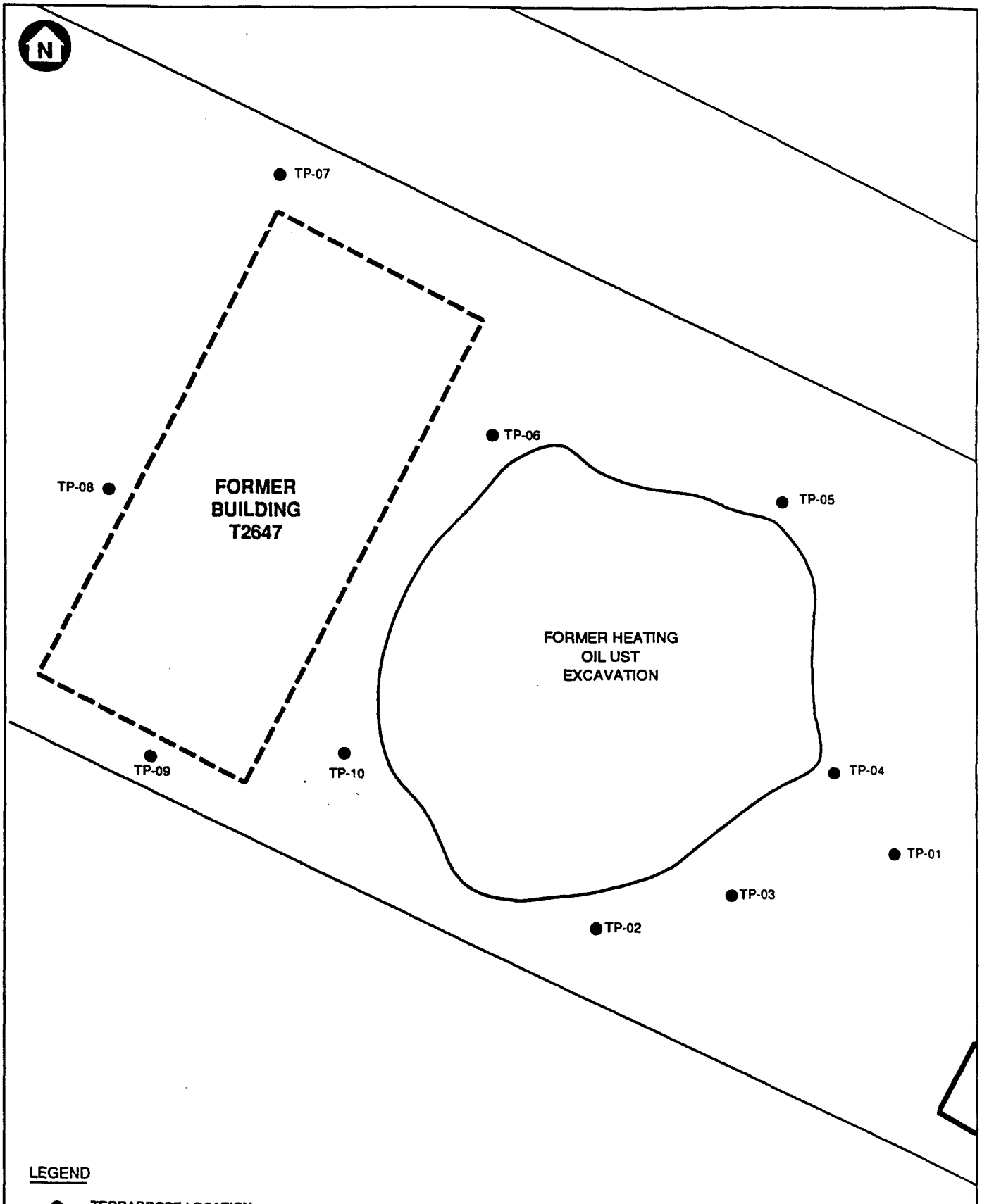

FIGURE 3-1
TERRAPROBE LOCATIONS
STUDY AREA 58 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

