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U.S. Army
Environmental
Center

# NO FURTHER ACTION DECISION UNDER CERCLA

## FORT DEVENS STUDY AREA 30
## MOORE ARMY AIRFIELD
## DRUM STORAGE AREA
## DATA ITEM A009

CONTRACT DAAA15-91-D-0008

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

JANUARY 1995

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# UNDER CERCLA
# STUDY AREA 30
# MOORE ARMY AIRFIELD DRUM STORAGE AREA

## 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.
Wakefield, Massachusetts
Project No. 6917-11

JANUARY 1995

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# EXECUTIVE SUMMARY

Investigations of Study Area 30 (Moore Army Airfield Drum Storage Area) at Fort Devens Massachusetts have resulted in the decision that no further studies or remediation are required at this site. Study Area 30 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.

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, and Enhanced Preliminary Assessment, and a Site Investigation have been conducted which address Study Area 30.

Field Investigation of Study Area 30 was initiated in 1992 in conjunction with the other ten Group 3, 5 and 6 Study Areas at Fort Devens. Investigation at Study Area 30 entailed installing a total of two monitoring wells and eight soil borings in the east and west drum storage areas. Nine other wells were installed as part of the group-wide water quality assessment at the airfield. To evaluate the potential impact of contaminant migration from Study Area 30 to the Nashua River, surface water and sediment samples were collected from the Nashua River.

Total petroleum hydrocarbon compound concentrations in soil samples were observed to be generally low; the highest concentration of 171 micrograms per gram was detected in a surface soil sample in the east drum storage area. Many of the other samples exhibited total petroleum hydrocarbon compound concentrations near or below the detection limit. Organic compounds (toluene, xylene, and polynuclear aromatic hydrocarbons) were observed predominantly in surface soils in unpaved areas. Concentrations of these analytes decrease with, or are absent at depth. The current volatile organic compound distribution suggests that downward migration may have occurred in two well borings but significant concentrations are not observed at depth. The poor correlation between polynuclear aromatic hydrocarbons and total petroleum hydrocarbon compounds distribution in surface soils suggests that airborne combustion product deposition is a likely source for the polynuclear aromatic hydrocarbons. The absence of polynuclear aromatic hydrocarbons in the west is likely the result of pavement cover there. The absence of chlorinated solvents in all of the soils suggests that releases of those compounds have not occurred in this study area. Inorganic analyte concentrations in Study Area 30 soil samples were observed to be generally at or below calculated background concentrations for Fort Devens soils. Elevated concentrations of sodium (maximum 487 micrograms per gram) in soil are likely be the result of runway and taxiway de-icing. The source of the slightly elevated concentrations of beryllium (maximum 0.847 micrograms per gram) in soil is not known.

Based on groundwater analytical data it is apparent that no observable contamination of groundwater has occurred as a result of potential releases from drummed waste in Study Area 30.

The results of sediment sampling support the conclusion that contaminant migration via storm and surface water runoff from the airfield and other upstream sources is a likely source of sediment contamination in the Nashua River; the specific source area for this contamination cannot be determined however, due to the large number of stormwater connections. Surface water and sediment in the Nashua River has been investigated under Area Requiring Environmental Evaluation 70.

Ecological and human health Preliminary Risk Evaluations found no unacceptable risk associated with volatile organic compounds. Polynuclear aromatic hydrocarbon concentrations detected in surficial soils exceeded both human health and ecological guidelines, but are likely the result of combustion product deposition and not historical Study Area 30 activities.

In summary, based on the results of the investigation and Preliminary Risk Evaluations performed for Study Area 30, there is no evidence or reason to conclude that historical site operations conducted at Study Area 30 have resulted in significant environmental contamination which poses a threat to human health or the environment.

# 1.0 INTRODUCTION

This decision document has been prepared to support a no further action decision at Study Area 30 - Moore Army Airfield Drum Storage Area (SA 30) 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 30 was identified as a potential source of contamination in the MEP. 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 the SA 30 along with the other ten SAs in SA Groups 3, 5 and 6 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 30 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, 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 surfaces range from about 200 feet (ft) above mean sea level (MSL) along the Nashua River in the northern portion of the installation to 450 ft 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 current mission of Fort Devens is to command and train its assigned units and support various tenant activities.

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 Main Post along its western edge. 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 cafeteria, post exchange, commissary, bowling alley, and golf course), administrative buildings, classrooms and training facilities, maintenance facilities, and ammunition storage facilities.

The South Post is located south of Massachusetts Highway 2 and contains individual training areas designated for troop training, range activities, and a parachute drop zone where air training exercises are performed. 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, where SA 30 is located, and the installation Waste Water Treatment Plant.

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.

### 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 that are associated 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 30, the Moore Army Airfield (MAAF) Drum Storage Area is one of four SAs at MAAF which is in the northern most part of the North Post (Figure 2-2). The airfield occupies an extensive, comparatively flat kame-plain remnant. The soils are stratified sand and gravel transported by glacial meltwater streams and deposited in deltas in a glacial lake. These soils have significantly high permeability. Groundwater beneath SA 30 flows roughly northwest (Figure 2-2) at an average rate of 65 ft/year (ABB-ES, 1993).

Three small locations in the northern part of the airfield were reportedly used for temporary storage of containerized hazardous waste between 1975 and 1990. Two of the storage locations are near one another at the end of the aircraft defueling pad (McMaster et al., 1982). This area will be referred to hereinafter as the "west drum storage area". When the field investigations at SA 30 were initiated, the west drum storage area was the only known location. More recently, however, it was learned that drums were stored in that location for only the past few years (Reynolds, personal communication, 1991). Prior to that, and for a longer period, drums of hazardous waste were stored at a location farther east. This location will be referred to as the "east drum storage area". Hazardous wastes are no longer stored at the airfield.

The east and west drum storage areas (collectively SA 30) are located about 650 feet apart at the northern end of MAAF taxiway (Figure 2-2).

According to Biang et al. (1992), the west drum storage area was used for temporary storage (less than 90 days) of containerized hazardous waste between 1975 and 1990. Space was available for the outdoor storage of approximately ten to fifteen 55-gallon drums on wooden pallets. Stored materials included fuel samples, waste methyl ethyl ketone, naphtha, and other petroleum-based paint thinners generated by aircraft maintenance activities (McMaster et al., 1982), as well as alkaline cleaners, dry cleaning solution, aircraft cleaning compounds, lube oil, and waste solvents (Biang et al., 1992). Pavement in the west drum storage area was observed to be broken and in poor condition. According to Reynolds (personal communication, 1991), drums were also stored in a grassy area adjacent to the west side of the defueling pad. The west drum storage area was closed in 1990 after a centralized 90-day storage facility was constructed elsewhere at Fort Devens.

The east drum storage area was not identified by Biang et al. (1992) or McMaster et al. (1982). According to MAAF staff member Reynolds (personal communication, 1991), the east drum storage area (unpaved) was used before, and for a longer period than, the west drum storage area. The east drum storage area has not been used since approximately 1975. Although no visible evidence of the former storage area remains, Reynolds identified the location.

SA 30 is expected to remain as part of the airfield in the foreseeable future.

# 3.0 RELATED INVESTIGATIONS

## 3.1 MASTER ENVIRONMENTAL PLAN

The MAAF drum storage area was identified as a possible source for release of contaminants into the environment. The MEP recommended collection of soil samples for laboratory analysis of Target Compound List (TCL) compounds, toxicity characteristic compounds and total petroleum hydrocarbon compounds (TPHCs); and collection of surface water and sediment samples at the Nashua River's edge for laboratory analysis of TCL compounds, TPHC and total organic carbon (sediment only).

## 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 30 were provided in the PA.

## 3.3 SITE INVESTIGATION REPORT

The SI was initiated in June 1992 and included eleven of the Group 3, 5 and 6 SAs listed in the MEP.

- SA 38 (Building 3713/Battery Repair Area)
- SA 44 (Cannibalization Yard)
- SA 52 (TDA Maintenance Yard)
- SA 9 (North Post Landfill)
- SA 19 (Wastewater Treatment Plant)
- SA 20 (Rapid Infiltration Sand Beds)
- SA 21 (Sludge Drying Beds)
- **SA 30 (Moore Army Airfield Drum Storage Area)**
- SA 31 (Moore Army Airfield Fire-Fighting Training Area)
- SA 47 (Moore Army Airfield Underground Storage Tank Site)
- SA 50 (Moore Army Airfield World War II Fuel Point)

The SI was conducted by ABB-ES under contract with USAEC. The Final Site Investigation Report was issued April 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 investigation specific to SA 30 focused on identifying potential incidental releases of waste at each of the drum storage areas resulting in soil contamination and possibly groundwater contamination.

Because of the proximity of all four of the MAAF SAs, the groundwater beneath the airfield and surface water and sediment in the Nashua River were investigated on a group-wide basis. Groundwater monitoring well locations were selected to provide both local coverage of SA-specific contaminants and collectively to provide group-wide coverage of the water table elevations for groundwater flow directions.

Eleven monitoring wells (G6M-92-01X through G6M-92-11X) were installed in boring locations throughout Group 6. Wells G6M-92-02X and G6M-92-03X were specifically located at the west and east drum storage sites of SA-30; the remaining wells in the series are Group 6-specific, not SA 30-specific. Monitoring well locations are shown in Figure 2-2. The monitoring well soil borings G6M-92-02X and G6M-92-03X were drilled to 10 feet below the water table (73 and 70 feet bgs, respectively), and soil samples were collected at 5-foot intervals for field screening by photoionization detector (PID) and for field classification. Five split-spoon samples were also selected for analysis for project analyte list (PAL) organics, PAL inorganics, and TPHC. In both borings, one analytical sample was collected at the ground surface (from 0 to 2 feet bgs) and one from the saturated zone at the approximate depth of the water table. The other three samples were selected from intermediate depths in each boring. Analytical sample depths were selected based on observation and screening results. In the absence of observed contamination, samples were collected at roughly even intervals, where possible, from the intermediate zone.

Two rounds of groundwater samples, three months apart, were collected from the monitoring wells. The samples were analyzed for PAL organics, PAL inorganics (unfiltered), PAL anions/cations, total suspended solids (TSS), and TPHC. Due to the cross-contamination issue detailed in the Final SI Report (ABB-ES, 1993), a third round of groundwater samples was collected and analyzed for PAL volatile organic compounds (VOCs).

In addition to the monitoring well borings, eight shallow (10-foot-deep) soil borings (30B-92-01X through 30B-92-08X) were drilled in and around the west and east drum storage areas to identify possible near-surface soil contamination (Figure 3-1). Continuous split-spoon soil samples were collected for field screening by PID and for field classification. Three split-spoon samples from each boring were analyzed for PAL organics, PAL inorganics, and TPHC. In each boring, one analytical sample was collected at the ground surface (0 to 2 feet bgs) or immediately beneath pavement, one sample from the bottom of the boring, and the third sample was selected from an intermediate depth. Analytical sample depths were selected based on observation and screening results. In the absence of observed contamination, samples were selected from at roughly even intervals, where possible, from the intermediate zone.

