Rec'd 7-10-96

U.S. Army Environmental Center

NO FURTHER ACTION DECISION UNDER CERCLA
STUDY AREA 43O
HISTORIC GAS STATION SITES

GROUP 2, 7, AND HISTORIC GAS STATION
FORT DEVENS, MASSACHUSETTS

CONTRACT DAAA15-91-0008

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

APRIL 1996

Signed 6-25-96

PRINTED ON RECYCLED PAPER

27 960044 ABBN

AEC Form 45, 1 Feb 93 replaces THAMA Form 45 which is obsolete.

NO FURTHER ACTION DECISION UNDER CERCLA
STUDY AREA 43O
HISTORIC GAS STATION SITES

FORT DEVENS, MASSACHUSETTS

Prepared for:

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

Prepared by:

ABB Environmental Services, Inc.
Portland, Maine
Project No. 7053-15

APRIL 1996

NO FURTHER ACTION DECISION UNDER CERCLA
STUDY AREA 43O
HISTORIC GAS STATION SITES
FORT DEVENS, MASSACHUSETTS

TABLE OF CONTENTS

NO FURTHER ACTION DECISION UNDER CERCLA
STUDY AREA 43O
HISTORIC GAS STATION SITES
FORT DEVENS, MASSACHUSETTS

LIST OF FIGURES

NO FURTHER ACTION DECISION UNDER CERCLA
STUDY AREA 43O
HISTORIC GAS STATION SITES
FORT DEVENS, MASSACHUSETTS

LIST OF TABLES

EXECUTIVE SUMMARY

Investigations of Study Area (SA) 43O (Historic Gas Station Site) at Fort Devens, Massachusetts have resulted in the decision that no further hazardous waste studies or remediation are required at this site. SA 43O was identified in the Federal Facilities Agreement between the U.S. Environmental Protection Agency (USEPA) and the U.S. Department of Defense (DoD) as a potential site of contamination.

Fort Devens was placed on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) on December 21, 1989. In addition, under Public Law 101-510, the Defense Base Realignment and Closure Act (BRAC) of 1990, Fort Devens was selected for cessation of operations and closure. In accordance with these acts, numerous studies, including a Master Environmental Plan (MEP), an Enhanced Preliminary Assessment (PA), removal of two underground storage tanks (USTs), a Site Investigation (SI), and a Supplemental Site Investigation (SSI) have been conducted which address SA 43O. Under the Devens Reuse Plan the portion of the installation in which SA 43O is located, has been identified for future innovation and technology businesses.

The two USTs associated with the historic gas station at SA 43O were removed in 1991 as part of an installation-wide UST removal program (Kurz Associates, 1991). Residual contamination was observed at the time of removal. As part of the removal program, three monitoring wells (2680W-01 through 2680W-03) were installed to monitor for free product. The groundwater table was measured at 9 feet below ground surface, and no product was detected.

SI field activities for SA 43O were initiated in 1992 in conjunction with the other 12 Groups 2, 7, and Historic Gas Stations SI at Fort Devens. The Site Investigation at SA 43O consisted of 10 Terraprobe™ points, one soil boring, and one round of groundwater sampling from existing monitoring wells mentioned above.

The Terraprobe™ points were advanced to the water table (9 feet) and one subsurface soil sample was collected from each point and analyzed in the field for benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons (TPHC). The results of the Terraprobe™ soil samples indicated that residual BTEX and TPHC contamination was present in the soils around the former UST.

One soil boring (43O-92-01X) was drilled to confirm the field analytical results. Two subsurface soil samples were collected for off-site laboratory analysis. No volatile organic compounds (VOCs) or TPHC were detected in either of the samples collected and lead was present at a concentration below the Fort Devens background concentration.

Only two of the three existing monitoring wells (2680W-01 and 2680W-02) were sampled during Round Two groundwater sampling due to an obstruction in 2680W-03. Chloroform was the only VOC detected in both groundwater samples. Lead was detected above the Fort Devens background concentration in the unfiltered groundwater sample collected from both 2680W-01 and 2680W-02. These concentrations are above the established Fort Devens background concentration, however, the lead concentrations may be attributed to the total suspended solids concentrations detected in the samples. Filtered samples were not collected to confirm this hypothesis.

Based on the results of the SI it was concluded that contaminant distribution had not been fully characterized at SA 43O. It was recommended that additional Terraprobe™ points were needed to supplement the points completed during the SI, and that additional groundwater monitoring wells and sampling were needed to better define site-specific groundwater quality. An SSI field program was undertaken in 1993. The field activities included the installation of three groundwater monitoring wells (XOM-93-01X through XOM-93-03X), the collection of three subsurface soil samples for off-site laboratory analysis, completion of eight Terraprobe™ points for the collection of subsurface soil samples for field analysis, two rounds (Round Three and Four) of groundwater sampling, and hydraulic conductivity tests. Field analytical soil samples were collected from 10 to 13 feet and analyzed in the field for BTEX and TPHC. BTEX was not detected in any of the soil samples collected. TPHC was detected in soil samples collected on the southeast and northwest sides of the former UST location.

One subsurface soil sample was collected from the water table at each of the three monitoring well borings completed at SA 43O. No VOCs or semi-volatile organic compounds (SVOCs) were detected. One soil sample (the 10-foot sample from XOM-93-02X) was analyzed for inorganics. Several inorganic analytes (copper, iron, manganese, nickel, and sodium) were detected slightly above the Fort Devens background. TPHC was detected in the soil samples collected from the monitoring well boring drilled through former UST excavation (XOM-93-02X) and from the monitoring well boring drilled northeast of the former UST excavation (XOM-93-03X). TPHC was not detected in the sample collected from the monitoring well boring drilled west of the former UST excavation (XOM-93-01X). Monitoring wells were installed in each of the borings.

Round Three groundwater samples were collected in October 1993 from the three SSI monitoring wells (XOM-93-01X through XOM-93-03X) and two of the three existing monitoring wells (2680W-01 and 2680W-02). A groundwater sample was not collected from 2680W-03 because of an obstruction in the monitoring well. Several VOCs (toluene, ethylbenzene, xylenes (TEX) and trichloroethene (TCE)), one SVOC (naphthalene), and TPHC were detected in the downgradient monitoring wells (XOM-93-01X, XOM-93-03X and 2680W-02) and the monitoring well installed within the former UST excavation (XOM-93-02X). Fuel-related VOCs were detected in 2680W-02, XOM-93-01X and XOM-93-02X at total concentrations of 0.74 to 9.5 μg/L. TCE was detected in the groundwater sample collected from XOM-93-01X at 1.5 μg/L, XOM-93-02X at 1.2 μg/L and at XOM-93-03X at 12 μg/L. Lead was detected above the Fort Devens background concentration in the unfiltered sample from each monitoring well, however, lead was not detected above the method detection limit in any of the filtered samples.

The results of the Round Four groundwater sampling, completed in January 1994, confirmed the presence of several VOCs (TCE, chloroform, ethylbenzene, and xylenes) and one SVOC (naphthalene) in the downgradient monitoring wells (2680W-02, XOM-93-01X, and XOM-93-03X), and the monitoring well installed within the former UST excavation (XOM-93-02X). Fuel-related VOCs were detected in groundwater sample collected from XOM-93-01X at a total concentrations of 8.19 μg/L. TCE was detected in the groundwater sample collected from 2680W-02 at 0.76 μg/L and at XOM-93-03X at 9.3 μg/L. TPHC was not detected in any of the Round Four samples. Lead was detected above the Fort Devens background concentration in several of the unfiltered groundwater samples but not in the any of the filtered samples.

Based on the results of Rounds Two, Three and Four the Army agreed to collect one additional round of groundwater samples (Round Five) from each existing monitoring well, at the request of the USEPA and Massachusetts Department of Environmental Protection (MADEP). These samples were designed to determine the concentration of the VOC contaminants during high water table conditions. Round Five was completed in April 1994. The results of the Round Five groundwater sampling also confirmed the presence of several VOCs (TCE, ethylbenzene and xylenes) in the downgradient monitoring wells (XOM-93-01X and XOM-93-03X) and the monitoring well installed within the former UST excavation (XOM-93-02X). Fuel-related VOCs were detected in groundwater sample collected from XOM-93-02X at a total concentrations of 1.63 μg/L. TCE was detected in the groundwater sample collected from XOM-93-02X at 0.53 μg/L and at XOM-93-03X at 6.2 μg/L. No SVOCs or TPHC were detected in the Round Five samples. Lead was detected above the Fort Devens background concentration in several of the unfiltered groundwater samples.

Concentrations of lead in the unfiltered samples ranged from below the detection limit at 2680W-01 to 17.9 μg/L at 2680W-02. Lead was not detected above the analytical method detection limit in any of the filtered groundwater samples collected during Round Five.

In 1995 the Army Corps of Engineers attempted to locate a suspected dry well believed to have been associated with the historic gas station formerly located at SA 43O. It was assumed that the suspected dry well was the source of the TCE contamination detected in groundwater during the SI and SSI. The results of the search did not confirm the presence of the dry well at SA 43O. No report was produced.

The human health Preliminary Risk Evaluation (PRE) completed in the Revised Final Site Investigation Report (ABB-ES, 1995), indicated that residual contaminant concentrations detected in soil did not pose a risk to human health. However, the concentrations of TCE in groundwater would pose a potential risk to human health. Based on the four rounds of groundwater data collected from SA 43O it appears that the concentration of TCE was declining, and if the concentration continues to decline it will eventually be below the federal Maximum Concentration Limit (MCL) of 5 μg/L without groundwater remediation.

Therefore, the decision has been made to remove SA 43O from further consideration in the Installation Restoration Program (IRP).

1.0 INTRODUCTION

This decision document has been prepared to support a no further action (NFA) decision at Study Area (SA) 43O 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) 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. The Historic Gas Station Sites were identified in the MEP as potential areas of contamination. On December 21, 1989, Fort Devens was placed on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA).

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 43A through S along with the other 12 SAs in Groups 2 and 7 at Fort Devens. The SI was conducted by ABB Environmental Services, Inc. (ABB-ES). Based on the results of the SI, ABB-ES completed a Supplemental SI (SSI) at 13 SAs in Groups 2 and 7 in 1993. SA 43O was included in this SSI.

Under Public Law 101-510, the BRAC of 1990, Fort Devens was 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 43O were conducted to support this overall mission.