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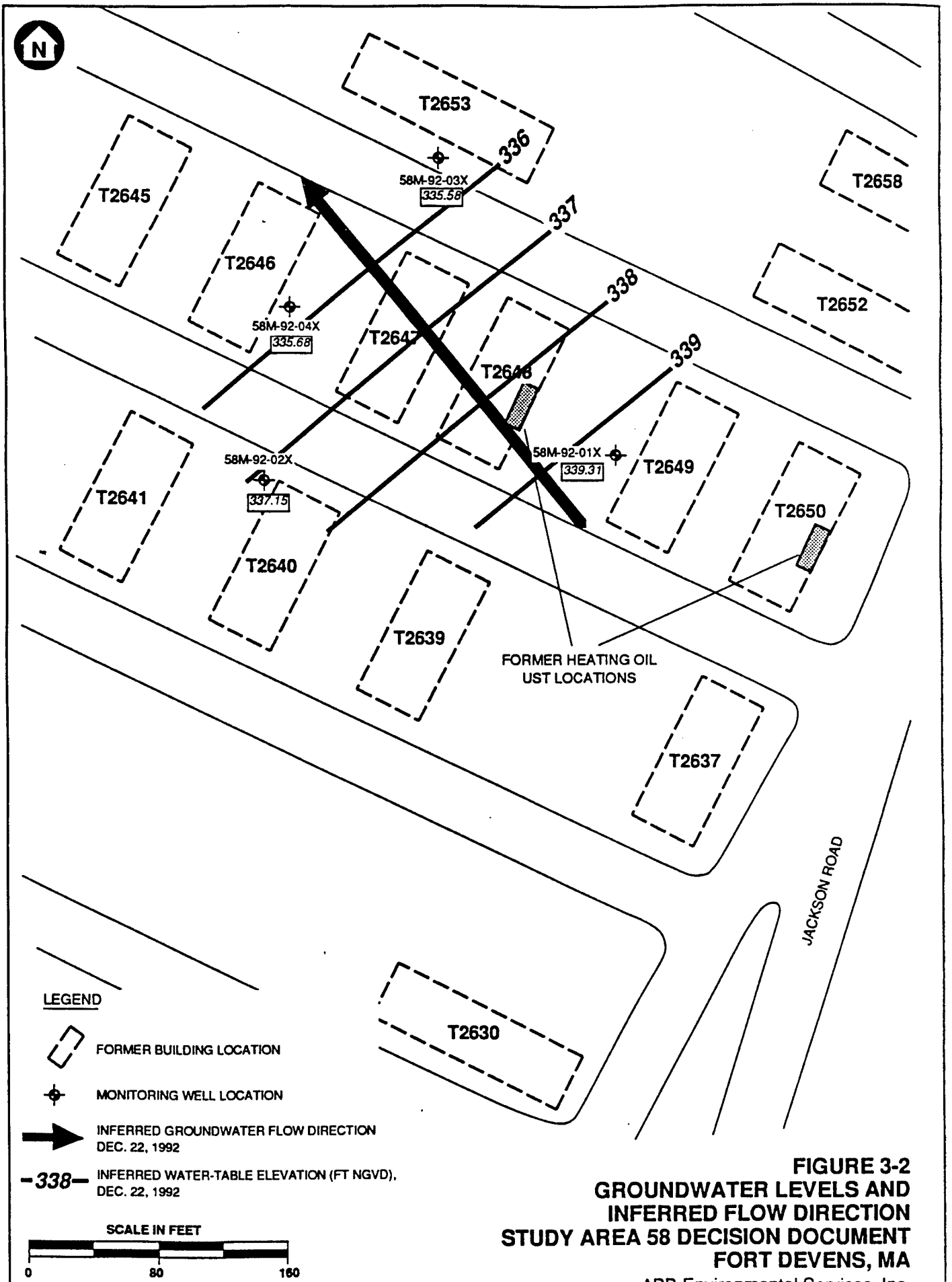

FIGURE 3-2
GROUNDWATER LEVELS AND INFERRED FLOW DIRECTION
STUDY AREA 58 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