Because of the proximity of the drums to the Nashua River, impacts to surface water from contaminated runoff and groundwater were also considered. Surface water and sediment sampling locations were selected to provide samples that were representative of downstream stormwater runoff discharge points from the airfield, as well as samples that were spaced along the Nashua River so that the possible impact of groundwater discharge to the river from the MAAF SAs could be evaluated. Surface water and sediment sampling locations G6D-92-02X, G6D-92-03X, and G6D-92-04X were located near outfalls of the MAAF storm water system, and location G6D-92-01X is upstream of the storm water outfalls (Figure 2-2). Sediment samples were submitted for analysis of PAL organics, PAL inorganics, and TPHC. Surface water samples were analyzed for the same parameters in addition to PAL water quality parameters and TSS.

### 3.4 PRELIMINARY RISK EVALUATION

Preliminary Risk Evaluations (PREs) were performed as part of the SI to help establish whether environmental contamination at SA 30 required further investigation or remediation. This section presents the general approach employed for the SI PREs; details of the Human Health and Ecological PREs are presented in Sections 5.0, and 6.0 respectively.

As detailed in Section 3.3, environmental investigations at SA 30 entailed sampling the following environmental media:

- Surface Soil (defined as soil to a depth of 3 feet)
- Subsurface Soil (defined as soil between 3 and 15 feet deep)
- Groundwater
- Nashua River Surface Water and Sediments

Human health and ecological PREs were conducted to evaluate contamination in surface soil; only the human health PRE was conducted to evaluate contamination in subsurface soils and in groundwater. Because analytes detected in the Nashua River are not specifically derived from the Groups 3, 5, and 6 SAs, the Army and regulatory authorities have previously agreed that surface water and sediment from these water bodies would be evaluated in a separate study (Area Requiring Environmental Evaluation 70 [AREE 70]). Therefore, Nashua River contamination was not considered in the SI PREs.

### 3.4.1 Human Health Risk Evaluation

The Human Health PRE at SA 30 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, 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.

**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 was published in September 1988. Further 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 30 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.

### 3.4.2 Ecological Risk Evaluations

The ecological PRE at SA 30 included the following elements:

- **Ecological Characterization**: The purpose of the ecological characterization is to identify ecological receptors potentially exposed to contamination at the SA. For part of research being conducted for the U.S. Army Corps of Engineers, ABB-ES has developed a database of all flora and fauna known to seasonally or permanently occur at, or migrate through, Fort Devens (ABB-ES, November 1992). Particular emphasis has been paid to rare and endangered biota; the term "rare and endangered" is used to refer to those species with protected status under the Federal Endangered Species Act (FESA) of 1973, as amended in 1988, and the Massachusetts Endangered Species Act (MESA) of 1990. The most current versions of both state and federal rare and endangered species lists have been included in this Fort Devens Biological Database. Information regarding all rare and endangered species known to occur at Fort Devens has been obtained from the Massachusetts Natural Heritage Program (MNHP) and the USFWS. In addition, the ABB-ES database contains records that have not yet been incorporated into the MNHP database. This database was used to ascertain whether or not SA 30 is providing rare and endangered species habitat.

- **Comparison to Ecological Standards and Criteria:** This element of the ecological PRE identifies possible ecological exposure pathways, and serves to characterize the risk to terrestrial and aquatic receptors potentially exposed to environmental contamination at the SA.

  Exposure pathways describe the mechanism(s) by which ecological receptors are exposed to contaminated media, and consist of a: (1) contaminant source; (2) environmental transport medium; (3) point of receptor contact; and (4) the exposure route (e.g., ingestion of prey items that have bioaccumulated contaminants in their tissues, drinking of contaminated surface water, incidental sediment ingestion, dermal absorption, inhalation, etc.). Potential receptors at SA 30 are Terrestrial biota in uplands.

  No state or federal standards or guidelines exist for surface soil exposure, so it was evaluated through comparison of maximum analyte concentrations in surface soils to protective contaminant levels (PCLs) obtained through a computer-generated chronic exposure food web model. In order to establish conservative PCLs for the screening level PRE, an acceptable level of risk (Hazard Index [HI] equals 1) associated with chronic exposure to each surface soil contaminant isolated at Fort Devens was established. The food model is further described in the SI (ABB-ES, 1993).

  The surface soil PCLs, are referred to as benchmark values. Screening of ecological risk at SA 30 was based on establishing a contaminant-specific ratio between the average exposure concentrations and the benchmark values. This comparison of the exposure concentration with the appropriate benchmark results in an index of potential impact associated with exposure to environmental contaminants. When the average exposure concentration is less than the benchmark value (i.e., the ratio of the exposure concentration to the benchmark value < 1), ecological risk was assumed to be insignificant. When the value exceeds the exposure concentration (i.e., the ratio of the exposure concentration to the benchmark value > 1), a discussion of the ecological significance of this exceedance was included in the PRE. This conservative approach provides a screening-level evaluation of potential effects of individual chemicals of potential concern (CPCs) on ecological receptors.

# 4.0 CONTAMINATION ASSESSMENT

The SA 30 SI analytical results are discussed by medium in the following subsections.

## 4.1 SOILS

Three soil samples were collected for laboratory analysis from each of the eight soil borings advanced in SA 30 (24 samples total). Five soil samples were collected from each of the two borings (10 samples total) advanced for the purpose of installing groundwater monitoring wells (G6M-92-02X and G6M-92-03X) in SA 30. The laboratory results for organic and inorganic analytes in the 34 soil samples collected in SA 30 are provided in Tables 4-1 and 4-2, respectively. Figures 4-1, 4-2, and 4-3 show the distribution of total VOCs, semivolatile organic compounds (SVOCs), and TPHC in soils collected at the three depth intervals detailed in Section 3.3. Figures 4-4, 4-5, and 4-6 show the distribution of those inorganic analytes at each depth interval exceeding calculated background concentrations. Appendix H of the SI Report (ABB-ES, 1993) contains the calculations used in determining background concentrations. For clarity, the three deeper subsurface samples taken from the two groundwater monitoring well borings are not depicted in Figures 4-1 through 4-6 but are listed in Tables 4-1 and 4-2.

Toluene and xylene (typical petroleum product compounds) were detected at low (0.0013 to 0.0057 micrograms per gram [$\mu$g/g]) concentrations in 18 of the 34 samples. There is no apparent horizontal distribution pattern evident; the compounds are generally equally distributed between the east and west drum storage areas. Likewise, no consistent vertical distribution in the soil column is evident though concentrations were highest near the surface. Concentrations were detected as deep as 65 feet below the surface.

SVOCs, mostly polynuclear aromatic hydrocarbons (PAHs), were detected predominantly in the east drum storage area. The highest concentrations of these PAHs appear in surface soils. Only subsurface soil samples from boring 30B-92-01X (in the west drum storage areas) exhibited detectable concentrations of PAHs. Concentrations of PAHs in these subsurface soils were generally an order of magnitude less than the surface concentrations in the east drum storage area.

TPHC concentrations were observed to be generally low; the highest concentration of 171 $\mu$g/g was detected at G6M-92-03X. Many of the other samples exhibited TPHC concentrations near or below the detection limit. There does not appear to be a clear correlation between the PAH concentrations and TPHC and no obvious lateral or vertical distribution is evident.

Organic compounds (toluene, xylene, and PAHs) were observed predominantly in surface soils in unpaved areas. Concentrations of these analytes decrease with, or are absent at depth. The current VOC distribution suggests that downward migration may have occurred in borings G6M-92-02X and G6M-92-03X, but significant concentrations are not observed at depth. Toluene and xylene are likely to be SA activity-derived compounds and may be related to the paint and paint thinner stored at the site. The absence of chlorinated solvents in all of the soils suggests that releases of those compounds have not occurred in this study area. PAHs were detected in surface soils (defined as 0-2 feet) in the East Drum Storage Area at concentrations between 14 $\mu$g/g and 145 $\mu$g/g of total PAHs. No PAHs were reported in surface soils at the West Drum Storage Area, however concentrations of 1.35 $\mu$g/g and 0.179 $\mu$g/g were reported at 2-8 feet and 8-10 feet respectively. Potentially PAH-containing substances (JP-4, gasoline, naptha, petroleum-based paint thinners, lube oil and waste solvents) were reportedly stored at both drum storage locations. However, the Army has concluded that because the specific types and relative abundances of PAHs found in surface soil are characteristic of a pyrogenic origin, the source of the PAH detections at SA30, most notably in the east drum storage area, is atmospheric deposition of petroleum combustion by-products. The proximity of the airfield runways and taxiways, which provide a source of combustion particles, and the abundance of PAHs in exposed surface soils supports airborne deposition as a source. The absence of other closely associated petroleum compounds, such as branched alkanes, alkenes, and isoprenoids; and lower total petroleum hydrocarbon values than would be expected if this contamination were attributable to historical spillage, further supports the Army's position.

With the exception of beryllium and sodium, no significant concentrations of inorganic analytes were widely detected. Copper, zinc, and calcium were also rarely detected above background at isolated sampling locations. Concentrations of beryllium ranged from 0.552 to 0.847 $\mu$g/g in the 12 samples in which it was detected. Sodium was detected in virtually all samples collected with concentrations ranging from less than the detection limit to 487 $\mu$g/g. No apparent lateral or vertical distribution pattern of these inorganic analytes is evident.

Inorganic analyte concentrations in SA 30 soil samples were observed to be generally at or below calculated background concentrations for Fort Devens soils. Elevated concentrations of sodium in soil may be the result of runway and taxiway de-icing. The source of the slightly elevated beryllium in soil is not known.

### 4.2 GROUNDWATER

Two wells, G6M-92-02X and G6M-92-03X (Figure 3-1), were installed to assess groundwater impacts due specifically to the drum storage activities. Analytical results for groundwater are provided in Table 4-3. Figure 4-7 shows the distribution of analytes detected in groundwater at SA 30. No organic compounds were detected in groundwater samples collected from these wells during Round 1; bis(2-ethylhexyl)phthalate (B2EHP), however, was detected at both locations in Round 2/Round 3 groundwater samples. As detailed in Section 4.4, B2EHP is a suspected laboratory contaminant. Except for sodium in the Round 1 sample from G6M-92-03X and barium, potassium, sodium, and zinc in Round 2 samples, none of the detected inorganic analytes exhibited concentrations above calculated background concentrations. Appendix H of the SI Report (ABB-ES, 1993) contains the calculations used in determining background concentrations. Based on this data it is apparent that no observable contamination of groundwater has occurred as a result of potential releases from drummed waste in SA 30.

### 4.3 SURFACE WATER AND SEDIMENT

Analytical results for surface water and sediment samples are provided in Tables 4-4 and 4-5, respectively.

In summary, no organic compounds were found above detection limits in any surface water samples; nine of the 23 inorganic analytes were detected (arsenic, barium, calcium iron, lead, magnesium, manganese, potassium, and sodium). Figure 4-8 shows the distribution of contaminants detected in the Nashua River surface water samples. Detected organic compounds in Nashua River sediments included acetone, toluene, three PAHs, B2EHP, and TPHC. Both toluene and B2EHP were likely laboratory contaminants as described in Section 4.4. TPHC concentrations were highest in the upstream sample. The distributions of organic compounds, TPHC, and selected inorganic analytes for sediment samples are provided in Figures 4-9 through 4-11. Surface runoff from the airfield is discharged to the Nashua River via storm drainage and general migration of contaminants is possible through this mechanism. The results of sediment sampling support the conclusion that contaminant migration via storm and surface water runoff from the airfield and other upstream sources is a likely cause of sediment contamination in the Nashua River. Due to the large number of connections to the stormwater drainage system, it is impossible to determine the exact source of specific contaminants. Surface water and sediment in the Nashua River will be further investigated under AREE 70.