2.0 BACKGROUND AND PHYSICAL SETTING

2.1 DESCRIPTION AND LAND USE

Fort Devens is located approximately 35 miles northwest of Boston, Massachusetts, 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 surfaces 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 runs along the western edge of the Main Post. 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 shoppette, cafeteria, post exchange, commissary, bowling alley, golf course, and hospital), administrative buildings, classrooms and training facilities, maintenance facilities, and ammunition storage facilities. The Historic Gas Station Sites, including SA 43O, are located on the Main Post (see Figure 2-1).

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 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.

Under Public Law 101-510, the BRAC of 1990, Fort Devens has been identified for closure in 1996. The area around SA 43O has been identified as a reuse area in the Devens Reuse Plan (Vanasse Hagen Brustin, Inc., 1994). This portion of the installation is designated for future innovation and technology businesses. Because of this, the future land and groundwater uses are assumed to be industrial/commercial.

2.2 Regional Geology

Fort Devens is near the western boundary of the Seaboard Lowland Section of the New England-Maritime Physiographic province (Jahns, 1953). It is adjacent to the Worcester County Plateau of the Central Uplands province and part of the installation lies within the province (Koteff, 1966). The land surface is almost completely covered with 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 attendant wetlands. There are also several kettle ponds and one kettle lake located within the installation.

2.4 Study Area Description and History

SA 43O, one of the 19 Historic Gas Station Sites, is included in the Group 2 SAs located on the Main Post. The structures of the historic gas station at SA 43O consisted of a pump island and a small gasoline pumphouse. The gas station was a Type B station which had two 5,000 gallon (or possibly 5,140 gallon) USTs located on either side of the gasoline pumphouse and pump island. The station was used during World War II as a vehicle motor pool to support military operations. The motor pool operations were discontinued during the late 1940s or early 1950s. No records were available on the decommissioning of this motor pool or the removal of the associated UST. The area where SA 43O most recently used by the Nuclear, Biological, and Chemical (NBC) School for classroom facilities (Building 2680) and parking.

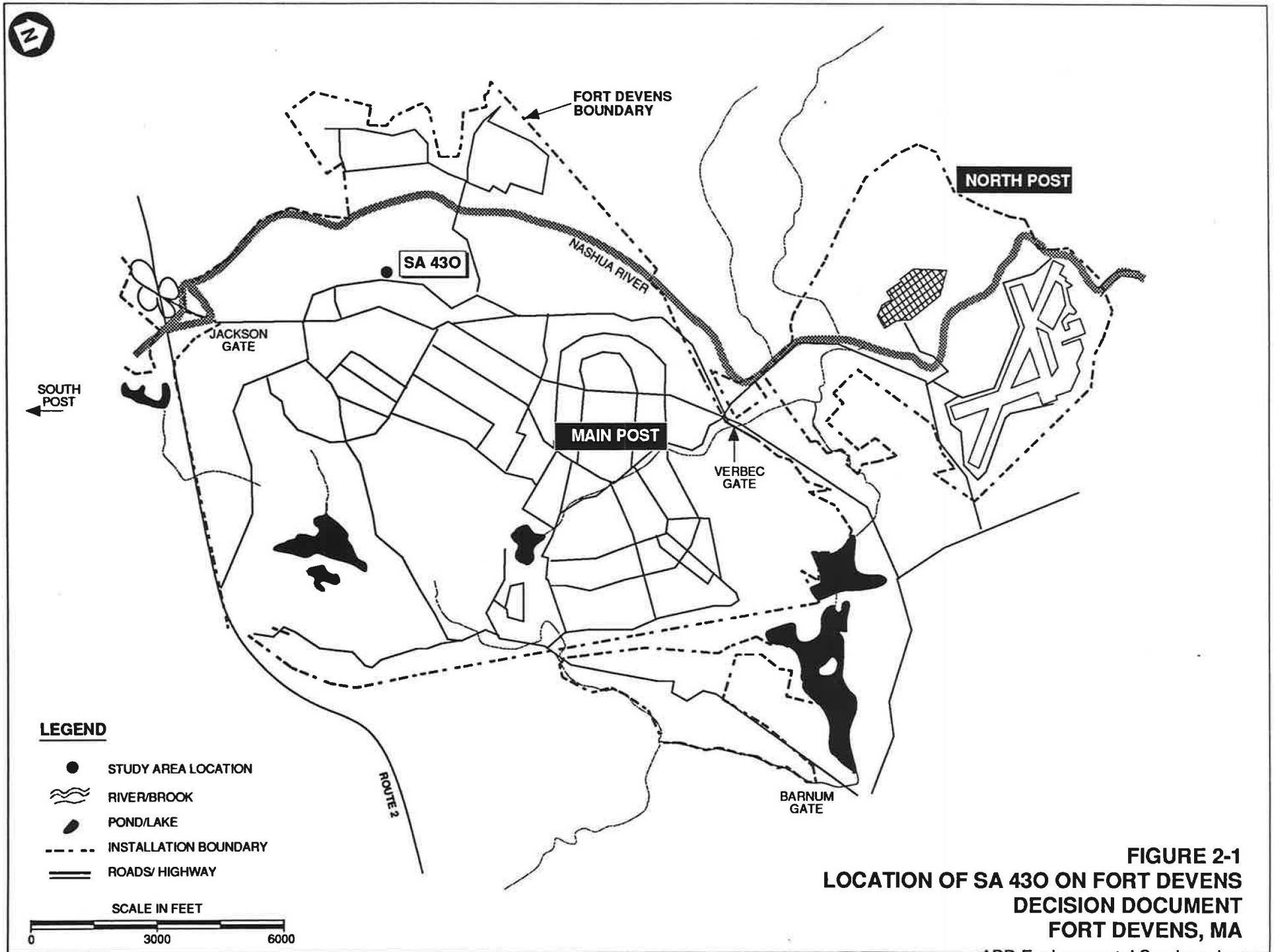

FIGURE 2-1
LOCATION OF SA 43O ON FORT DEVENS
DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

9511009D(wm) 0

3.0 RELATED INVESTIGATIONS

3.1 MASTER ENVIRONMENTAL PLAN

SA 43, the Historic Gas Station Sites, was identified as a possible source for release of contaminants into the environment. The 19 gas stations were identified from a circa 1941 map (Barbour, 1941). The MEP recommended that the remaining USTs be located, and residual contamination in soil be removed (Biang, et al., 1992).

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 43O were provided in the PA.

3.3 SITE INVESTIGATION REPORT

The SI was initiated in June 1992 and included the following 13 Group 2 and 7 SAs originally identified listed in the MEP.

- 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 in 1992 under contract with the USAEC. 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 SI field investigation program at SA 43O consisted of 10 Terraprobe™ points, one soil boring, and groundwater sampling from the existing monitoring wells (Figure 3-1).

The Terraprobe™ points were advanced to the water table (9 feet bgs) and one subsurface soil sample was collected from each point and analyzed in the field for benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons (TPHC) (Figure 3-1).

One soil boring (43O-92-01X) was advanced to the water table and two subsurface soil samples were collected for off-site laboratory analysis. The samples were analyzed for Project Analyte List (PAL) volatile organic compounds (VOCs), TPHC, and lead (see Figure 3-1).

Two of the three existing monitoring wells (2680W-01 and 2680W-02) were developed and sampled. Development and sampling was not conducted on 2680W-03 due to an obstruction in the well which prevented access to the groundwater at this location. These samples were collected during the second round (Round Two) of the SI groundwater sampling for Groups 2 and 7.

The results of the SI are presented in Section 4.0.

3.4 Supplemental Site Investigation Data Package

The SSI was also conducted by ABB-ES in 1993 under contract with USAEC. The purpose of the SSI was to further define the distribution of contaminants detected in soil and groundwater samples collected during the SI.

The SSI field program consisted of eight Terraprobe™ points advanced on all sides of the Terraprobe™ points completed at this site during the SI. These points were located in and around the excavation of the former UST removed in 1991 (see Figure 3-1). The results of these samples collected during the SSI were used to further define the horizontal distribution of contaminants detected during the SI. Up to two soil samples were collected from each Terraprobe™ point. The samples were analyzed in the field for BTEX and TPHC.

Three groundwater monitoring wells (XOM-93-01X through XOM-93-03X) were installed to monitor downgradient groundwater quality (see Figure 3-1). One soil sample was collected from the water table in each of the monitoring well borings. The soil samples were submitted for laboratory analysis consisting of PAL VOCs, semivolatile organic compounds (SVOCs), lead, TPHC, and Total Organic Carbon (TOC). The well screen of each monitoring well was placed so that it intersected the water table to monitor for free product and allow for seasonal groundwater fluctuation.

Results of the SSI are presented in Section 4.0.

The soil encountered at SA 43O consisted of a silty sand and gravelly sand (fill material). The water table was encountered in the overburden soils at depths ranging from 7 to 11 feet below ground surface (bgs). Table 3-1 summarizes the soils encountered at SA 43O. Bedrock was not encountered.

Round Three groundwater samples were collected from the existing and newly installed monitoring wells in October 1993, Round Four Samples were collected in January 1994, and Round Five was collected in April 1994 at the request of USEPA. Each of the rounds of samples were submitted for off-site laboratory analysis consisting of PAL VOCs, SVOCs, lead (both filtered and unfiltered), TPHC, and total suspended solids (TSS).

After the SSI monitoring wells were developed and sampled, hydraulic conductivity tests were preformed. The tests consisted of a rising head test. The calculated hydraulic conductivities ranged from $2.9E^{-04}$ centimeters per second (cm/sec.) at XOM-93-01X to $5.8E^{-05}$ cm/sec. at XOM-93-03X. The results of the hydraulic conductivity tests are presented in Table 3-2.

The new monitoring wells were included in the November 8, 1993 synoptic water-level round at Fort Devens. The results of that round are presented in Table 3-2. The inferred groundwater flow appears to be moving to the west-northwest (Figure 3-2). All SSI exploration locations were surveyed.

The results of both phases of field investigation are presented in the Revised Final SI Report for Groups 2, 7 and Historic Gas Stations (ABB-ES, 1995).

In 1995, the Corps of Engineers completed a search for a suspected dry well that was reported to have been associated with the former historic gas station at SA 43O. It was believed that this dry well could be the source of the trichloroethene (TCE) contamination

detected in the groundwater during the SI and SSI. The results of the search did not indicate the location of the dry well or residual soil contamination. No report of the findings was prepared.