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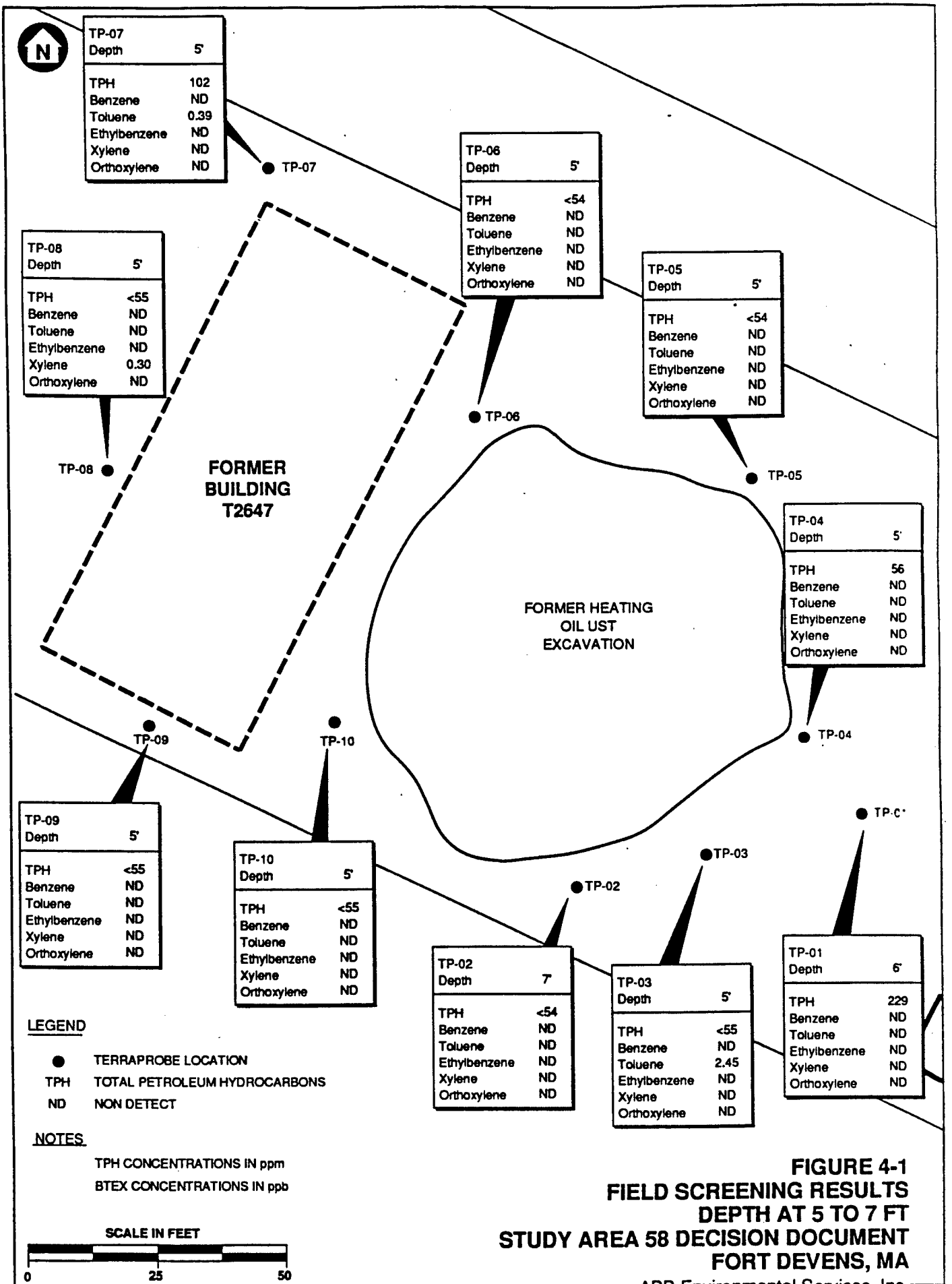

FIGURE 4-1
FIELD SCREENING RESULTS
DEPTH AT 5 TO 7 FT
STUDY AREA 58 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