## 4.4 QUALITY CONTROL BLANKS

The quality control blanks analyzed during the Groups 3, 5, and 6 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 May through July 1992.

The quality control blank data that are pertinent to the evaluation of SA 30 analytical samples entail the method blanks analyzed for organic contaminants. Chemically pure deionized water was used to collect method blanks at the laboratory. The blanks were run as if they were actual field samples using all the analytical methods. Any detected compounds were a result of contamination at the laboratory, since water used in the analyses is contaminant free. Since method blanks were done at the laboratory, there was no easy way to assign individual blanks to a specific group. Therefore, data provided is for method blank contamination globally for all of SA Groups 3,5,6. The following data is a presentation of all organic compounds detected above Certified Reporting Limit (CRL) values in the SA Groups 3,5,6 method blanks and the frequency at which they were found.

Water method blanks contained the following organic PAL compounds: B2EHP (2 of 2 samples at 6.6 $\mu$g/l), toluene (4 of 36 samples at 0.5 to 0.51 $\mu$g/l), chloroform (16 of 36 samples at 0.5 to 1.3 $\mu$g/l), 1,1,1-TCA (6 of 36 samples at 1.1 to 2.5 $\mu$g/l).

Soil method blanks contained the following organic PAL compounds: toluene (2 of 2 samples at 0.2 $\mu$g/g), B2EHP (2 of 26 samples at 1.1 $\mu$g/g), acetone (2 of 48 samples at 0.036 $\mu$g/g), TCFM (4 of 48 samples at 0.008 $\mu$g/g), and chloroform (2 of 48 samples at 0.002 $\mu$g/g).

SVOCs

USAEC methods LM18 and UM18 were used to analyze method blanks in soil and water, respectively. Toluene and B2EHP are listed in the USEPA SOW as common laboratory contaminants. These contaminants, when detected in sample results at similar concentrations, are probably representative of laboratory contamination. Other SVOC compounds detected in soil and water method blanks were 1,2-Epoxycyclohexene, mesityl oxide and several unknown compounds. These non-target compounds should also be considered as laboratory contaminants when seen in sample data at similar concentrations.

VOCs

USAEC methods LM19 and UM20 were used to analyze soil and water method blanks for VOCs. Acetone, trichlorofluoromethane, chloroform and one unknown compound were detected in the soil method blanks. Acetone and chloroform are defined as common laboratory contaminants in the USEPA SOW. Trichlorofluoromethane, although not included in this list is also frequently used as a solvent in laboratories. These compounds can be considered as laboratory introductions when observed in similar concentrations to those in the method blank data.

1,1,1-Trichloroethane, toluene and chloroform were reported in the water method blanks. Toluene and chloroform, as stated previously, are common laboratory contaminants. Their presence in similar concentrations as sample results should be attributed to this introduction rather than site contamination. The presence of 1,1,1-trichloroethane has also been attributed to laboratory contamination per conversations with ESE Laboratory personnel. The problem was persistent for several months. (ABB-ES, 1993)

# 5.0 PRELIMINARY HUMAN HEALTH RISK EVALUATION

## 5.1 SOILS

The human health PRE considered all soils to a depth of 3 feet as accessible under a residential future use exposure scenario. This approach is conservative (i.e., health protective) because the most likely future use of SA 30 is as an airfield. All subsurface soil (defined as 3-10 feet in depth) was considered as accessible under a commercial/industrial future use exposure scenario.

### 5.1.1 Surface Soils

Table 5-1 presents summary statistics on surface soil at SA 30 and USEPA Region III residential soil concentrations for comparison. Surface soil at SA 30 is represented by samples 30B-92-01X to 30B-92-08X, G6M-92-02X, and G6M-92-03X. An assessment of the inorganic data for SA 30 soils showed that there is no apparent gross contamination present. Additionally, these is no clear areal or depth concentration pattern. Maximum detected concentrations of beryllium, copper, lead, and zinc exceed the statistical background. However, for copper, lead, and zinc, their average concentrations are below the statistical background. Beryllium average concentration of 0.66 $\mu g/g$ and maximum concentration of 0.85 $\mu g/g$ are near the statistical background concentration of 0.357 $\mu g/g$.

The maximum detected concentrations of all but two inorganic analytes (arsenic and beryllium) are below the USEPA Region III residential soil concentrations. Although arsenic was detected at a concentration above the residential soil concentration, its average and maximum detected concentrations are below the statistical background. The average of detected concentrations of beryllium (0.66 $\mu g/g$) is essentially equal to the USEPA Region III commercial/industrial soil concentration of 0.67 $\mu g/g$. In the case of SA 30, the commercial/industrial soil concentrations are actually more appropriate for comparison than the residential soil concentrations.

Of the organic compounds detected in surface soil at SA 30, six analytes were detected at concentrations above the USEPA Region III residential soil concentrations. These include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

Soil boring locations 30B-92-01X through 05X and monitoring well boring location G6M-92-02X are in the west drum storage area. Samples at all depths from these borings show little, if any, organic compound contamination (including TPHC).

Soil boring locations 30B-92-06X through 08X and monitoring well soil boring location G6M-92-03X are in the east drum storage area. The PAHs reported above are the primary organic compounds in the area soils. In general, organic compound detections were limited to the surficial soil sample at each sampling location. This pattern is indicative of the deposition of airborne combustion products, most likely from aircraft engines at the airfield as opposed to SA 30 activities as detailed in Section 4.1.

When considering the SA activity-derived aromatic compounds (toluene and xylene), the USEPA Region III Risk-Based Concentration Table values are many orders of magnitude above the concentrations found in the SA during the SI activity.

### 5.1.2 Subsurface Soil

Table 5-2 presents summary statistics on subsurface soil at SA 30, and USEPA Region III commercial/industrial soil concentrations for comparison. Subsurface soil at SA 30 is represented by sampling 30B-92-01X to 30B-92-08X, G6M-92-02X and G6M-92-03X.

Only one analyte in Table 5-2, arsenic, was detected at a concentration above its respective USEPA Region III commercial/industrial soil concentration. Although the average (8.3 $\mu$g/g) and maximum (16 $\mu$g/g) detected arsenic concentrations exceed the commercial/industrial soil concentrations of 1.6 $\mu$g/g, both are below the base-wide statistical background concentration of 21.1 $\mu$g/g.

## 5.2 GROUNDWATER

Table 5-3 presents summary statistics on groundwater around SA 30 and drinking water standards and guidelines for comparison. Monitoring well locations G6M-92-02X and 03X have been used to define the groundwater quality in the vicinity of the former drum storage areas. Organic contaminants in soils at the subject areas were not detected in groundwater during the SI. Only one organic analyte, B2EHP, was detected in SA 30 monitoring wells. It was detected at concentrations (17.0 and 33.0 micrograms per liter [$\mu$g/l]) that exceed the USEPA Region III tap water concentration (6.1 $\mu$g/l) but is suspected as being a laboratory-introduced contaminant as described in Section 4.4. Three inorganic analytes, aluminum, iron, and manganese, were detected at maximum concentrations that exceed their respective drinking water standard or guideline. For all three inorganics, only secondary MCLs have been promulgated. No health-based drinking water standards exist for these compounds. It should also be noted that the maximum detected concentrations of these compounds are well below the statistical background levels.

## 6.0 PRELIMINARY ECOLOGICAL RISK EVALUATION

SA 30 consists of two small areas of broken pavement and mowed grassy areas, located approximately 650 feet apart from one-another, at the northern end of the MAAF. The two portions of SA 30 (the east and west drum storage areas) are connected by a paved driveway and are bordered to the north by a chain-link fence atop a slope adjacent to the Nashua River. Non-paved portions of SA 30 are devoid of woody cover and contain herbaceous species typical of disturbed old field uplands, including goldenrod (*Solidago* sp.), various grass species, evening primrose (*Oenothera biennis*), and shepherd's purse (*Capsella bursa-pastoris*).

Because of the limited habitat available at this site, minimal use of SA 30 by resident or migratory wildlife species is anticipated. However, occasional American robins (*Turdus migratorius*) and small mammals may periodically forage at this site. A review of the Fort Devens rare and endangered species database indicates that no rare or endangered species are known to occur in the vicinity of MAAF.

Ten surface soil samples were obtained at SA 30 (from stations 30B-92-01X through 30B-92-08X, G6M-92-02X, and G6M-92-03X). Twenty organic compounds were detected, including toluene, xylenes, and 18 SVOCs. All detected organic analytes were chosen as CPCs. The maximum concentrations of beryllium, copper, lead, and zinc exceeded background concentrations; therefore, these four inorganics were chosen as CPCs. Although SA 30 contains little ecological habitat, a potential contaminant exposure pathway exists for terrestrial receptors via incidental surface soil ingestion and terrestrial food web exposure. A screening-level evaluation of potential effects from surface soil exposure was conducted by comparing the maximum CPC concentrations to their respective surface soil benchmark values (protective contaminant levels [PCLs]) (Table 6-1). Of the four inorganic CPCs, only lead occurred at a concentration (45.0 $\mu$g/g) in excess of its respective surface soil PCL. However, because of the rare occurrence of lead in surface soil above the PCL (once in 11 samples), lead is not considered to be posing significant ecological risks at SA 30.

The maximum levels of benzo(a)pyrene and benzo(a)anthracene at SA 30 exceeded the PCLs derived for these two analytes. Benzo(a)pyrene was found in three of ten surface soil samples at concentrations ranging from 1.2 to 20 $\mu$g/g. Benzo(a)anthracene was found in four of ten surface soil samples at concentrations ranging from 0.91 to 10 $\mu$g/g. The average benzo(a)anthracene concentration at SA 30 is 5.7 $\mu$g/g, considerably less than the PCL of 8.9 $\mu$g/g established for this analyte. Although the PCLs used as screening tools in this ecological PRE were the values derived for the short-tailed shrew, the dry and disturbed conditions at SA 30 are unlikely to provide any habitat for this insectivorous mammal. The maximum concentrations of benzo(a)pyrene and benzo(a)anthracene detected at SA 30 are well below the respective PCLs derived for all other receptor species evaluated in the food web model. Furthermore, the lack of suitable habitat minimizes any risks to ecological receptors from these two SVOCs.

# 7.0 CONCLUSIONS

No further action is recommended for SA 30. This recommendation is based on historical site use as confirmed by physical observations, sampling, and chemical analysis. It is also based on the results of a PRE.