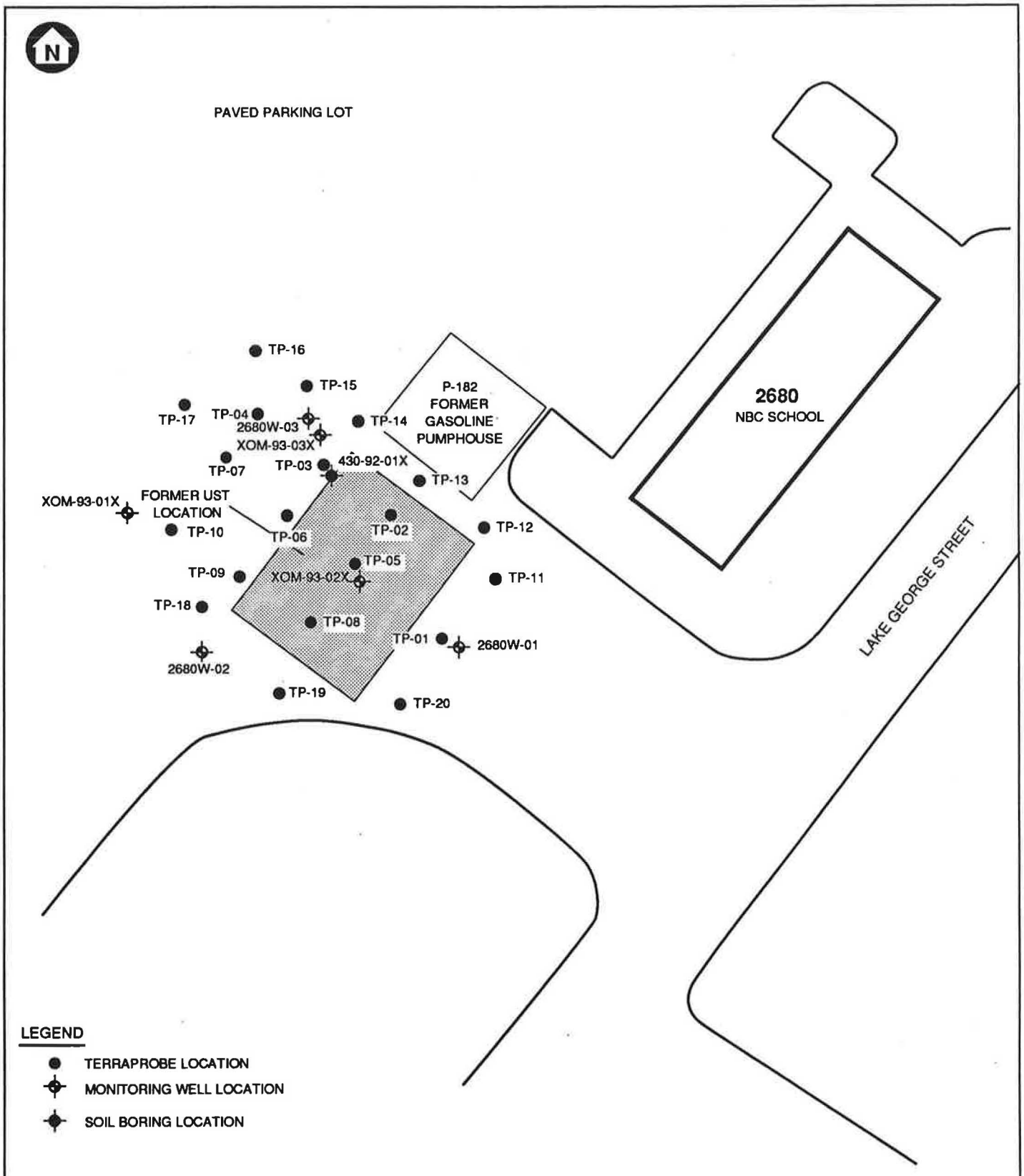

FIGURE 3-1
EXPLORATION LOCATIONS
SA 430 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

9511009D(o)12 6B7

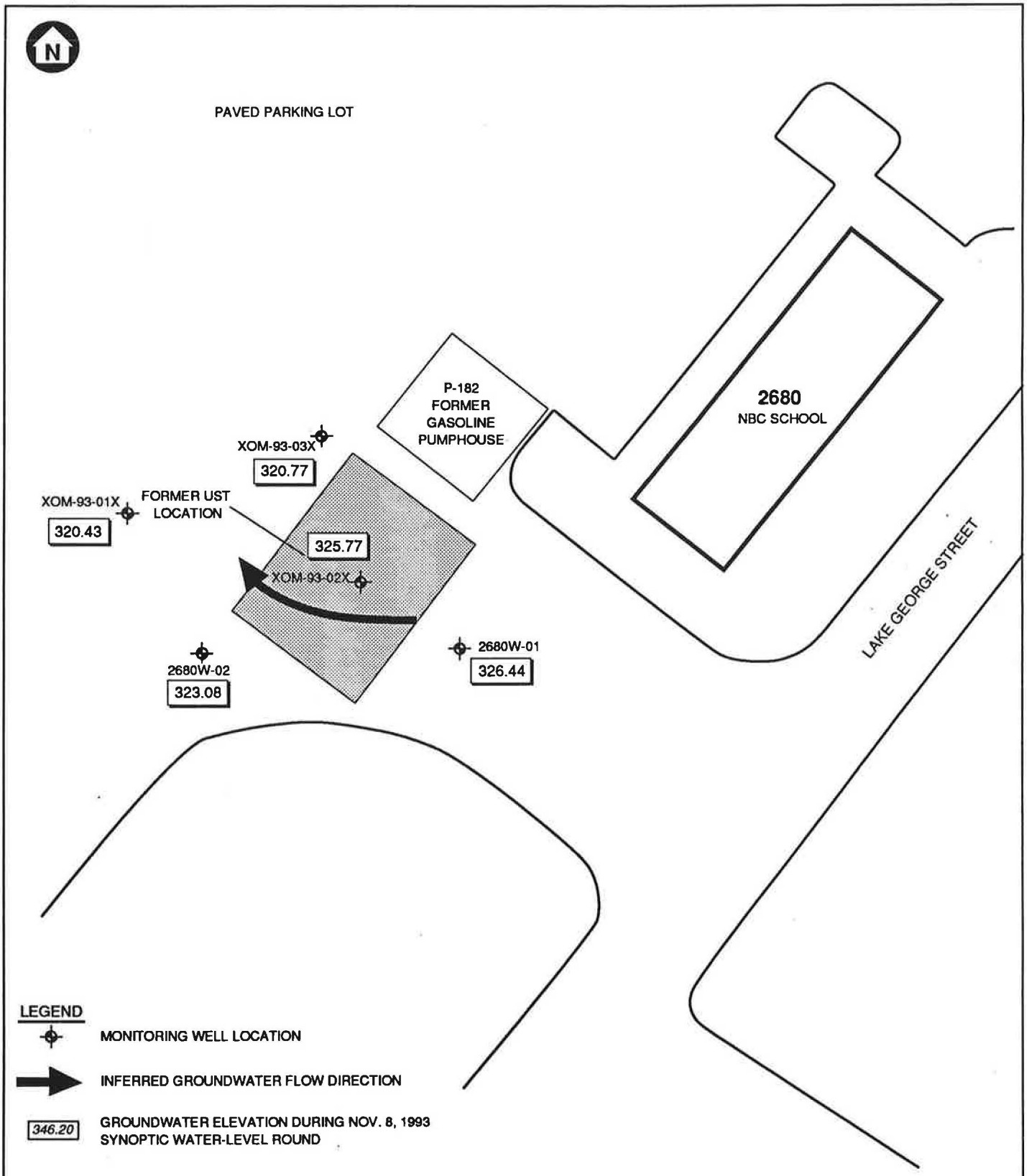

FIGURE 3-2
INFERRED GROUNDWATER FLOW DIRECTION
SA 430 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

9511009D(o) 2,9

TABLE 3-1
SUMMARY OF SOIL BORINGS
SA 43O - HISTORIC GAS STATION O

DECISION DOCUMENT
FORT DEVENS, MA

EXPLORATION ID	COMPLETION DEPTH (Feet bgs)	REFERENCE SAMPLE INTERVALS (Feet bgs)	ANALYTICAL SAMPLES COLLECTED	SOIL TYPE (USCS)	TOTAL VOCs BY PID (PPM)	COMMENTS
43O-92-01X	12.5	5-7	5-7	SM	22.0	
		7-9		SM	5.0	
		9-11		SM	BKG	
		11-12.5	11-12.5	SM	BKG	
XOM-93-01X	20.3	0-2		GP-SP	BKG	
		5-7		GP-SP	BKG	
		10-12	10-12	SM-SP	BKG	
		14-14.2		SP-GP	BKG	Rollerbit phylite from 14.2 to 20.3-feet
XOM-93-02X	18.5	0-2		SW-SM	BKG	
		2-4		SM-GP	BKG	
		4-6		SM-GP	BKG	
		6-8		SM-GP	BKG	
		8-10		SM-GP	BKG	
		10-12	10-12	SP	BKG	
		12-14		SP	BKG	
		14-16		SP-GP	BKG	
XOM-93-03X	19.8	0-2		GP-SP	BKG	
		5-7		SM-SP	BKG	
		10-12	10-12	SM-SP	BKG	
		14.5-14.7		SM-SP	BKG	Rollerbit phylite from 14.5 to 19.8-feet

NOTES:
bgs = below ground surface
VOCs = Volatile organic compounds
USCS = Unified soil classification system
ppm = parts per million
phyl = phylite
BKG = background levels of Total VOCs were measured with a PID at the work site

TABLE 3–2
SUMMARY OF WATER LEVELS AND HYDRAULIC CONDUCTIVITIES
SA 43O – HISTORIC GAS STATION O

DECISION DOCUMENT
FORT DEVENS, MA

WELL ID	ELEVATION[1]	DEPTH TO WATER (Feet bgs)	ELEVATION OF WATER (Feet NGVD)	CONDUCTIVITY HVORSLEV[2] (cm/sec)
XOM–93–01X	331.29	10.86	320.43	2.9E–04
XOM–93–02X	332.87	7.11	325.77	7.4E–05
XOM–93–03X	331.87	11.12	320.77	5.8E–05

Notes:
bgs = below ground surface
cm/sec = centimeters per second
NGVD = National Geodetic Vertical Datum
1 = elevation of top of pvc
2 = averaged value of two tests
Groundwater elevations from November 8, 1993
synoptic water level round

4.0 CONTAMINATION ASSESSMENT

4.1 SOILS

The two USTs associated with the historic gas station at SA 43O were removed in 1991 as part of an installation-wide UST removal program (Kurz Associates, 1991). Residual contamination was observed at the time of removal. As part of the removal program, three monitoring wells were installed (2680W-01 through 2680W-03) to monitor for free product. The groundwater table was measured at 9 feet below ground surface, and no product was detected (Kurz, 1991).