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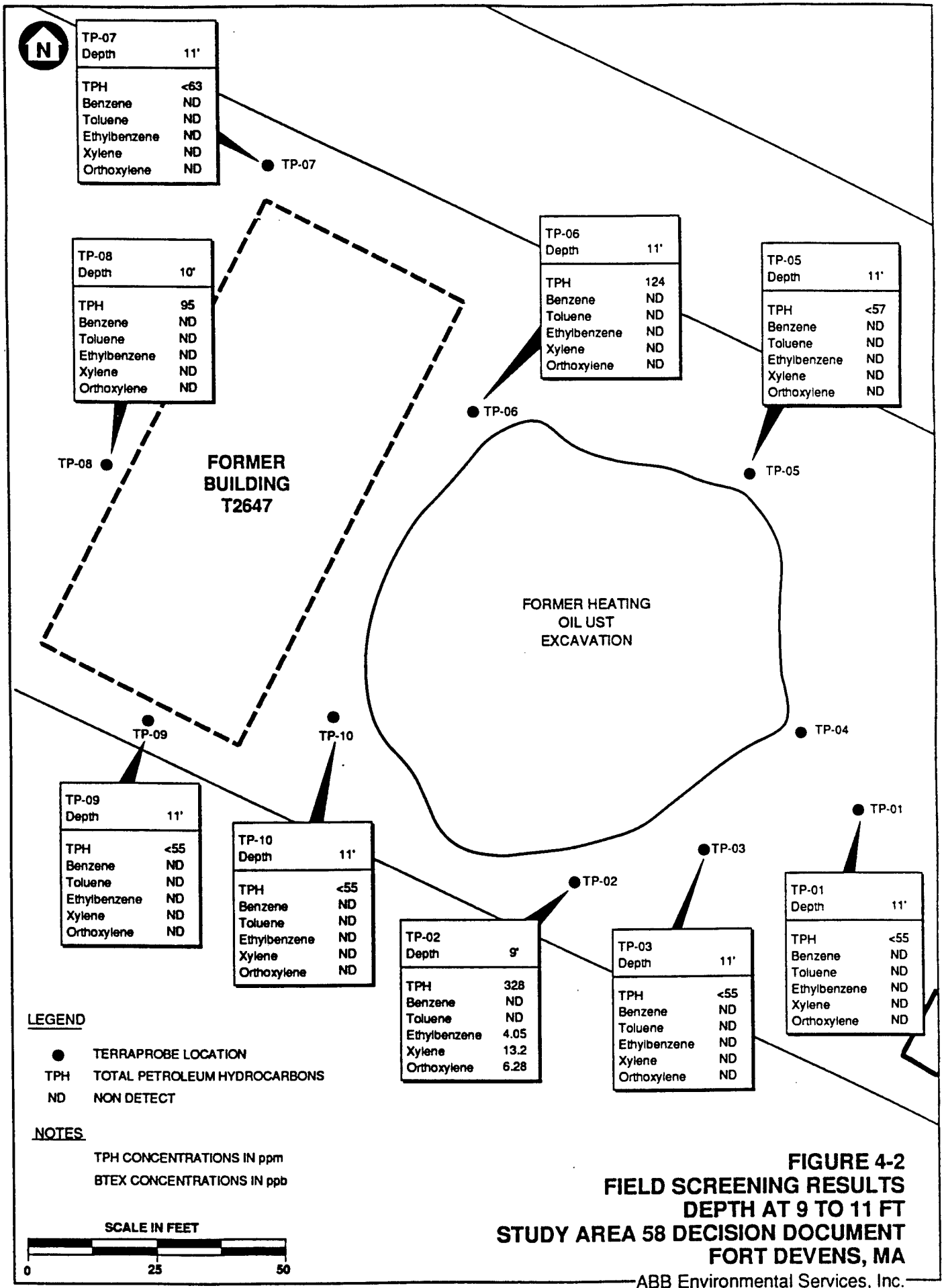

FIGURE 4-2
FIELD SCREENING RESULTS
DEPTH AT 9 TO 11 FT
STUDY AREA 58 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