The primary concerns in SA 30 have been the residual contamination due to releases from leaking drums. Sampling and analysis during the SI confirmed that some soil contamination may have been derived from VOCs possibly associated with paint or paint thinners; however, the ecological and human health PREs found no unacceptable risk associated with these contaminants. PAH concentrations detected in surficial soils exceeded both human health and ecological guidelines, but are likely the result of combustion product deposition and not historical SA 30 activities as detailed in Section 4.1. Water samples from monitoring well locations G6M-92-02X and G6M-92-03X in the subject areas do not indicate that contamination from former drum storage has impacted groundwater. B2EHP was detected in groundwater samples collected from these wells, but was only detected during Round 2 and is suspected to be a laboratory-introduced contaminant as detailed in Section 4.4.

| | |
|---|---|
| ABB-ES | ABB Environmental Services, Inc. |
| AREE 70 | Area Requiring Environmental Evaluation 70 |
| B2EHP | bis(2-ethylhexyl)phthalate |
| bgs | below ground surface |
| BRAC | Defense Base Realignment and Closure Act of 1990 |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CPC | chemical of potential concern |
| CRL | Certified Reporting Limit |
| DOD | U.S. Department of Defense |
| ESE | Environmental Science and Engineering, Inc. |
| FESA | Federal Endangered Species Act |
| ft | foot or feet |
| gpm | gallons per minute |
| IRP | Installation Restoration Program |
| MAAF | Moore Army Airfield |
| MCL | Maximum Contaminant Level |
| MEP | Master Environmental Plan |
| MESA | Massachusetts Endangered Species Act |
| MNHP | Massachusetts Natural Heritage Program |
| MSL | mean sea level |
| PA | Enhanced Preliminary Assessment |
| PAH | polynuclear aromatic hydrocarbon |
| PAL | Project Analyte List |
| PCL | protective contaminant level |
| PID | photoionization detector |
| PRE | Preliminary Risk Evaluation |

## GLOSSARY OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| SA | study area |
| SI | site investigation |
| SOW | Statement of Work |
| SVOC | semivolatile organic compounds |
| | |
| TCA | trichloroethane |
| TCFM | trichlorofluoromethane |
| TCL | target compound list |
| TPHC | total petroleum hydrocarbon compound |
| TSS | total suspended solids |
| | |
| $\mu g/g$ | micrograms per gram |
| $\mu g/l$ | micrograms per liter |
| USAEC | U.S. Army Environmental Center |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| | |
| VOC | volatile organic compound |

ABB Environmental Services, Inc. (ABB-ES), 1993. "Final Site Investigation Report - Groups 3, 5, & 6, Fort Devens, Massachusetts; Data Item A009; prepared for U.S. Army Environmental Center; prepared by ABB Environmental Services, Inc., Wakefield, MA; April.

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U.S. Environmental Protection Agency (USEPA), 1989. "Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites"; OSWER Directive #9355.4-02; September 7, 1989.

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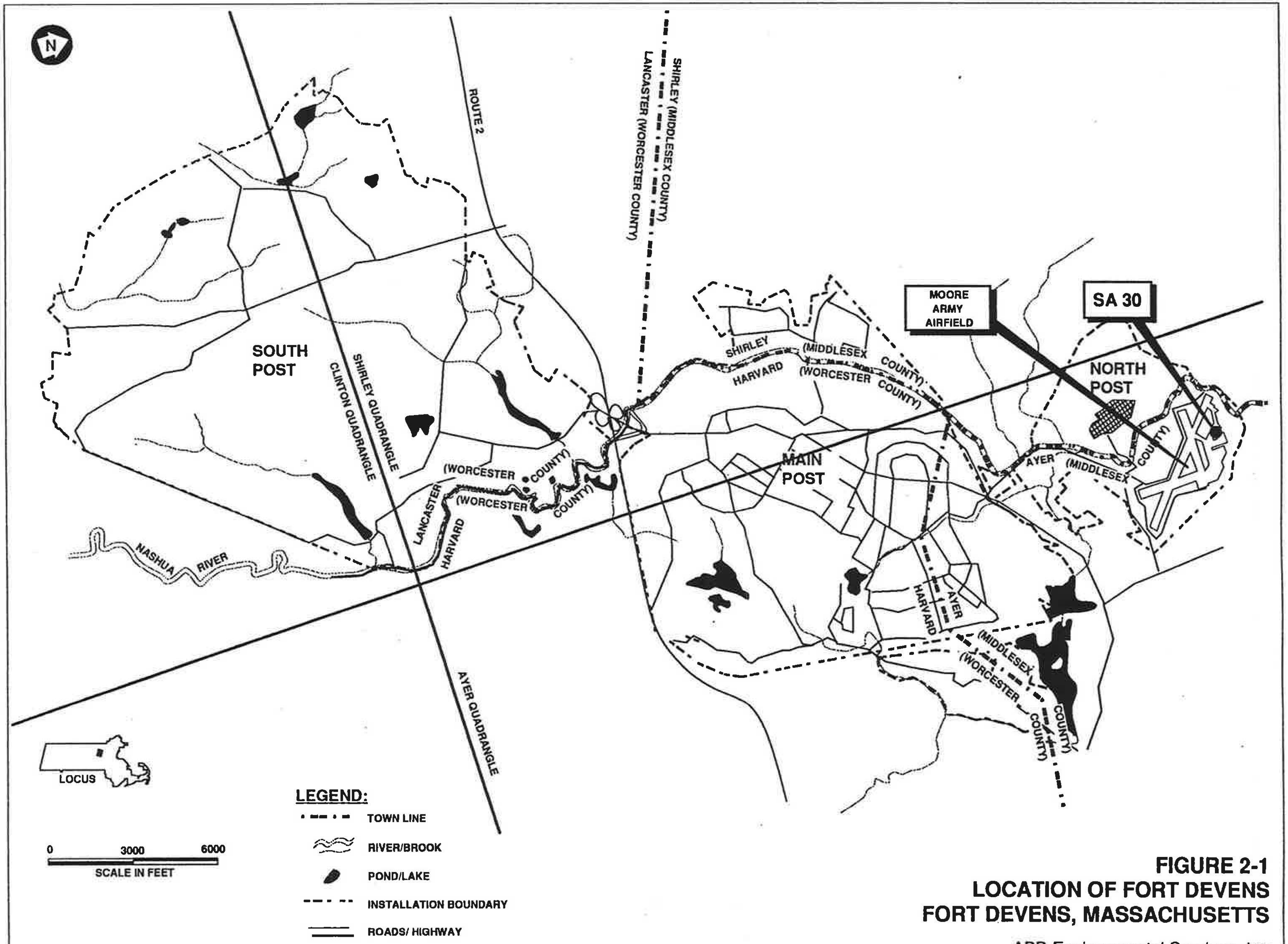

FIGURE 2-1
LOCATION OF FORT DEVENS
FORT DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.

7053-07 A

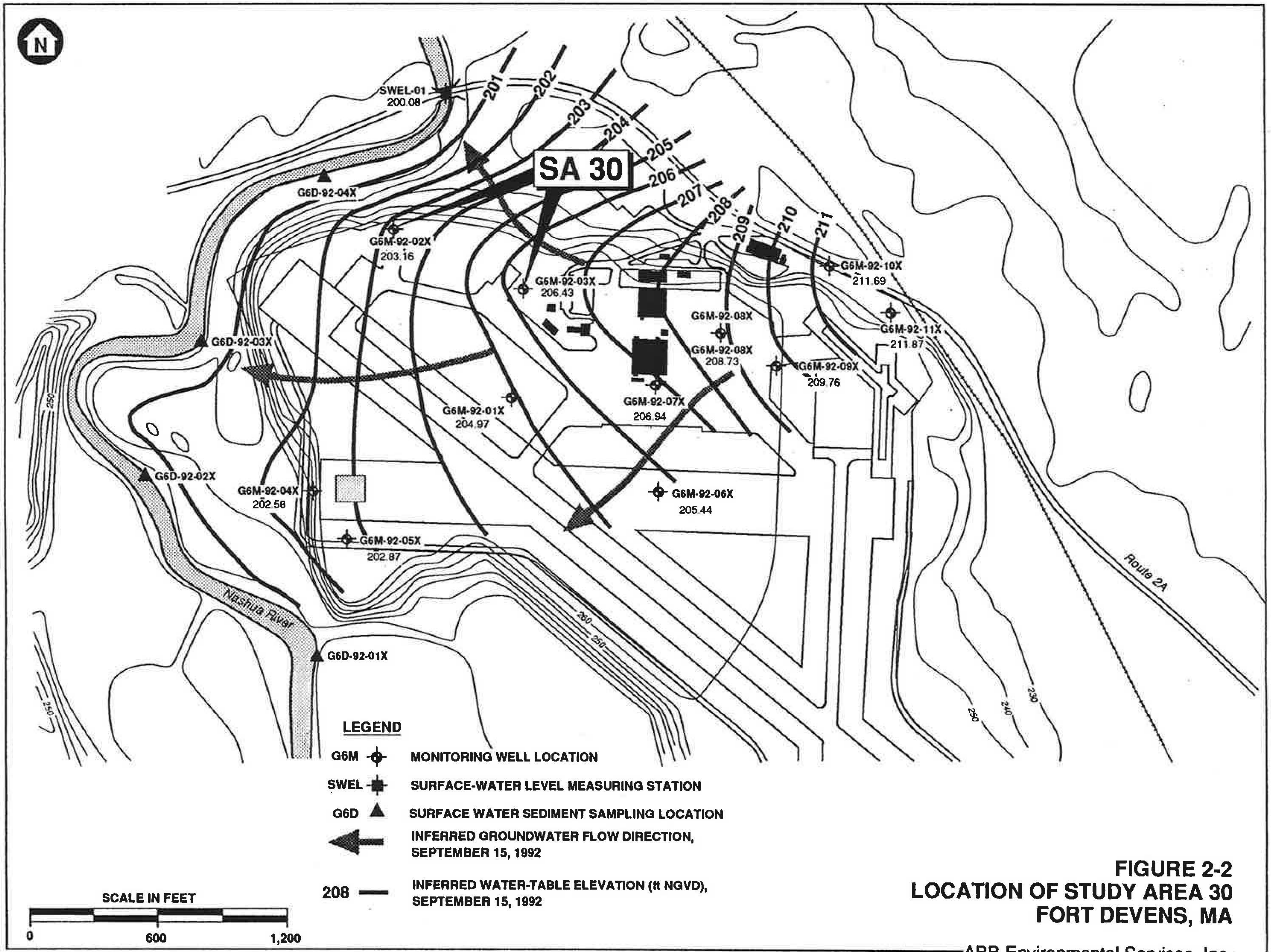

FIGURE 2-2
LOCATION OF STUDY AREA 30
FORT DEVENS, MA

6917-07(a)-123 567

ABB Environmental Services, Inc.