The results of the SI Terraprobe™ soil samples indicated that residual soil contamination was present in the soils around the former UST. Total VOCs were detected in three of the 10 samples (TP-02, TP-03, and TP-08) ranging from 37 parts per billion (ppb) in TP-08 to 840 ppb in TP-03. TPHC was detected in six of the 10 soil samples collected from SA 43O. Concentrations of TPHC ranged from 620 parts per million (ppm) in TP-03 to 92 ppm in TP-04 (Table 4-1; Figure 4-1).

A total of eight Terraprobe™ points were completed during the SSI to further define the distribution of contaminants detected during the SI. Soil samples were collected from 10 to 13 feet and also analyzed for BTEX and TPHC. BTEX was not detected in any of the soil samples collected. TPHC was detected in upgradient and downgradient boring locations of the former UST location ranging from 71 ppm to 420 ppm (see Table 4-1; Figure 4-2 and 4-3).

One soil boring (43O-92-01X) was drilled during the SI at TP-03, which was found to have the highest concentration of contaminants, to confirm the field analytical results. No PAL VOCs or TPHC were detected in either of the samples collected from this boring and lead was present at a concentration below the Fort Devens background concentration (Table 4-2; Figure 4-4).

One subsurface soil sample was collected from the water table at each of the three monitoring well borings completed at this site. No PAL VOCs or SVOCs were detected. One soil sample (10-foot sample from XOM-93-02X) was analyzed for PAL inorganics. Several inorganic analytes were detected slightly above the installation background (Table 4-3). TPHC was detected at 35.1 micrograms per gram (μg/g) in XOM-93-02X and at

44.2 μg/g in XOM-93-03X. TPHC was not detected in the sample collected from XOM-93-01X (see Table 4-2; Figure 4-4).

4.2 GROUNDWATER

Only two (2680W-01 and 2680W-02) of the three existing monitoring wells were sampled during Round Two of the SI due to an obstruction in 2680W-03. Chloroform was detected in both groundwater samples at concentrations of 0.62 micrograms per liter (μg/L) and 1.2 μg/L, respectively. No other VOCs were detected in either samples. Lead was detected at 106 μg/L in 2680W-01 and 56.2 μg/L in 2680W-02. These concentrations are above the established Fort Devens background concentration, however, TSS concentrations were detected at 4,190 milligrams per liter (mg/L) and 1,320 mg/L, respectively. The lead concentrations may be attributed to high TSS concentrations (Table 4-4; Figure 4-5). Filtered samples were not collected to confirm this hypothesis.

Round Three groundwater samples, collected in October 1993, were collected from the three newly installed monitoring wells (XOM-93-01X through XOM-93-03X) and two of the three existing monitoring wells (2680W-01 and 2680W-02). A groundwater sample was not collected from 2680W-03 because of an obstruction in the monitoring well. Several VOCs toluene, ethylbenzene, and xylenes (TEX) and trichloroethene (TCE), one SVOC (naphthalene), and TPHC were detected in the new and existing downgradient monitoring wells and the monitoring well installed within the former UST excavation. TCE was the only VOC detected above drinking water standards. Concentrations ranged from 1.2 μg/L at XOM-93-02X and 1.5 μg/L at XOM-93-01X to 12 μg/L at XOM-93-03X. Lead was detected above the Fort Devens background concentration in the unfiltered sample from each monitoring well, however, lead was not detected above the detection limit in the filtered samples (see Table 4-4; Figure 4-5).

The results of the Round Four groundwater sampling, completed in January 1994, indicated the presence of several VOCs (TCE, chloroform, ethylbenzene, and xylenes) in the downgradient monitoring wells (2680W-02, XOM-93-01X, and XOM-93-03X) and the monitoring well installed in the former UST excavation (XOM-93-02X). TCE was detected at 9.3 μg/L at XOM-93-03X. This was the only VOC detected above its drinking water standard/guideline (5.0 μg/L). Naphthalene (0.85 μg/L at XOM-93-01X) was the only SVOC detected in the Round Four samples. TPHC was not detected in any of the Round Four samples. Lead was detected above the Fort Devens background concentration in several of the unfiltered groundwater samples. Concentrations of lead in the unfiltered

samples ranged from 9.5 μg/L at XOM-93-03X to 200 μg/L at 2680W-02. Lead was not detected above the analytical detection limit of 1.26 μg/L in any of the filtered groundwater samples collected during Round Four. TSS concentrations ranged from 850,000 μg/L at 2680W-01 to 65,000 μg/L at XOM-93-01X (see Table 4-4; Figure 4-5).

The results of the Round Five groundwater sampling, completed in April 1994, indicated the presence of several VOCs (TCE, ethylbenzene and xylenes) in the downgradient monitoring wells (XOM-93-01X, and XOM-93-03X) and the monitoring well installed in the former UST excavation (XOM-93-02X). This round of sampling was designed to monitor the groundwater quality during an increased water table period. TCE was the only VOC detected above its drinking water standard/guideline of 5.0 μg/L. TCE was detected at 6.2 μg/L in the groundwater samples collected from XOM-93-03X. No SVOCs or TPHC were detected in the Round Five samples. Lead was detected above the Fort Devens background concentration in several of the unfiltered groundwater samples. Concentrations of lead in the unfiltered samples ranged from below the method detection limit at 2680W-01 to 17.9 μg/L at 2680W-02. Lead was not detected above the analytical detection limit of 1.26 μg/L in any of the filtered groundwater samples collected during Round Five. TSS concentrations ranged from 500,000 μg/L at 2680W-01 and 2680W-02 to 11,000 μg/L at XOM-93-01X (see Table 4-4; Figure 4-5).