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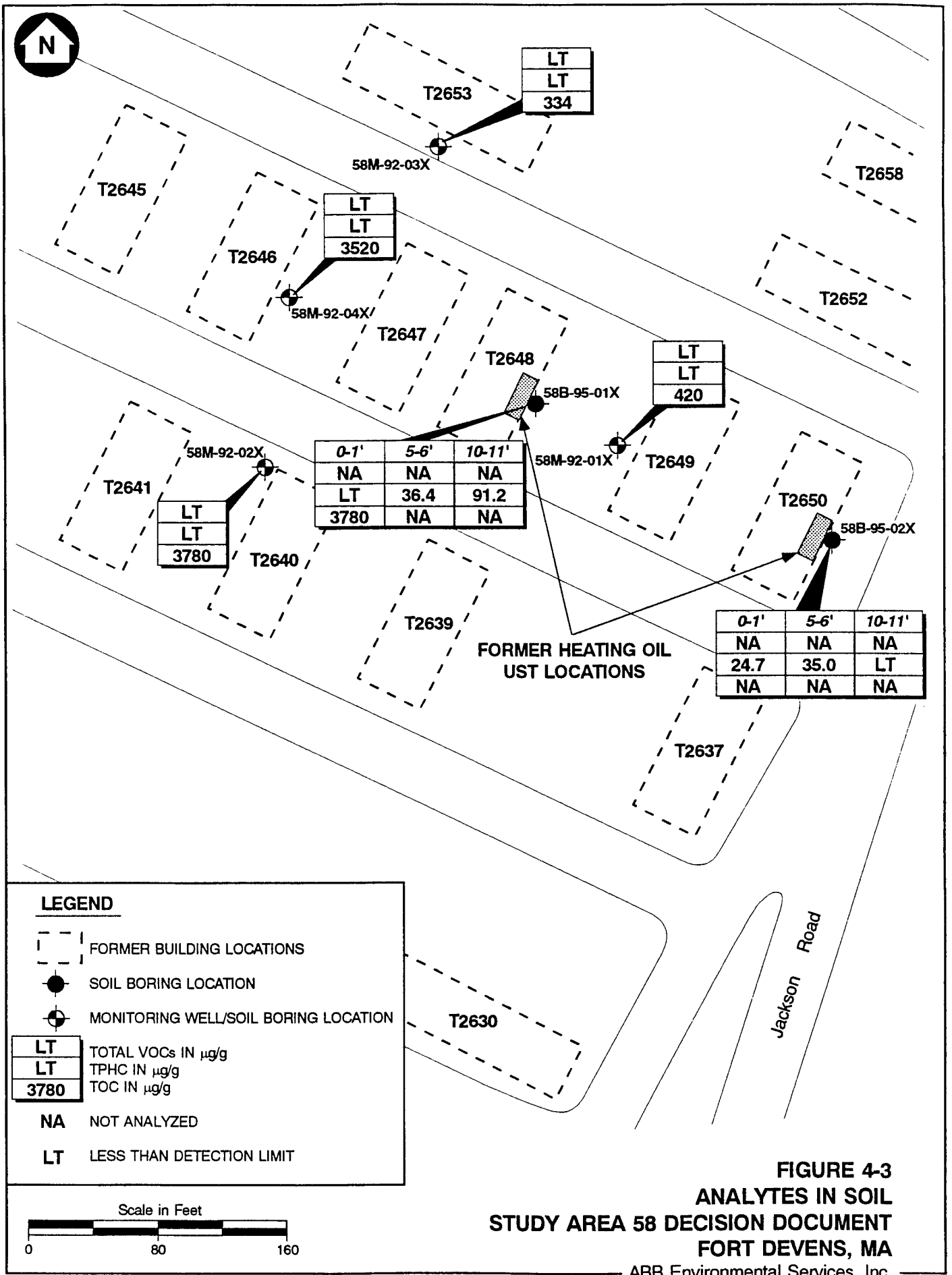

FIGURE 4-3
ANALYTES IN SOIL
STUDY AREA 58 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