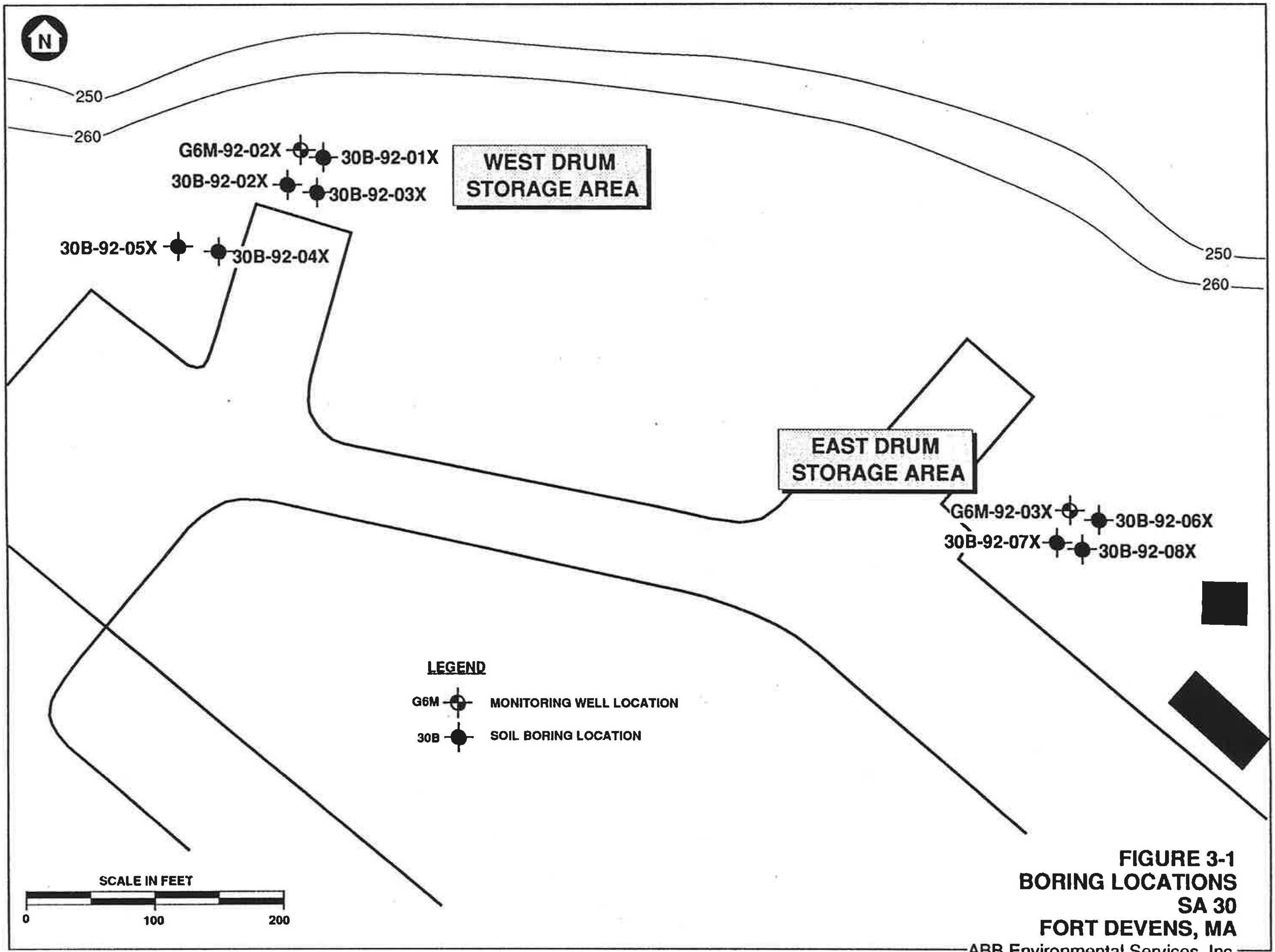

**FIGURE 3-1**
**BORING LOCATIONS**
**SA 30**
**FORT DEVENS, MA**

ABB Environmental Services, Inc.

6917-07(e)12

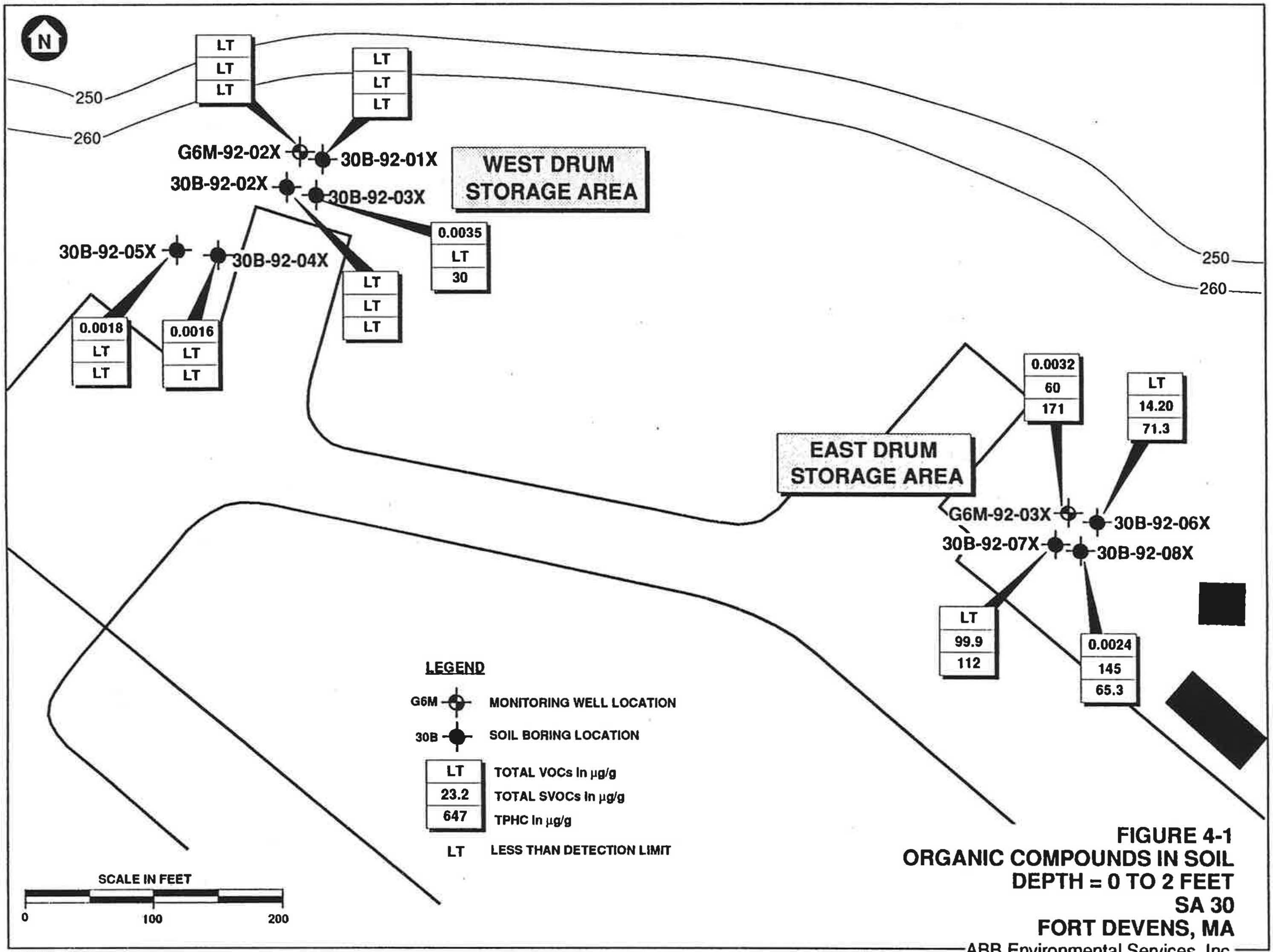

**FIGURE 4-1**
**ORGANIC COMPOUNDS IN SOIL**
**DEPTH = 0 TO 2 FEET**
**SA 30**
**FORT DEVENS, MA**

ABB Environmental Services, Inc.

6917-07(e)123

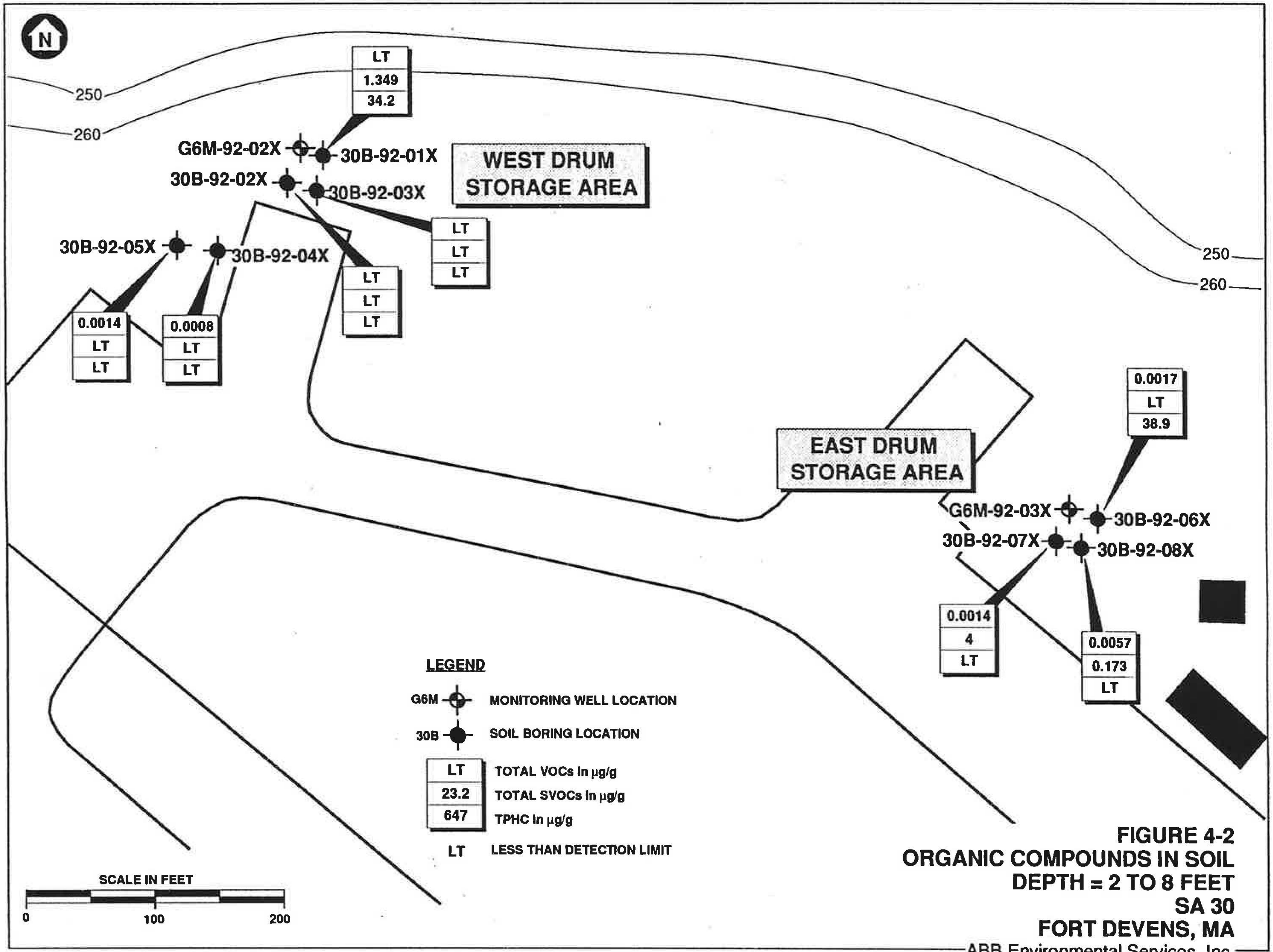

FIGURE 4-2
ORGANIC COMPOUNDS IN SOIL
DEPTH = 2 TO 8 FEET
SA 30
FORT DEVENS, MA

ABB Environmental Services, Inc.