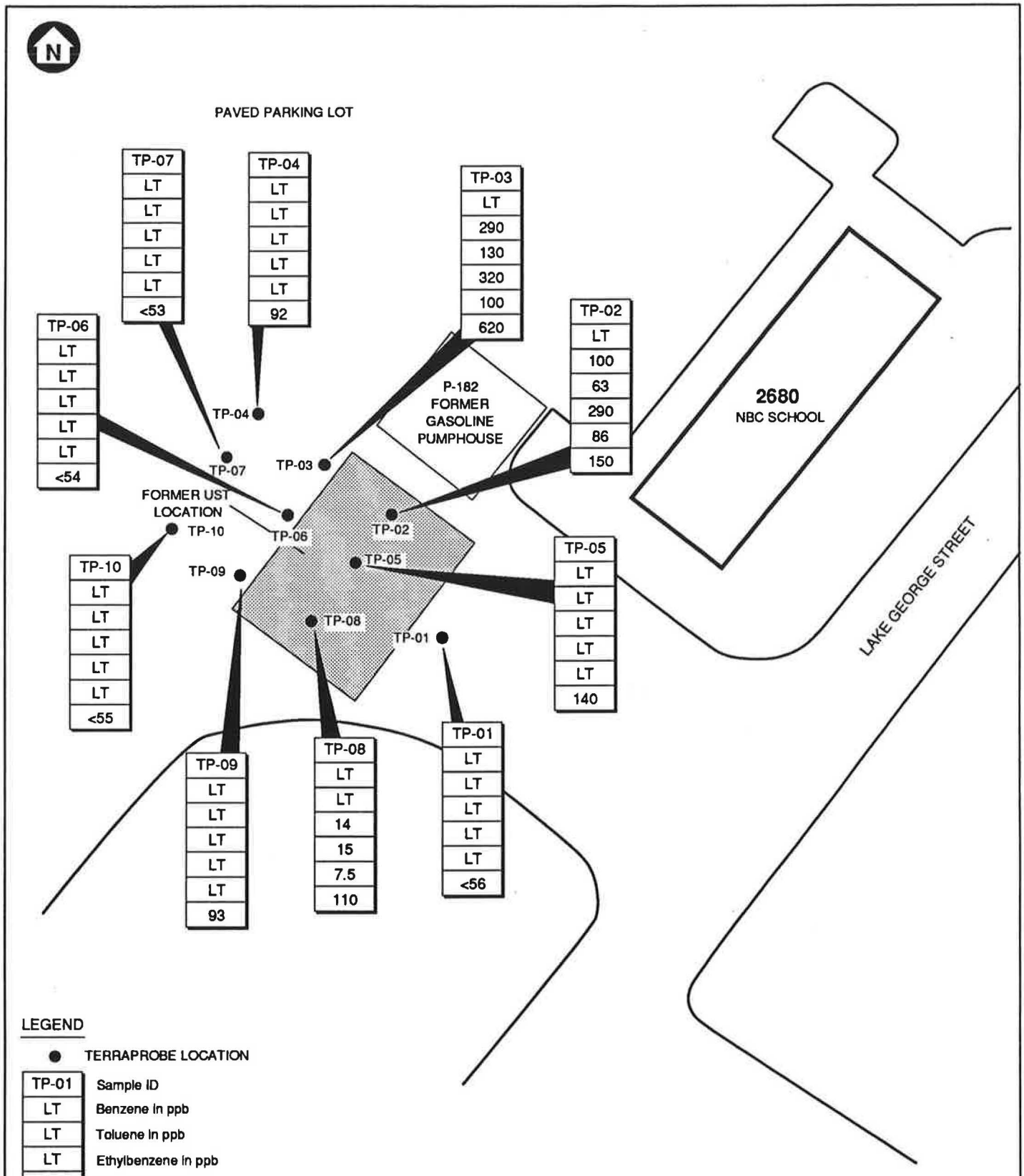

FIGURE 4-1
FIELD ANALYTICAL RESULTS
DEPTH AT 9 FT
SA 430 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

9511009D(o)1 3

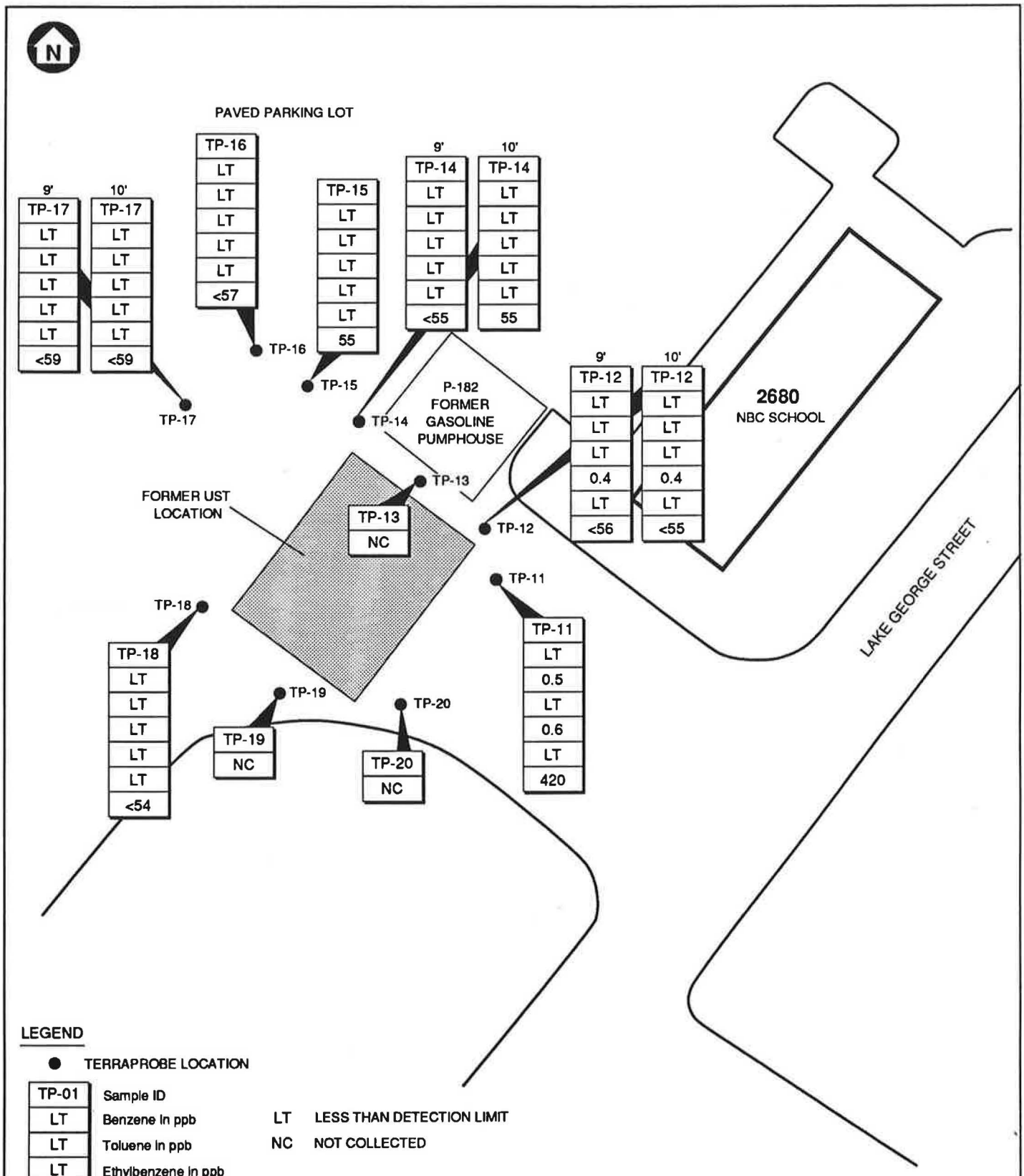

FIGURE 4-2
FIELD ANALYTICAL RESULTS
DEPTH AT 9 TO 10 FEET
SA 430 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

9511009D(o) 6 ,C

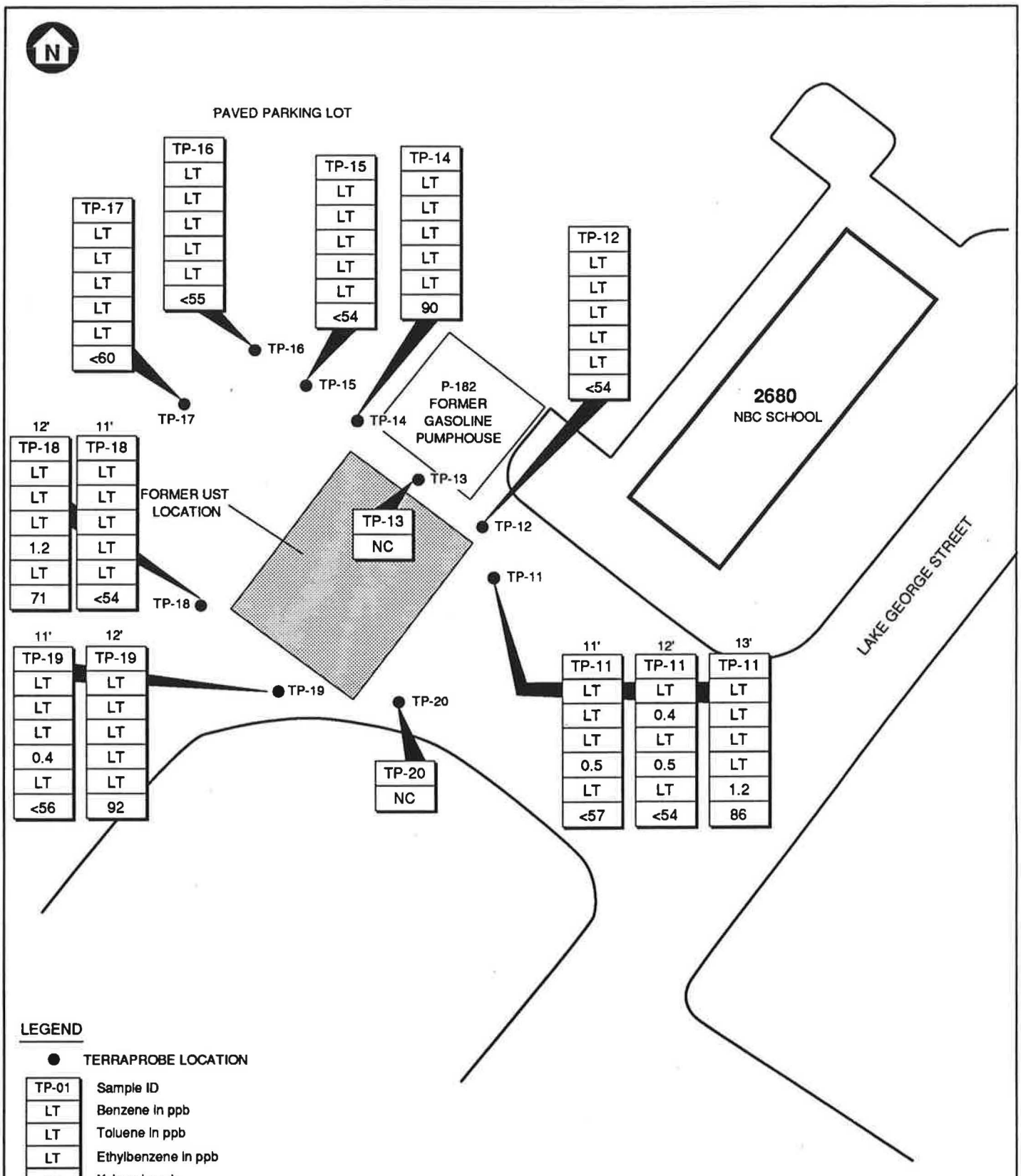

FIGURE 4-3
FIELD ANALYTICAL RESULTS
DEPTH AT 11 TO 13 FEET
SA 430 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

9511009D(o) 6 ,0

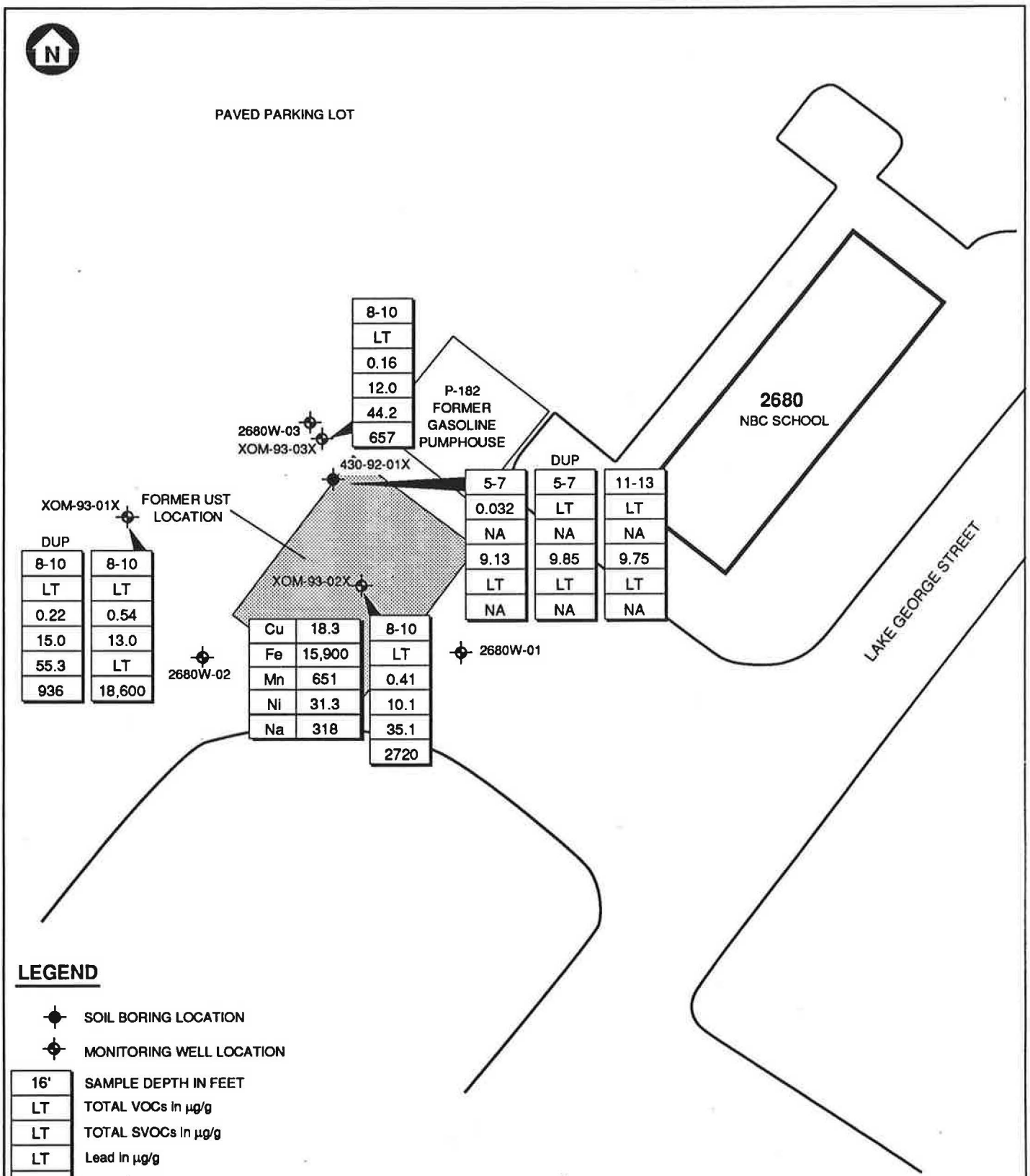

FIGURE 4-4
ANALYTES DETECTED IN SOIL
SA 430 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