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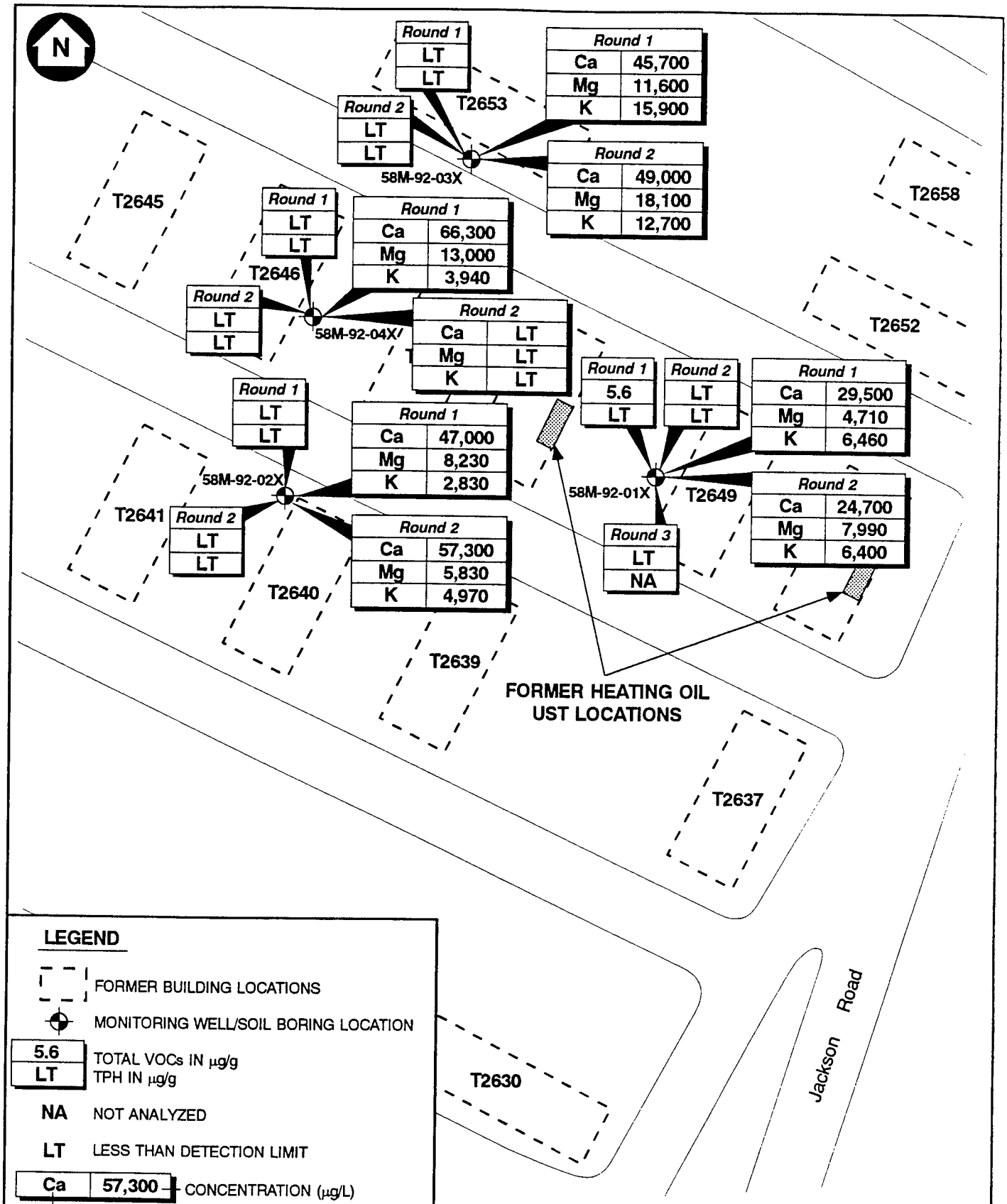

FIGURE 4-4
ANALYTES IN GROUNDWATER
STUDY AREA 58 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

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TABLE 4-1
FIELD SCREENING RESULTS
SA 58 – BUILDING 2648/2650 FUEL OIL SPILLS

DECISION DOCUMENT
FORT DEVENS

SAMPLE ID	SA	MEDIUM	SITE ID	DEPTH (feet)	TPHC ppm	TOTAL BTEX ppb	BEN* ppb	TOL* ppb	E-BEN* ppb	M/P XYL** ppb	O-XYL* ppb	COMMENTS
58TSX01XX601XF	58	SOIL	TP-01	6	229	0	ND	ND	ND	ND	ND	
58TSX01X1101XF	58	SOIL	TP-01	11	<55	0	ND	ND	ND	ND	ND	
58TSX02XX701XF	58	SOIL	TP-02	7	< 54	0	ND	ND	ND	ND	ND	
58TSX02XX901XF	58	SOIL	TP-02	9	328	10	ND	ND	4.05	13.20	6.28	
58TSX03XX501XF	58	SOIL	TP-03	5	< 55	2	ND	2.45	ND	ND	ND	
58TSX03X1101XF	58	SOIL	TP-03	11	< 55	0	ND	ND	ND	ND	ND	
58TSX04XX501XF	58	SOIL	TP-04	5	56	0	ND	ND	ND	ND	ND	
58TSX05XX501XF	58	SOIL	TP-05	5	< 54	0	ND	ND	ND	ND	ND	
58TSX05X1101XF	58	SOIL	TP-05	11	< 57	0	ND	ND	ND	ND	ND	
58TSX06XX501XF	58	SOIL	TP-06	5	< 54	0	ND	ND	ND	ND	ND	
58TSX06X1101XF	58	SOIL	TP-06	11	124	0	ND	ND	ND	ND	ND	
58TSX07XX501XF	58	SOIL	TP-07	5	102	0	ND	0.39	ND	ND	ND	
58TSX07X1101XF	58	SOIL	TP-07	11	< 63	0	ND	ND	ND	ND	ND	
58TSX08XX501XF	58	SOIL	TP-08	5	<55	0	ND	ND	ND	0.306	ND	
58TSX08X1001XF	58	SOIL	TP-08	10	95	0	ND	ND	ND	ND	ND	
58TSX09XX501XF	58	SOIL	TP-09	5	<55	0	ND	ND	ND	ND	ND	
58TSX09X1101XF	58	SOIL	TP-09	11	<55	0	ND	ND	ND	ND	ND	
58TSX10XX501XF	58	SOIL	TP-10	5	<55	0	ND	ND	ND	ND	ND	
58TSX10X1101XF	58	SOIL	TP-10	11	<55	0	ND	ND	ND	ND	ND	