6917-07(e)124

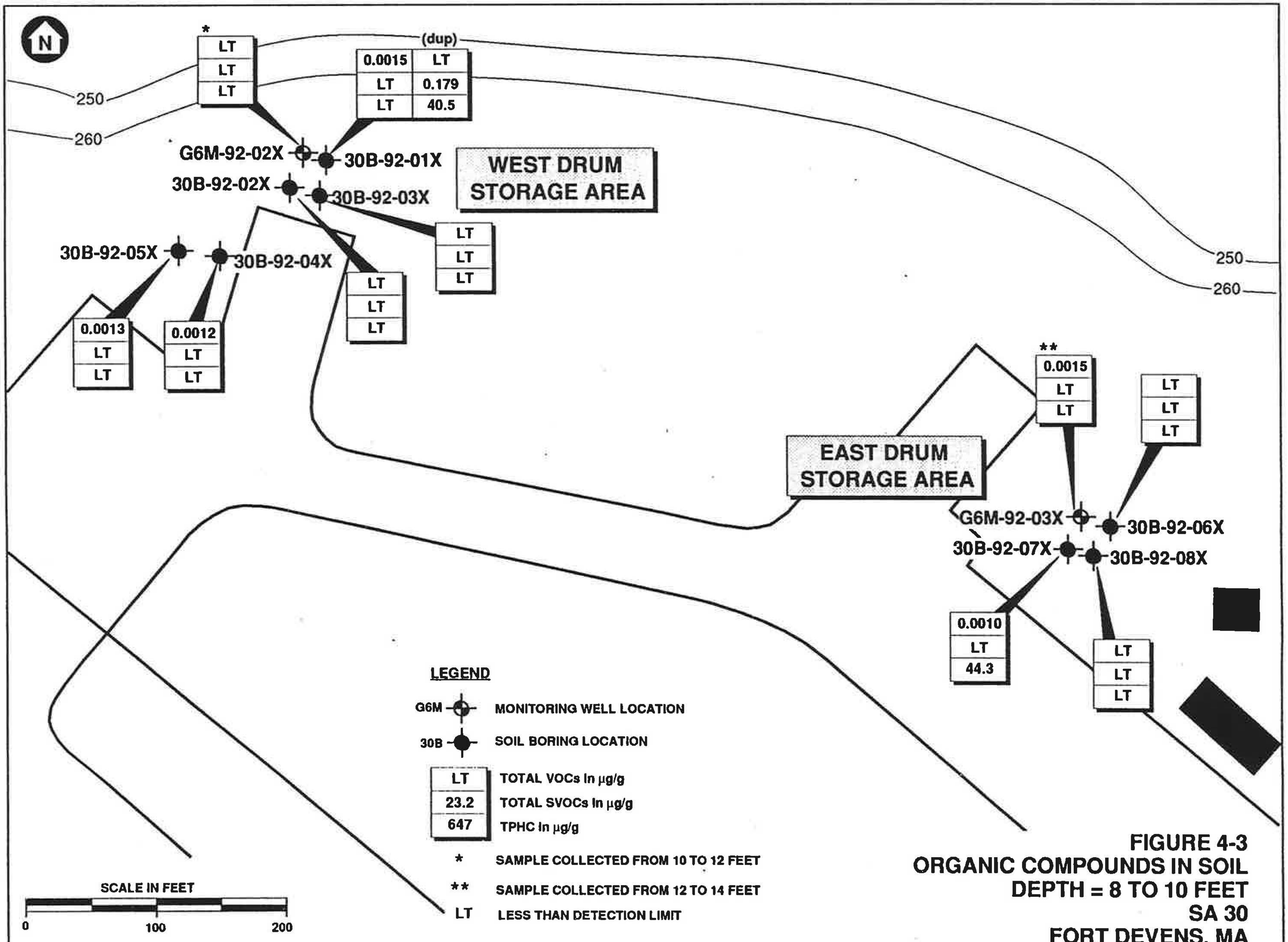

FIGURE 4-3
ORGANIC COMPOUNDS IN SOIL
DEPTH = 8 TO 10 FEET
SA 30
FORT DEVENS, MA

ABB Environmental Services, Inc.

6917-07(e)125

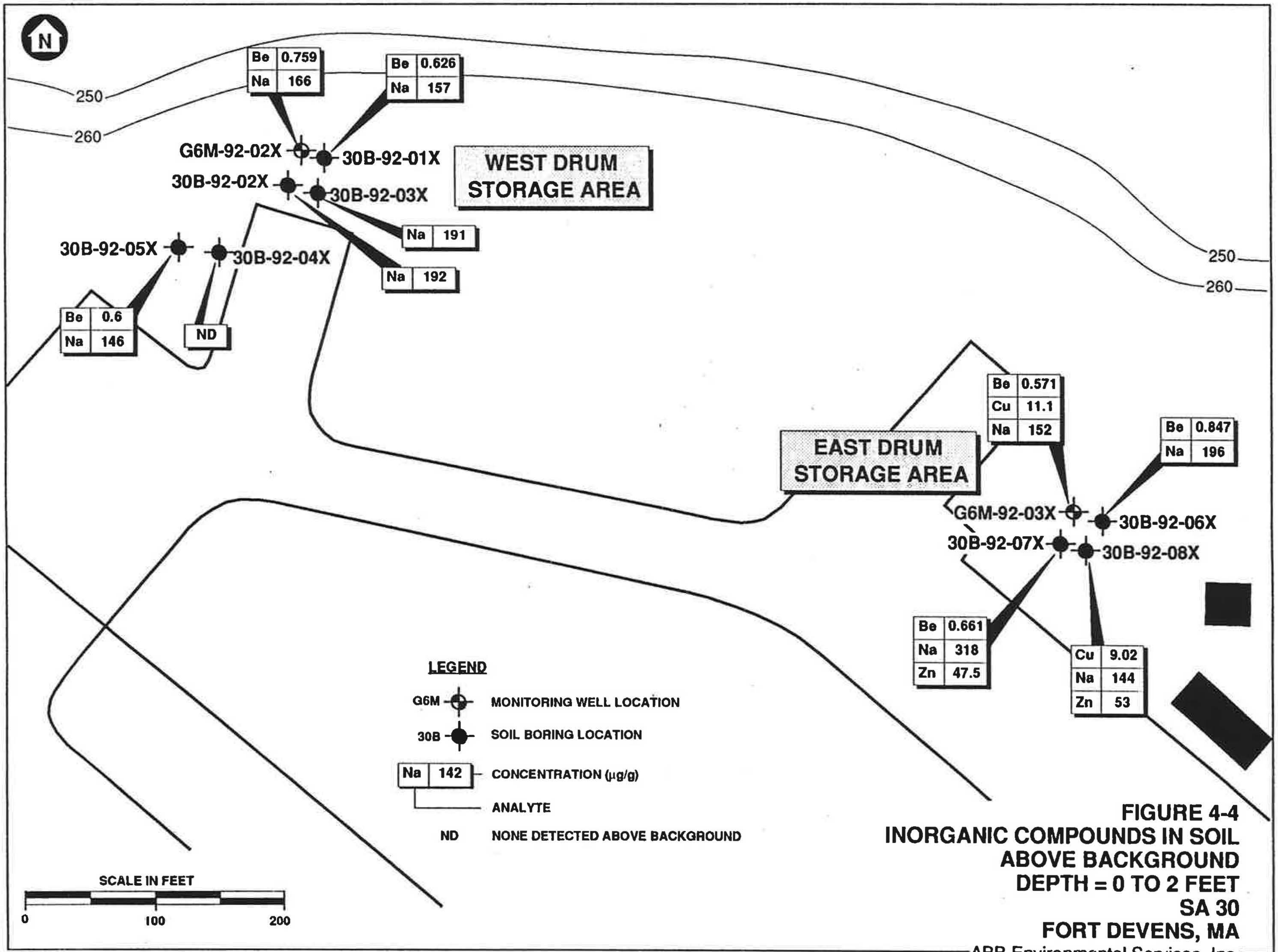

FIGURE 4-4
INORGANIC COMPOUNDS IN SOIL ABOVE BACKGROUND
DEPTH = 0 TO 2 FEET
SA 30
FORT DEVENS, MA

ABB Environmental Services, Inc.

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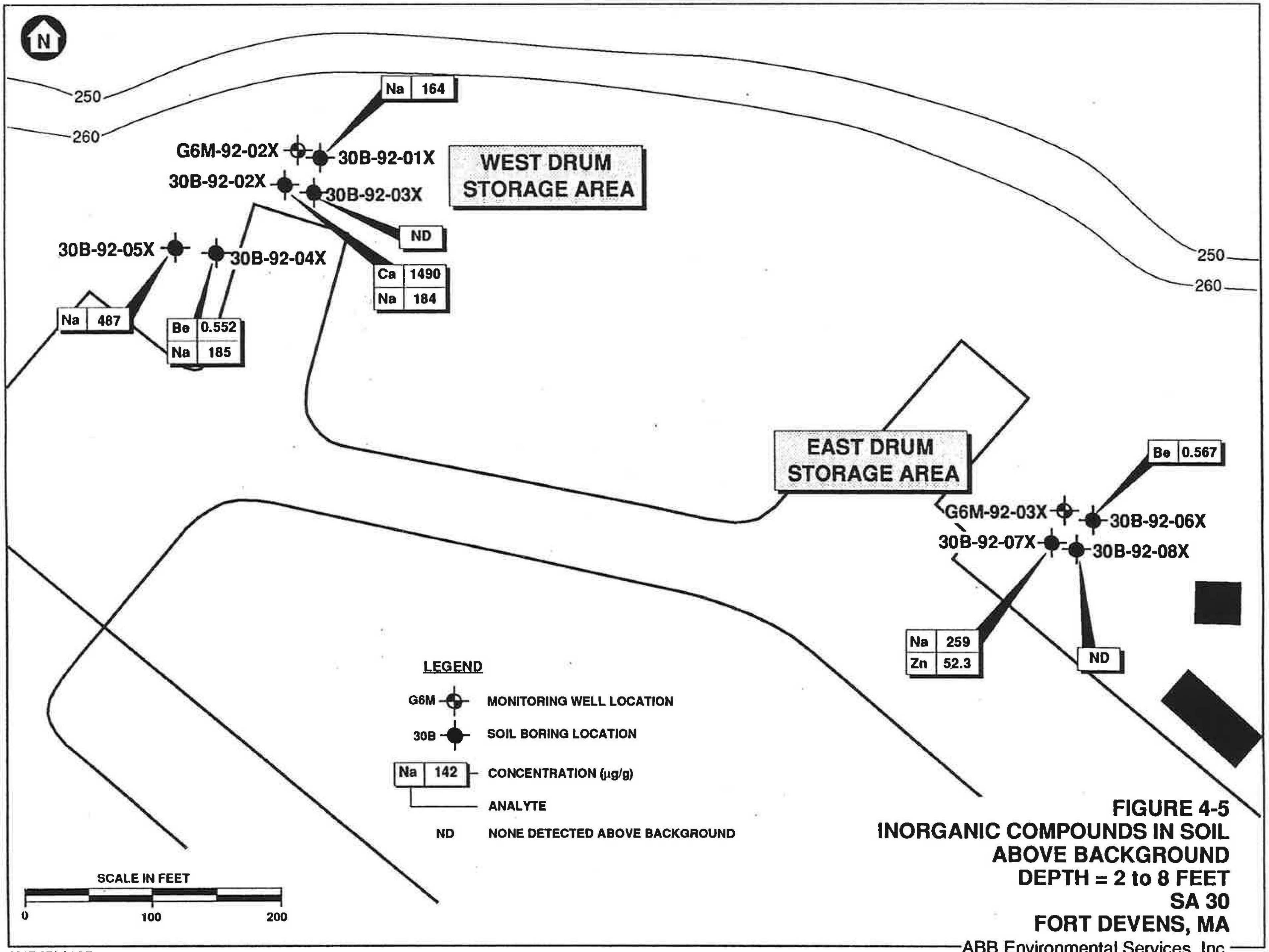

FIGURE 4-5
INORGANIC COMPOUNDS IN SOIL
ABOVE BACKGROUND
DEPTH = 2 to 8 FEET
SA 30
FORT DEVENS, MA

ABB Environmental Services, Inc.