9511009D(o) 2,8 7

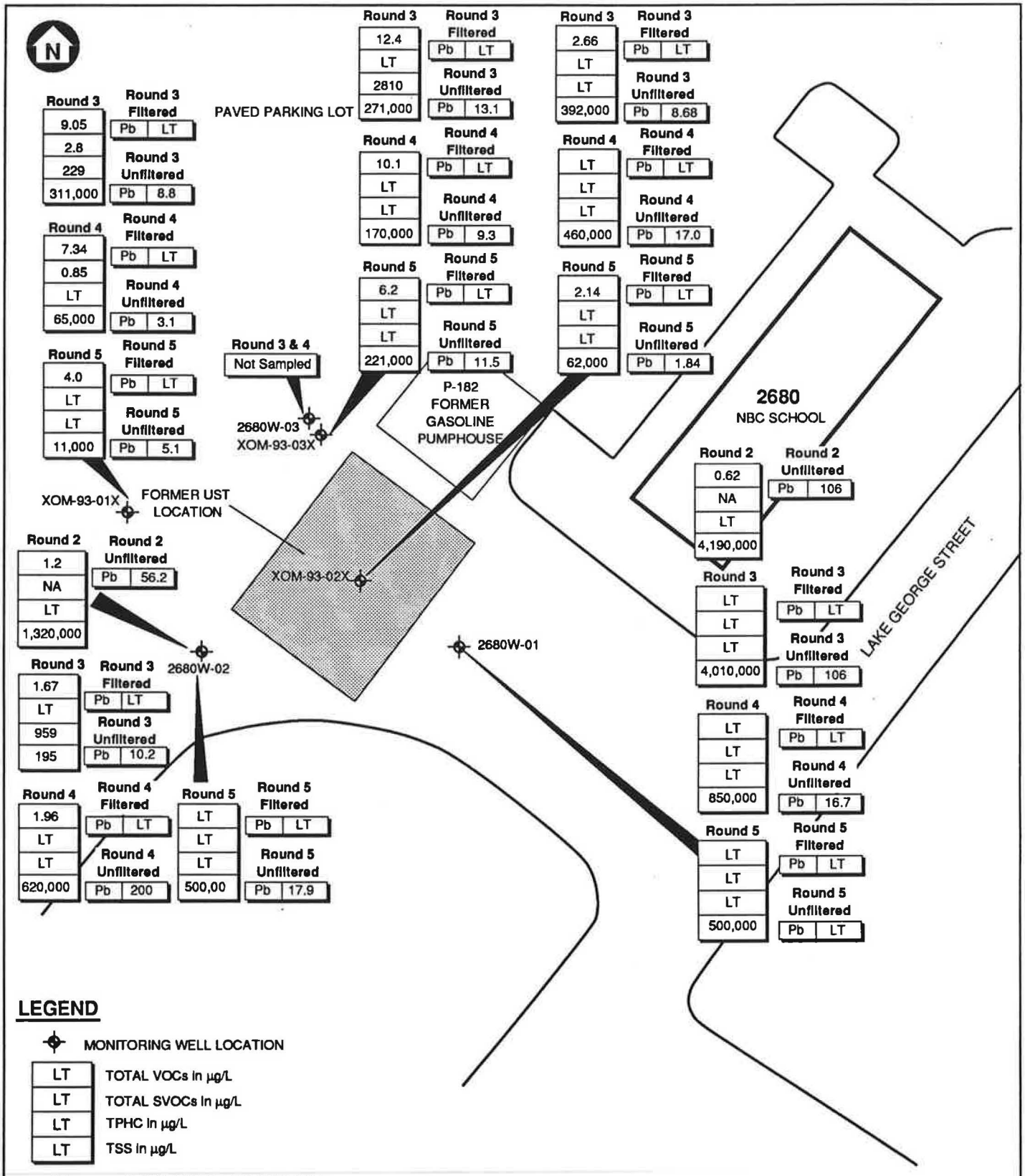

FIGURE 4-5
ANALYTES IN GROUNDWATER
SA 430 DECISION DOCUMENT
FORT DEVENS, MA

ABB Environmental Services, Inc.

9511009D(o) 2.A

TABLE 4-1
FIELD ANALYTICAL RESULTS FOR SUBSURFACE SOIL SAMPLES
SA 43O - HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

	TP-01	TP-02	TP-03	TP-04	TP-05	TP-06	TP-07	TP-08
ANALYTE	**TSO0109F**	**TSO0209F**	**TSO0309F**	**TSO0409F**	**TSO0509F**	**TSO0609F**	**TSO0709F**	**TSO0809F**
ORGANICS (ppb)	**9 FT**	**9 FT**	**9 FT**	**9 FT**	**9 FT**	**9 FT**	**9 FT**	**9 FT**
BENZENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TOLUENE	< 0.1	100	290	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
ETHYLBENZENE	< 0.1	63	130	< 0.1	< 0.1	< 0.1	< 0.1	14
m/p-XYLENE	< 0.1	290	320	< 0.1	< 0.1	< 0.1	< 0.1	15
o-XYLENE	< 0.1	86	100	< 0.1	< 0.1	< 0.1	< 0.1	7.5
OTHER (ppm)								
TOTAL PETROLEUM HYDROCARBONS	<56	150	620	92	140	<54	<53	110

Notes:

< = Less than detection limit.

TABLE 4-1
FIELD ANALYTICAL RESULTS FOR SUBSURFACE SOIL SAMPLES
SA 43O - HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

	TP-09	TP-10	TP-11	TP-11	TP-11	TP-11	TP-12	TP-12
ANALYTE	**TSO0909F**	**TSO1009F**	**TSO1110F**	**TSO1111F**	**TSO1112F**	**TSO1113F**	**TSO1209F**	**TSO1210F**
ORGANICS (ppb)	**9 FT**	**9 FT**	**10 FT**	**11 FT**	**12 FT**	**13 FT**	**9 FT**	**10 FT**
BENZENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TOLUENE	< 0.1	< 0.1	0.5	< 0.1	0.4	< 0.1	< 0.1	< 0.1
ETHYLBENZENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
m/p-XYLENE	< 0.1	< 0.1	0.6	0.5	0.5	< 0.1	0.4	0.4
o-XYLENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.2	< 0.1	< 0.1
OTHER (ppm)								
TOTAL PETROLEUM HYDROCARBONS	93	<55	420	< 57	< 54	86	< 56	< 55

Notes:

< = Less than detection limit.

TABLE 4–1
FIELD ANALYTICAL RESULTS FOR SUBSURFACE SOIL SAMPLES
SA 430 – HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

	TP–12	TP–14	TP–14	TP–14	TP–15	TP–15	TP–16	TP–16
ANALYTE	**TSO1211F**	**TSO1409F**	**TSO1410F**	**TSO1411F**	**TSO1509F**	**TSO1510F**	**TSO1609F**	**TSO1610F**
ORGANICS (ppb)	**11 FT**	**9 FT**	**10 FT**	**11 FT**	**9 FT**	**10 FT**	**9 FT**	**10 FT**
BENZENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TOLUENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
ETHYLBENZENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
m/p–XYLENE	< 0.1	< 0.1	< 0.1	0.4	< 0.1	< 0.1	< 0.1	< 0.1
o–XYLENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
OTHER (ppm)								
TOTAL PETROLEUM HYDROCARBONS	< 54	< 55	55	90	55	< 54	< 57	< 55

Notes:

< = Less than detection limit.

TABLE 4-1
FIELD ANALYTICAL RESULTS FOR SUBSURFACE SOIL SAMPLES
SA 43O - HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

	TP-17	TP-17	TP-17	TP-18	TP-18	TP-18	TP-19	TP-19
ANALYTE	**TSO1709F**	**TSO1710F**	**TSO1711F**	**TSO1810F**	**TSO1811F**	**TSO1812F**	**TSO1911F**	**TSO1912F**
ORGANICS (ppb)	**9 FT**	**10 FT**	**11 FT**	**10 FT**	**11 FT**	**12 FT**	**11 FT**	**12 FT**
BENZENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TOLUENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
ETHYLBENZENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
m/p-XYLENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.2	0.4	< 0.1
o-XYLENE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
OTHER (ppm)								
TOTAL PETROLEUM HYDROCARBONS	< 59	< 57	< 60	< 54	< 54	71	< 56	92

Notes:

< = Less than detection limit.

TABLE 4-2
ORGANIC ANALYTES IN SUBSURFACE SOIL
SA 43O - HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

	SSI				SI		
ANALYTE	XOM-93-01X	XOM-93-01X	XOM-93-02X	XOM-93-03X	43O-92-01X	43O-92-01X	43O-92-01X
ORGANICS (ug/g)	DUP 10 FT	10 FT	10 FT	10 FT	DUP 5 FT	5 FT	11 FT
ACETONE	< 0.017	< 0.017	< 0.017	< 0.017	0.032	< 0.017	< 0.017
DI-N-BUTYL PHTHALATE	0.22	0.54	0.41	0.16	< 0.62	< 0.62	< 0.62
OTHER (ug/g)							
TOTAL ORGANIC CARBON	936	18600	2720	657	495	NA	517
TOTAL PETROLEUM HYDROCARBONS	55.3	< 28.5	35.1	44.2	< 27.9	< 27.9	< 27.7

Notes:
< = Less than detection limit.
NA = not analyzed.