NOTES:

* = ND DENOTES A NON DETECTOR CONCENTRATIONS BELOW 5 PPB
** = ND DENOTES A NON DETECTOR CONCENTRATIONS BELOW 10 PPB
SA = STUDY AREA
TPHC = TOTAL PETROLEUM HYDROCARBONS
BTEX = BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

BEN = BENZENE
TOL = TOLUENE
E-BEN = ETHYLBENZENE
M/P-XYL = M/P-XYLENE
O-XYL = O-XYLENE

TABLE 4-2
ORGANIC COMPOUNDS IN SOIL
SA 58 – BUILDING 2648/2650 FUEL OIL SPILLS

DECISION DOCUMENT
FORT DEVENS

ANALYTE	BORING	58M-92-01X	58M-92-02X	58M-92-03X	58M-92-04X
	DEPTH	12 FT	9 FT	8 FT	9 FT
VOLATILES (ug/g)					
ACETONE		0.054	< 0.017	< 0.017	< 0.017
OTHER (ug/g)					
TOTAL ORGANIC CARBON		420.0	3780.0	334.0	3520.0

ANALYTE	BORING	58B-95-01X	58B-95-01X	58B-95-01X
	DEPTH	0 FT	5 FT	10 FT
OTHER (ug/g)				
TOTAL PETROLUEM HYDROCARBONS		<20.8	36.4	91.2

ANALYTE	BORING	58B-95-02X	58B-95-02X	58B-95-02X
	DEPTH	0 FT	5 FT	10 FT
OTHER (ug/g)				
TOTAL PETROLUEM HYDROCARBONS		24.7	35.0	<27.9

NOTES:

TABLE LISTS DETECTED ANALYTES ONLY – SEE PROJECT ANALYTE LIST FOR SUMMARY

< = LESS THAN DETECTION LIMIT SHOWN

TABLE 4–3
ANALYTES IN GROUNDWATER
SA 58 – BUILDING 2648/2650 FUEL OIL SPILLS

DECISION DOCUMENT
FORT DEVENS

ANALYTE	BACK-GROUNDS	ROUND 1 58M-92-01X	ROUND 2 58M-92-01X	ROUND 3 58M-92-01X	ROUND 1 58M-92-02X	ROUND 2 58M-92-02X
ORGANICS (µg/L)						
BENZENE		0.69	< 0.50	< 0.50	< 0.50	< 0.50
TOLUENE		0.84	< 0.50	< 0.50	< 0.50	< 0.50
TRICHLOROETHYLENE/TRICHLOROETHENE		0.83	< 0.50	< 0.50	< 0.50	< 0.50
TRICHLOROFLUOROMETHANE		3.3	< 0.50	< 0.50	< 0.50	< 0.50
INORGANICS (µg/L)						
CALCIUM	14700.0	29500.0	24700.0	NA	47000.0	57300.0
MAGNESIUM	3480.0	4710.0	7990.0	NA	8230.0	5830.0
POTASSIUM	2370.0	6460.0	6400.0	NA	2830.0	4970.0
ANIONS/CATIONS (µg/L)						
SULFATE		16100.0	12900.0	NA	19800.0	75400.0
ALKALINITY		63000.0	61000.0	NA	108000.0	117000.0
BICARBONATE		76900.0	74400.0	NA	179000.0	143000.0
NITRATE/NITRITE		7500.0	3300.0	NA	1100.0	970.0
CHLORIDE		19900.0	6340.0	NA	32300.0	5490.0
OTHER (µg/L)						
TOTAL SUSPENDED SOLIDS		NA	540.0	NA	NA	1080.0