6917-07(e)127

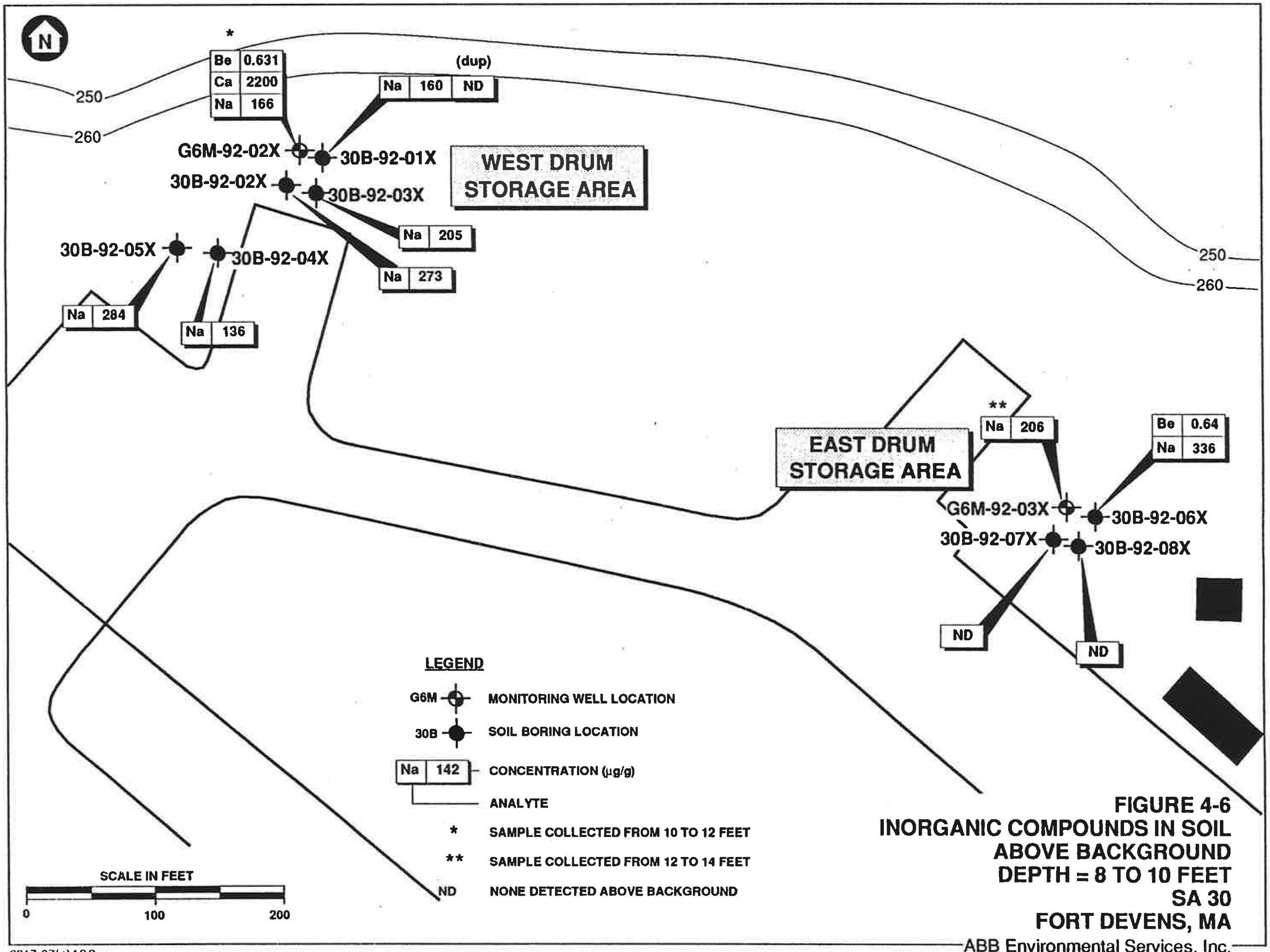

FIGURE 4-6
INORGANIC COMPOUNDS IN SOIL ABOVE BACKGROUND
DEPTH = 8 TO 10 FEET
SA 30
FORT DEVENS, MA

ABB Environmental Services, Inc.

6917-07(e)128

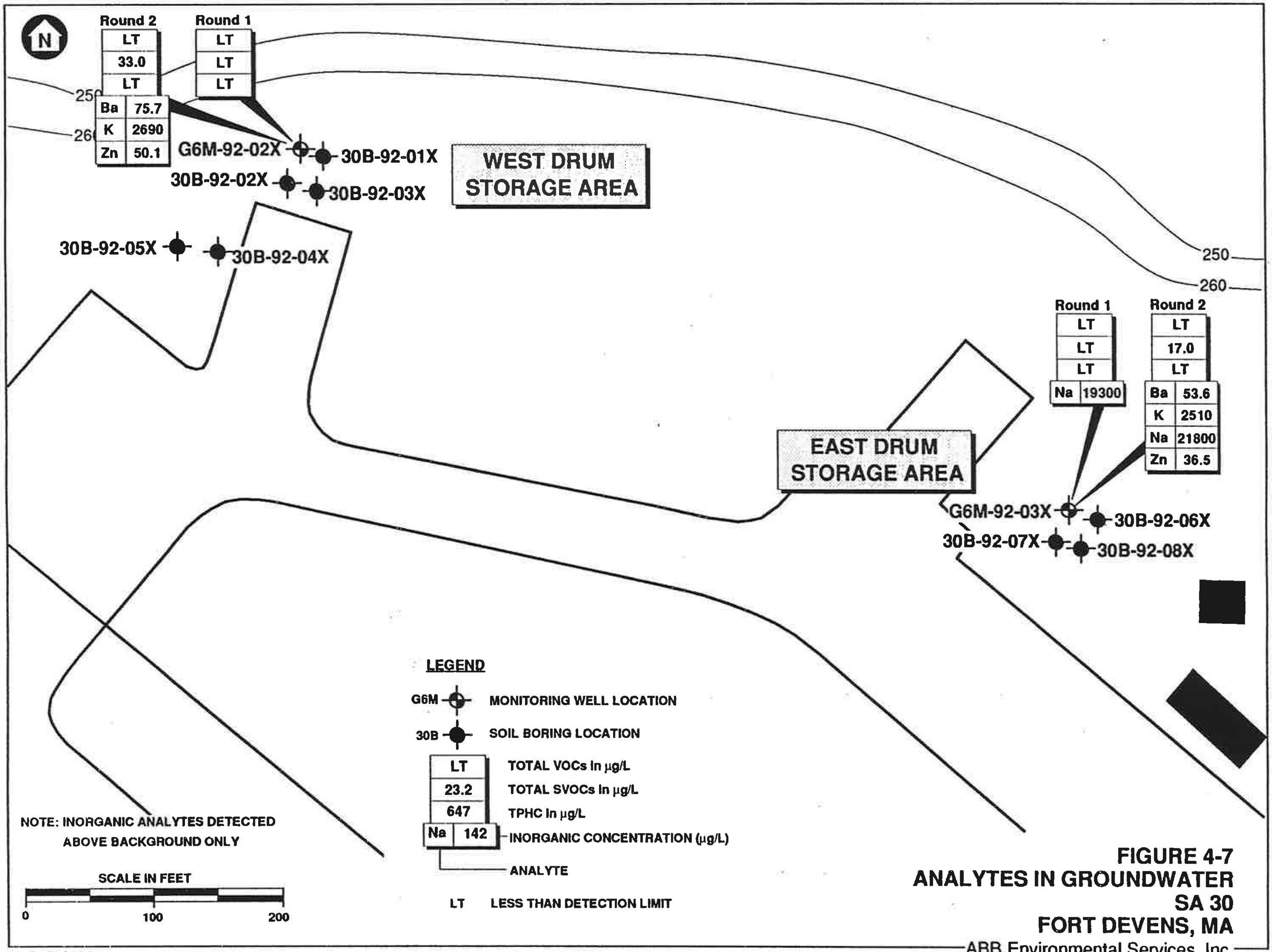

**FIGURE 4-7**
**ANALYTES IN GROUNDWATER**
**SA 30**
**FORT DEVENS, MA**

ABB Environmental Services, Inc.

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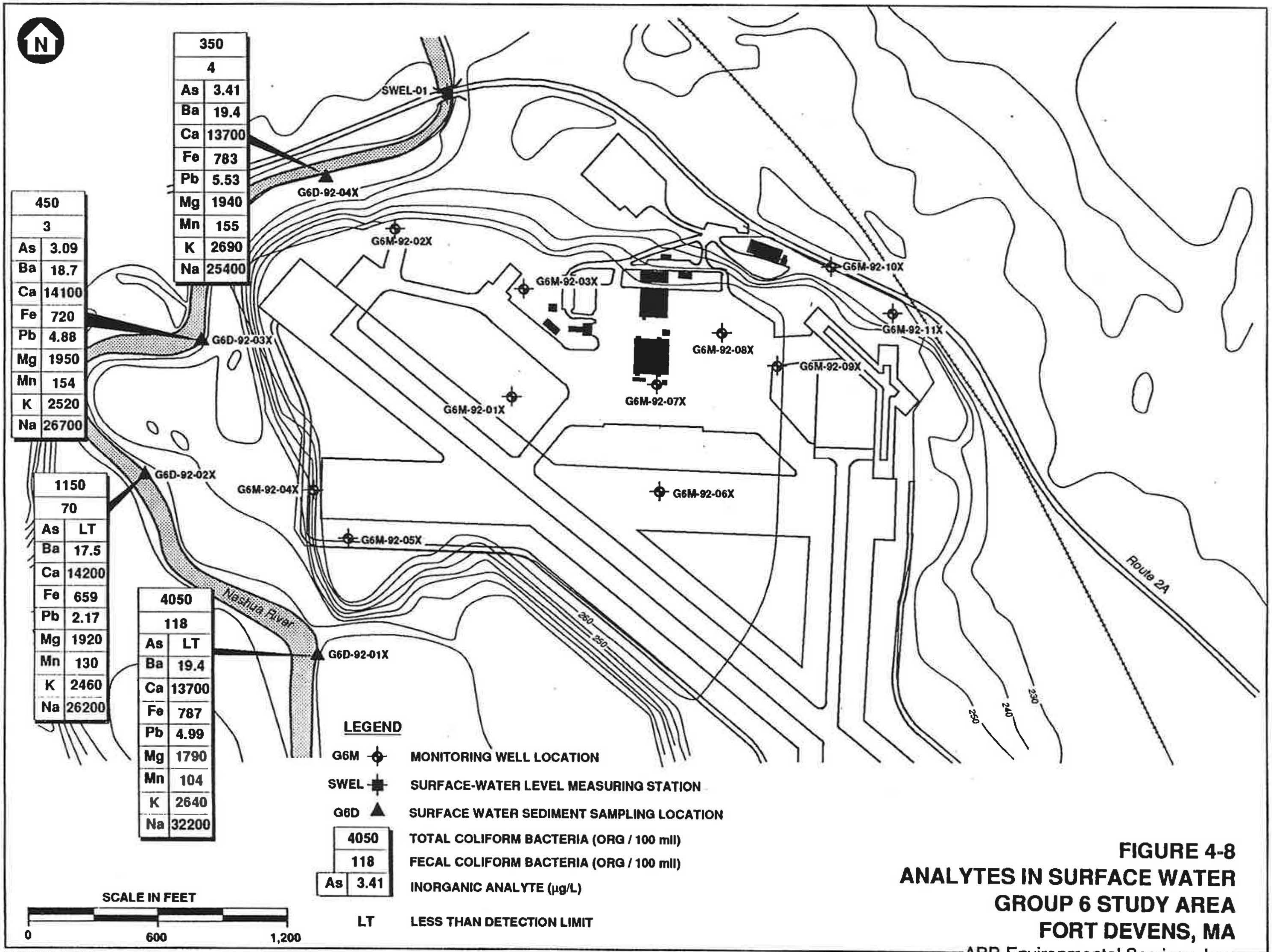