TABLE 4-3
INORGANIC ANALYTES IN SUBSURFACE SOIL
SA 43O - HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

		SSI				SI		
ANALYTE	BACKGROUND	XOM-93-01X	XOM-93-01X	XOM-93-02X	XOM-93-03X	43O-92-01X	43O-92-01X	43O-92-01X
INORGANICS (µg/g)		DUP 10 FT	10 FT	10 FT	10 FT	DUP 5 FT	5 FT	11 FT
ALUMINUM	15000.0	NA	NA	6420	NA	NA	NA	NA
ARSENIC	21.0	NA	NA	5.79	NA	NA	NA	NA
BARIUM	42.5	NA	NA	16.6	NA	NA	NA	NA
CALCIUM	1400.0	NA	NA	1060	NA	NA	NA	NA
CHROMIUM	31.0	NA	NA	16.1	NA	NA	NA	NA
COBALT	NA	NA	NA	8.62	NA	NA	NA	NA
COPPER	8.39	NA	NA	18.3	NA	NA	NA	NA
IRON	15000.0	NA	NA	15900	NA	NA	NA	NA
LEAD	36.9	15	13	10.1	12	9.13	9.85	9.75
MAGNESIUM	5600.0	NA	NA	3690	NA	NA	NA	NA
MANGANESE	300.0	NA	NA	651	NA	NA	NA	NA
NICKEL	14.0	NA	NA	31.3	NA	NA	NA	NA
POTASSIUM	1700.0	NA	NA	408	NA	NA	NA	NA
SODIUM	131.0	NA	NA	318	NA	NA	NA	NA
VANADIUM	28.7	NA	NA	7.28	NA	NA	NA	NA
ZINC	35.3	NA	NA	35.7	NA	NA	NA	NA

Notes:

NA = not analyzed.

Shaded values exceed background limit.

TABLE 4–4
ANALYTES IN GROUNDWATER
SA 43O – HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

ANALYTE	BACKGROUND	2680W–01 FILTERED ROUND 2	2680W–01 UNFILTERED ROUND 2	2680W–01 FILTERED ROUND 3	2680W–01 UNFILTERED ROUND 3	2680W–01 FILTERED ROUND 4	2680W–01 UNFILTERED ROUND 4	2680W–01 FILTERED ROUND 5	2680W–01 UNFILTERED ROUND 5
ORGANICS (µg/L)									
XYLENES		NA	< 0.84	NA	< 0.84	NA	< 0.84	NA	< 0.84
TOLUENE		NA	< 0.5	NA	< 0.5	NA	< 0.5	NA	< 0.5
CHLOROFORM		NA	0.62	NA	0.62	NA	< 0.5	NA	< 0.5
ETHYLBENZENE		NA	< 0.5	NA	< 0.5	NA	< 0.5	NA	< 0.5
NAPHTHALENE		NA	< 0.5	NA	< 0.5	NA	< 0.5	NA	< 0.5
TRICHLOROETHYLENE		NA	< 0.5	NA	< 0.5	NA	< 0.5	NA	< 0.5
INORGANICS (µg/L)									
LEAD	4.25	NA	106	< 1.26	106	< 1.26	16.7	< 1.26	< 1.26
OTHER (µg/L)									
TOTAL SUSPENDED SOLIDS		NA	4190000	NA	4010000	NA	850000	NA	500000
TOTAL PETROLEUM HYDROCARBONS		NA	< 120	NA	< 190	NA	< 190	NA	< 190

Notes:
< = Less than detection limit.
NA = Not analyzed
Shaded values exceed background limit

TABLE 4–4
ANALYTES IN GROUNDWATER
SA 43O – HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

ANALYTE	BACKGROUND	2680W–02 FILTERED ROUND 2	2680W–02 UNFILTERED ROUND 2	2680W–02 FILTERED ROUND 3	2680W–02 UNFILTERED ROUND 3	2680W–02 FILTERED ROUND 4	2680W–02 UNFILTERED ROUND 4	2680W–02 FILTERED ROUND 5	2680W–02 UNFILTERED ROUND 5
ORGANICS (µg/L)									
XYLENES		NA	< 0.84	NA	< 0.84	NA	< 0.84	NA	< 0.84
TOLUENE		NA	< 0.5	NA	0.74	NA	< 0.5	NA	< 0.5
CHLOROFORM		NA	1.2	NA	< 0.5	NA	1.2	NA	< 0.5
ETHYLBENZENE		NA	< 0.5	NA	0.89	NA	< 0.5	NA	< 0.5
NAPHTHALENE		NA	< 0.5	NA	< 0.5	NA	< 0.5	NA	< 0.5
TRICHLOROETHYLENE		NA	< 0.5	NA	< 0.5	NA	0.76	NA	< 0.5
INORGANICS (µg/L)									
LEAD	4.25	NA	56.2	< 1.26	10.2	< 1.26	200	< 1.26	17.9
OTHER (µg/L)									
TOTAL SUSPENDED SOLIDS		NA	1320000	NA	195	NA	620000	NA	500000
TOTAL PETROLEUM HYDROCARBONS		NA	< 120	NA	959	NA	< 190	NA	< 180

Notes:
< = Less than detection limit.
NA = Not analyzed
Shaded values exceed background limit

TABLE 4–4
ANALYTES IN GROUNDWATER
SA 430 – HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

ANALYTE	BACKGROUND	XOM–93–01X FILTERED ROUND 3	XOM–93–01X UNFILTERED ROUND 3	XOM–93–01X FILTERED ROUND 4	XOM–93–01X UNFILTERED ROUND 4	XOM–93–01X FILTERED ROUND 5	XOM–93–01X UNFILTERED ROUND 5
ORGANICS (µg/L)							
XYLENES		NA	0.9	NA	0.94	NA	< 0.84
TOLUENE		NA	< 0.5	NA	< 0.5	NA	< 0.5
CHLOROFORM		NA	0.81	NA	< 0.5	NA	< 0.5
ETHYLBENZENE		NA	5.8	NA	6.4	NA	4
NAPHTHALENE		NA	2.8	NA	0.85	NA	< 0.5
TRICHLOROETHYLENE		NA	1.5	NA	< 0.5	NA	< 0.5
INORGANICS (µg/L)							
LEAD	4.25	< 1.26	8.79	< 1.26	3.1	< 1.26	5.1
OTHER (µg/L)							
TOTAL SUSPENDED SOLIDS		NA	311000	NA	65000	NA	11000
TOTAL PETROLEUM HYDROCARBONS		NA	229	NA	< 180	NA	< 180

Notes:
< = Less than detection limit.
NA = Not analyzed
Shaded values exceed background limit

TABLE 4–4
ANALYTES IN GROUNDWATER
SA 430 – HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

ANALYTE	BACKGROUND	XOM–93–02X FILTERED ROUND 3	XOM–93–02X UNFILTERED ROUND 3	XOM–93–02X FILTERED ROUND 4	XOM–93–02X UNFILTERED ROUND 4	XOM–93–02X FILTERED ROUND 5	XOM–93–02X UNFILTERED ROUND 5
ORGANICS (µg/L)							
XYLENES		NA	1.9	NA	< 0.84	NA	1.1
TOLUENE		NA	< 0.5	NA	< 0.5	NA	< 0.5
CHLOROFORM		NA	< 0.5	NA	< 0.5	NA	< 0.5
ETHYLBENZENE		NA	0.49	NA	< 0.5	NA	0.51
NAPHTHALENE		NA	< 0.5	NA	< 0.5	NA	< 0.5
TRICHLOROETHYLENE		NA	1.2	NA	< 0.5	NA	0.53
INORGANICS (µg/L)							
LEAD	4.25	< 1.26	8.68	< 1.26	17	< 1.26	1.84
OTHER (µg/L)							
TOTAL SUSPENDED SOLIDS		NA	392000	NA	460000	NA	62000
TOTAL PETROLEUM HYDROCARBONS		NA	< 190	NA	< 190	NA	< 190

Notes:
< = Less than detection limit.
NA = Not analyzed
Shaded values exceed background limit

TABLE 4-4
ANALYTES IN GROUNDWATER
SA 43O – HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

ANALYTE	BACKGROUND	XOM-93-03X FILTERED ROUND 3	XOM-93-03X UNFILTERED ROUND 3	XOM-93-03X FILTERED ROUND 4	XOM-93-03X UNFILTERED ROUND 4	XOM-93-03X FILTERED ROUND 5	XOM-93-03X UNFILTERED ROUND 5
ORGANICS (µg/L)							
XYLENES		NA	< 0.84	NA	< 0.84	NA	< 0.84
TOLUENE		NA	< 0.5	NA	< 0.5	NA	< 0.5
CHLOROFORM		NA	< 0.5	NA	1	NA	< 0.5
ETHYLBENZENE		NA	< 0.5	NA	< 0.5	NA	< 0.5
NAPHTHALENE		NA	< 0.5	NA	< 0.5	NA	< 0.5
TRICHLOROETHYLENE		NA	12	NA	9.3	NA	6.2
INORGANICS (µg/L)							
LEAD	4.25	< 1.26	13.1	< 1.26	9.5	< 1.26	11.5
OTHER (µg/L)							
TOTAL SUSPENDED SOLIDS		NA	271000	NA	170000	NA	221000
TOTAL PETROLEUM HYDROCARBONS		NA	2810	NA	< 190	NA	< 190

Notes:
< = Less than detection limit.
NA = Not analyzed
Shaded values exceed background limit

5.0 PRELIMINARY HUMAN HEALTH RISK EVALUATION

The screening methodology for the Human Health Preliminary Risk Evaluation (PRE) has been described in detail in Section 3.6 of the Revised Final SI Report for Groups 2, 7, and Historic Gas Stations (ABB-ES, 1995), and will not be repeated here. The most recent of the health standards and guidelines discussed in that report are used here; the standard or guideline for some analytes has been updated since the Final SI Report. For this NFA document, the most recent update of the standards and guidelines includes the Fourth Quarter 1993 USEPA Region III Risk-Based Concentration Table (USEPA, 1993a); the May 1993 publication of the USEPA Office of Water entitled "Drinking Water Regulations and Health Advisories" (USEPA, 1993b); and the Autumn 1993 publication of Massachusetts Drinking Water Standards and Guidelines (Massachusetts Department of Environmental Protection (MADEP), 1993a). Risk-based concentrations for gasoline and diesel fuel have been recalculated based on parameters used in the USEPA Region III Risk-Based Concentration Table. For a Massachusetts Contingency Plan (MCP) Method 1 Risk Characterization under the MCP, compliance with these soil standards constitutes a demonstration of no significant health risk from exposure to oil or hazardous material in soil (MADEP, 1993b). For this PRE, MCP Method 1 S-2/GW-1 soil standards are used as screening guidelines along with the USEPA Region III Risk-Based Concentrations. SA subsurface soil (i.e., 3 to 15 feet) are presumed to be Category S-2 soil, soil that is less accessible and has a lower frequency or lower intensity of possible contact than Category S-1 soil.