NOTES:
NA = NOT ANALYZED
TABLE LISTS DETECTED ANALYTES ONLY – SEE PROJECT LIST FOR SUMMARY
[ ] = VALUE ABOVE BACKGROUND LEVEL

TABLE 4–3
ANALYTES IN GROUNDWATER
SA 58 – BUILDING 2648/2650 FUEL OIL SPILLS

DECISION DOCUMENT
FORT DEVENS

ANALYTE	BACK-GROUND	ROUND 1 58M–92–03X	ROUND 2 58M–92–03X	ROUND 1 58M–92–04X	ROUND 2 58M–92–04X
ORGANICS (µg/L)					
BENZENE		< 0.05	< 0.50	< 0.05	< 0.50
TOLUENE		< 0.05	< 0.50	< 0.05	< 0.50
TRICHLOROETHYLENE/TRICHLOROETHENE		< 0.05	< 0.50	< 0.05	< 0.50
TRICHLOROFLUOROMETHANE		< 0.05	< 0.50	< 0.05	< 0.50
INORGANICS (µg/L)					
CALCIUM	14700.0	45700.0	49100.0	66300.0	10200.0
MAGNESIUM	3480.0	11600.0	18100.0	13000.0	1980.0
POTASSIUM	2370.0	15900.0	12700.0	3940.0	1620.0
ANIONS/CATIONS (µg/L)					
SULFATE		34900.0	26500.0	36300.0	13600.0
ALKALINITY		160000.0	165000.0	105000.0	17000.0
BICARBONATE		195000.0	201000.0	128000.0	20700.0
NITRATE/NITRITE		340.0	5200.0	550.0	33.8
CHLORIDE		29300.0	23900.0	19300.0	3450.0
OTHER (µg/L)					
TOTAL SUSPENDED SOLIDS		NA	439.0	NA	132.0

Table 5-1
Human Health PRE Evaluation of Subsurface Soil
SA 58 – Building 2648 and 2650 Fuel Oil Spills

Decision Document
Fort Devens

Analyte	Detected Concentration [b]		Frequency of Detection	Region III Commercial/Industrial Concentration (ug/g)	Maximum Exceeds Region III Concentration?
	Average (ug/g)	(ug/g)			
Organics					
Acetone	0.054	0.054	1/4	100,000	NO

Notes:

[a] Base-wide background soil inorganics database

[b] Subsurface soil samples from sampling stations 58M-92-01X to 58M-92-04X

NA = not available

ug/g = micrograms per gram

Table 5–2
Human Health PRE Evaluation of Groundwater
SA 58 – Building 2648 and 2650 Fuel Oil Spills

Decision Document
Fort Devens

Analyte	Groundwater Background Concentration (ug/L)	Detected Concentration [a]		Frequency of Detection	Maximum Exceeds Background?	Drinking Water Standard/Guideline [b] (ug/L)	Maximum Exceeds Standard/Guideline?
		Average (ug/L)	Maximum (ug/L)				
Organics							
benzene		0.69	0.69	1/8		5	NO
toluene		0.84	0.84	1/8		1000	NO
trichloroethene		0.83	0.83	1/8		5	NO
trichlorofluoromethane		3.3	3.3	1/8		1300	NO
Inorganics							
calcium	14700	41225	66300	8/8	YES	NA	NA
magnesium	3480	8930	18100	8/8	YES	NA	NA
potassium	2370	6852.5	15900	8/8	YES	NA	NA
Anions/Cations							
nitrite/nitrate	NA	2374.2	7500	8/8	NA	10000	NO
Other							
total suspended solids	NA	547750	1080000	4/4	NA	NA	NA

Notes:
[a] Based on unfiltered samples from Round 1 and Round 2
[b] Includes the lowest of either the EPA or MA drinking water standards, or if no federal standard or guideline is available, the Region III tap water concentration
SA 58 is represented by the following monitoring wells: 58M–92–01X through 58M–92–04X.
NA = Not available
ug/L = micrograms per liter