5.1 Soils

During the SI, 10 Terraprobe™ subsurface soil samples and one confirmatory soil sample were collected and analyzed and are discussed in the SI Report. An additional 22 Terraprobe™ samples and one confirmatory boring sample were taken during the SSI. Tables 4-1, 4-2, and 4-3 give the individual analytical results for the samples. Table 5-1 summarizes the combined SI and SSI Terraprobe™ and confirmatory boring results and compares them to Region III commercial and MCP Category S-2 soil guidelines. Low concentrations of TEX which did not exceed guidelines were detected in both SI and SSI Terraprobe™ samples. TPHC was detected in 14 of 36 samples at concentrations not exceeding guidelines. The acetone and di-n-butyl phthalate which were detected in the off-site laboratory analytical results for the soil borings are common laboratory contaminants and are not considered site-related. Concentrations of inorganics detected in the soil did not exceed guidelines. In conclusion, it appears that contact with subsurface soil at SA 43O does not pose a potential risk to human health.

5.2 Groundwater

Table 5-2 presents summary data based on unfiltered groundwater samples from SA 43O along with drinking water standards/guidelines for comparison. The organics detected were chloroform, ethylbenzene, toluene, naphthalene, TCE, xylenes, and TPHC. The concentrations of chloroform, ethylbenzene, toluene, and xylenes did not exceed their respective federal Maximum Contaminant Levels (MCLs). In addition, chloroform is a common laboratory contaminant and is not considered site-related. No standard is available for naphthalene, but the detected concentration does not exceed the Region III tap water concentration. TCE was the only organic contaminant which exceeded its federal MCL. TPHC was detected in two of three samples and the average concentration exceeded the MCP GW-1 standard.

Lead was the only inorganic analyzed for and was detected in four of four samples. Both the maximum and average concentrations of lead exceeded the USEPA action level. However, the results of the filtered inorganic sample results showed lead below the detection limit. Based on these results and the TSS result, it is unlikely that the lead concentration detected, is a result of petroleum releases at this site.

Based on this screening, TCE and TPHC concentrations in groundwater are above the guidelines/standard used to determine potential risk to human health. However, based on the four rounds of groundwater data collected from SA 43O it appeared that the concentration of TCE was declining, and if the concentration continues to decline it will reach a concentration below the federal MCL of 5 μg/L without instituting a groundwater remediation program. In addition, the future reuse of SA 43O, and the surrounding area, will apparently be limited to a commercial/industrial scenario. This reuse would likely limit the groundwater exposure to future site workers. Because of these reasons, it appears that future exposure to groundwater at SA 43O would not pose a risk to human health.

TABLE 5-1
HUMAN HEALTH PRE EVALUATION OF SUBSURFACE SOIL
SA 43O - HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

ANALYTE	FREQUENCY OF DETECTION	DETECTED CONCENTRATION [a]		REGION III COMMERCIAL/ INDUSTRIAL CONCENTRATION	MCP S-2 STANDARD	MAXIMUM EXCEEDS GUIDELINE CONCENTRATION ?
		AVERAGE	MAXIMUM			
ORGANICS (µg/kg)						
ACETONE	1/4	--	0.000032	100000000	3000	NO
DI-N-BUTYLE PHTHALATE	1/4	--	0.00041	100000000	NA	NO
TOLUENE	4/36	97.7	290	200000000	90000	NO
ETHYLBENZENE	3/36	69	130	100000000	80000	NO
m/p-XYLENE*	11/32	57.2	320	1000000000	800000	NO
o-XYLENE*	4/32	48.7	100	1000000000	800000	NO
OTHER (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	14/36	151	620	1680	2500	NO

Notes:

[a] Subsurface soil (3 to 15 feet) based on field screening samples TP-01 through TP-10 from 1992, TP-11 through TP-19 from 1993, and soil borings XOM-93-02X and 43O-92-01X.

* = analyte from field screening samples

µg/kg = micrograms per kilogram

mg/kg = millograms per kilogram

-- = not applicable

MCP = Massachusetts Contingency Plan

NA = not available

TABLE 5–2
HUMAN HEALTH PRE EVALUATION OF GROUNDWATER
SA 43O – HISTORIC GAS STATIONS

DECISION DOCUMENT
FORT DEVENS, MA

ANALYTE	FREQUENCY OF DETECTION	DETECTED CONCENTRATION [a] AVERAGE (µg/L)	DETECTED CONCENTRATION [a] MAXIMUM (µg/L)	GROUNDWATER BACKGROUND CONCENTRATION (µg/L)	MAXIMUM EXCEEDS BACKGROUND ?	DRINKING WATER STANDARD/ GUIDELINE [b] (µg/L)	MAXIMUM EXCEEDS STANDARD/ GUIDELINE ?
ORGANICS							
CHLOROFORM	5/17	0.89	1.2	NA	–	5	NO
ETHYLBENZENE	6/17	3.0	6.4	NA	–	700	NO
NAPHTHALENE	2/17	1.8	2.8	NA	–	1500	NO
TOLUENE	1/17	0.74	0.74	NA	–	1600	NO
TRICHLOROETHENE	6/17	5.16	12	NA	–	5	YES
XYLENES	4/17	1.21	1.9	NA	–	10000	NO
INORGANICS							
LEAD	13/17	44.1	200	4.25	YES	15	YES
OTHER							
TOTAL PETROLEUM HYDROCARBONS	3/17	1332.2	2810	NA	–	1000	YES

Notes:

[a] Groundwater based on unfiltered samples from 2680W–01 and 2680W–03 (2 rounds each) and XOM–93–01X to XOM–93–03X (one duplicate).

[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.

NA = not available

µg/L = micrograms per liter

– = not applicable

Shaded compounds exceed standard or guideline.

6.0 PRELIMINARY ECOLOGICAL RISK EVALUATION

A preliminary ecological risk evaluation was not prepared for SA 43O because contaminants associated with a UST would be confined to subsurface soil, and would not impact any ecological receptors.

7.0 CONCLUSIONS

The objectives of the SI and the SSI field investigations at SA 43O were to determine if the former historic gas station activities had adversely impacted the soil or groundwater quality at the site. Based on the results of the samples collected from SA 43O it does appear that the soil or groundwater quality in the vicinity of SA 43O has been impacted by past activities. However, as noted in the human health groundwater PRE the reduction in TCE concentrations from Round Three to Round Five, indicates that the TCE levels are declining; and if the levels continue to decline, that eventually these values will fall below the federal MCL eliminating the potential human health risk. In addition, the planned reuse of this portion of Fort Devens is for commercial/industrial activities which would likely limit future exposures to site groundwater. Therefore, no further action is recommended for this historic gas station.

8.0 DECISION

On the basis of the findings at SA 43O, there is no evidence or reason to conclude that contamination from the former USTs has caused significant environmental contamination or pose a threat to human health or the environment. The decision has been made to remove SA 43O 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 — 25 JUN 96

JAMES C. CHAMBERS — DATE
BRAC Environmental Coordinator

U.S. ENVIRONMENTAL PROTECTION AGENCY

James P Byrne — 6/25/96

JAMES P. BYRNE — DATE
Fort Devens Remedial Project Manager

[X] Concur

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

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

D. Lynne Welsh — 6/25/96

D. LYNNE WELSH — DATE
Section Chief, Federal Facilities - CERO

[X] Concur

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

ABB-ES	ABB Environmental Services, Inc.
bgs	below ground surface
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm/sec	centimeters per second
DoD	U.S. Department of Defense
gpm	gallons per minute
IRP	Installation Restoration Program
LUST	leaking underground storage tank
MADEP	Massachusetts Department of Environmental Protection
MCL	Maximum Concentration Level
MCP	Massachusetts Contingency Plan
MEP	Master Environmental Plan
MSL	mean sea level
µg/g	micrograms per gram
µg/L	micrograms per Liter
mg/L	milligrams per Liter
NBC	Nuclear, Biological and Chemical
NFA	No Further Action
NPL	National Priorities List
PA	Enhanced Preliminary Assessment
PAL	Project Analyte List
ppb	parts per billion
ppm	part per million
PRE	Preliminary Risk Evaluation
SA	Study Area

SARA	Superfund Amendments and Reauthorization Act
SI	site investigation
SSI	supplemental site investigation
SVOC	semivolatile organic compounds
TCE	trichloroethene
TEX	toluene, ethylbenzene and xylene
TOC	total organic compounds
TPHC	total petroleum hydrocarbon compounds
TSS	total suspended solids
USAEC	U.S. Army Environmental Center
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound

ABB Environmental Services, Inc. (ABB-ES), 1995. "Revised Final Site Investigation Report - Groups 2, 7, and Historic Gas Stations, Fort Devens, Massachusetts"; Data Item A009; prepared for the U.S. Army Environmental Center by ABB Environmental Services, Inc., Portland, ME, October.

Barbour, F.A., c. 1941. "Fort Devens, Mass. General Layout Plan"; Plan 6101-710.1B; prepared for Construction Division, Office of Quartermaster General; Scale approximately 1:7,000.

Biang, C.A., R.W. Peters, R.H. Pearl, and S.Y. Tsai, 1992. "Master Environmental Plan for Fort Devens, Massachusetts"; prepared for U.S. Army Toxic and Hazardous Materials Agency; prepared by Argonne National Laboratory, Environmental Assessment and Information Sciences Division; Argonne, IL; Final, April.

Jahns, R.H., 1953. "Surficial Geology of the Ayer Quadrangle, Massachusetts"; Scale 1:31,680; U.S. Geological Survey.

Koteff, C., 1966. "Surficial Geologic Map of the Clinton Quadrangle, Worcester County, Massachusetts;" U.S. Geological Survey Map GQ-567.

Kurz Associates, Inc., 1991. "Underground Storage Tank Removal and Related Environmental Investigations, Fort Devens Military Reservation, Harvard, Massachusetts", prepared by Franklin Environmental Services, Inc., Wrentham, MA; Bridgewater, MA; January.

Massachusetts Department of Environmental Protection, (MADEP), 1988. "Massachusetts Contingency Plan", 310 CMR 40.00 et. seq.

U.S. Environmental Protection Agency (USEPA), 1993a. "Risk-Based Concentration Table, Fourth Quarter 1993"; prepared by Roy L. Smith, USEPA Region III Technical Support Section. October 15, 1993.

U.S. Environmental Protection Agency (USEPA), 1993b. "Drinking Water Regulation and Health Advisories"; Office of Water, Washington, D.C., May 1993.

Vanasse Hagen Brustlin, Inc., 1994. Devens Reuse Plan; prepared for the Boards of Selectman for Towns of Ayer, Harvard, Lancaster, and Shirley; November 14, 1994.