G6D-92-04X

| | |
|---|---|
| 350 | |
| 4 | |
| As | 3.41 |
| Ba | 19.4 |
| Ca | 13700 |
| Fe | 783 |
| Pb | 5.53 |
| Mg | 1940 |
| Mn | 155 |
| K | 2690 |
| Na | 25400 |

G6D-92-03X

| | |
|---|---|
| 450 | |
| 3 | |
| As | 3.09 |
| Ba | 18.7 |
| Ca | 14100 |
| Fe | 720 |
| Pb | 4.88 |
| Mg | 1950 |
| Mn | 154 |
| K | 2520 |
| Na | 26700 |

G6D-92-02X

| | |
|---|---|
| 1150 | |
| 70 | |
| As | LT |
| Ba | 17.5 |
| Ca | 14200 |
| Fe | 659 |
| Pb | 2.17 |
| Mg | 1920 |
| Mn | 130 |
| K | 2460 |
| Na | 26200 |

G6D-92-01X

| | |
|---|---|
| 4050 | |
| 118 | |
| As | LT |
| Ba | 19.4 |
| Ca | 13700 |
| Fe | 787 |
| Pb | 4.99 |
| Mg | 1790 |
| Mn | 104 |
| K | 2640 |
| Na | 32200 |

**FIGURE 4-8**
**ANALYTES IN SURFACE WATER**
**GROUP 6 STUDY AREA**
**FORT DEVENS, MA**

6917-07(a)-123 0

ABB Environmental Services, Inc.

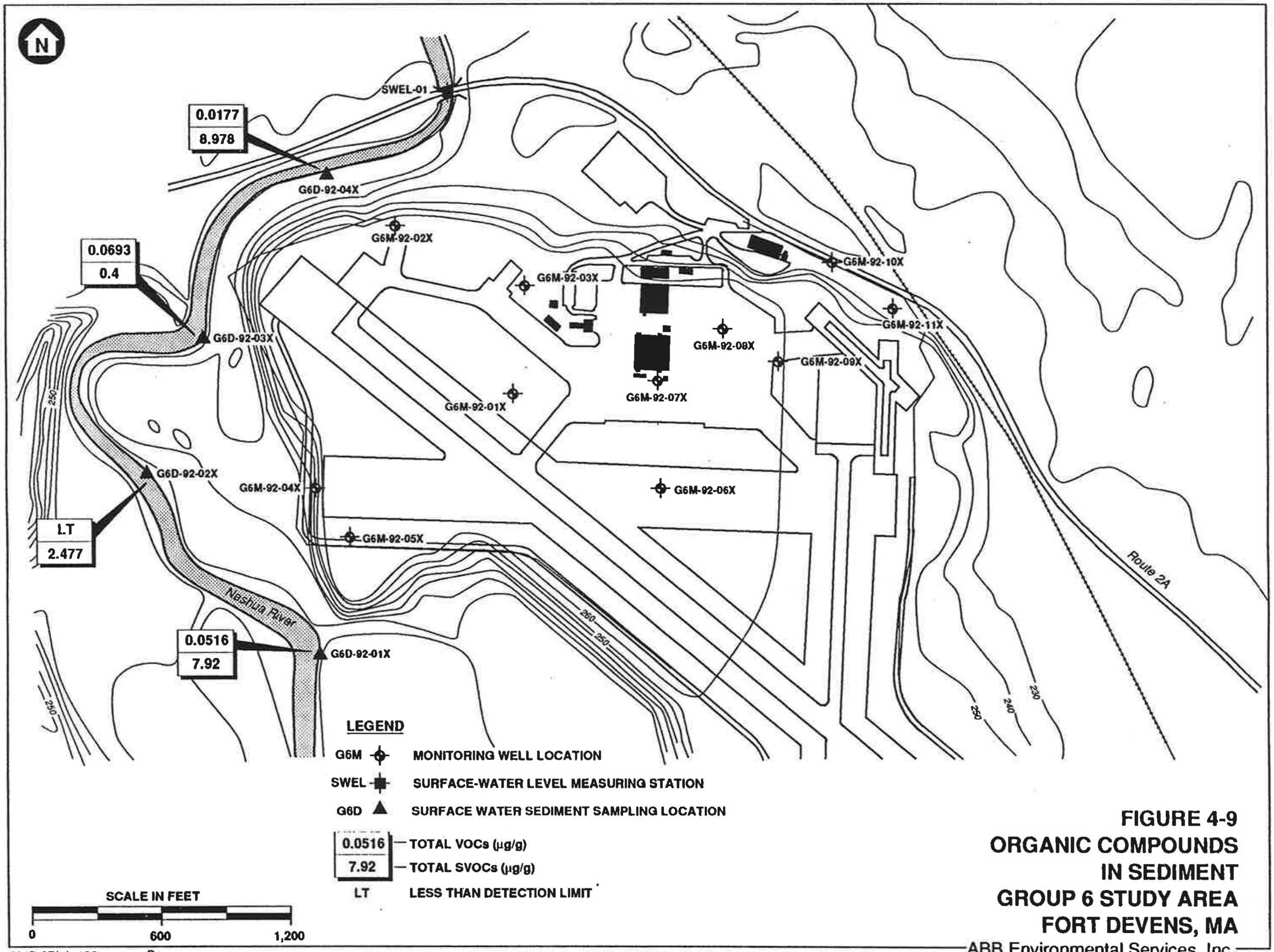
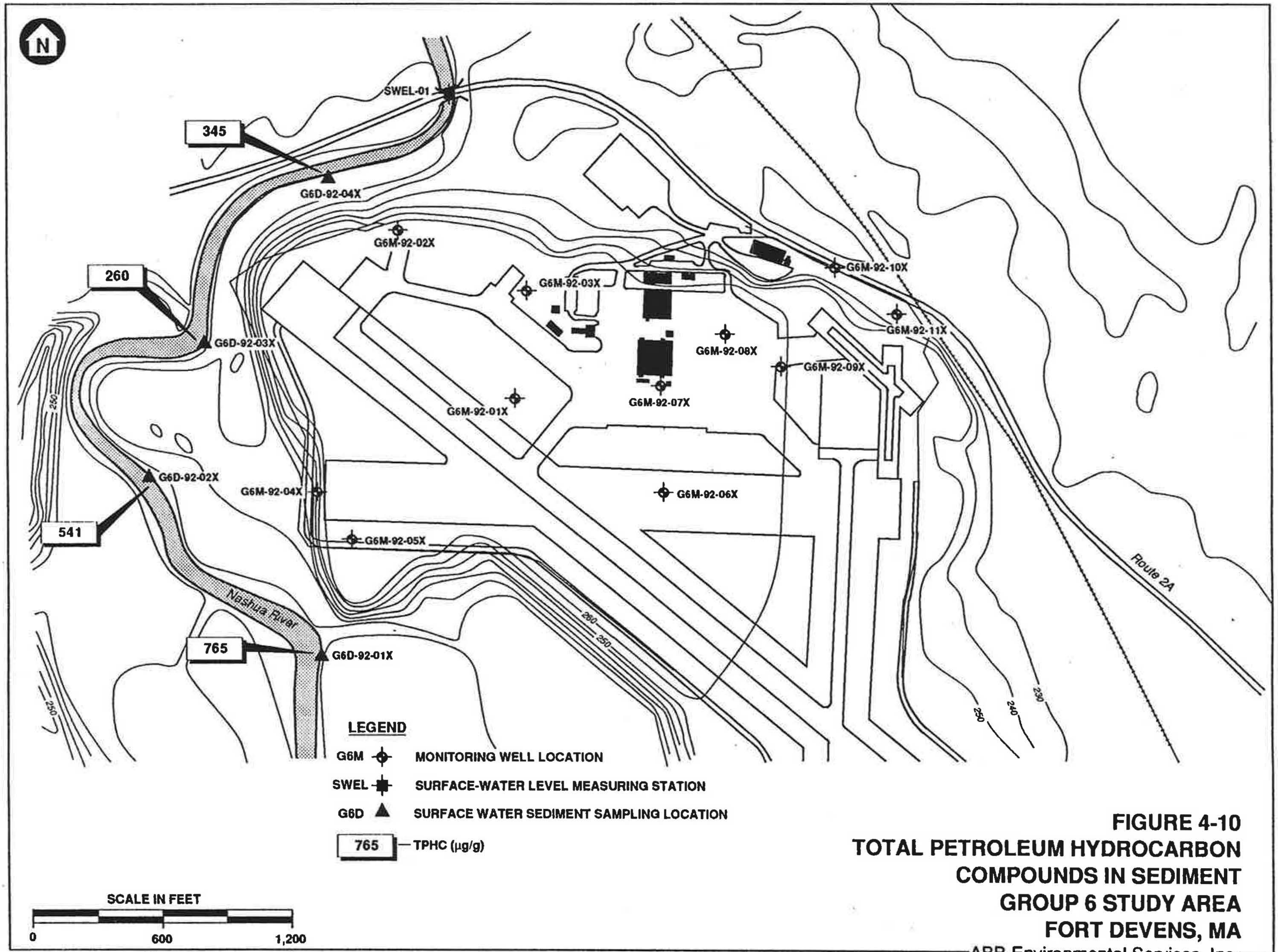


FIGURE 4-9
ORGANIC COMPOUNDS
IN SEDIMENT
GROUP 6 STUDY AREA
FORT DEVENS, MA

ABB Environmental Services, Inc.

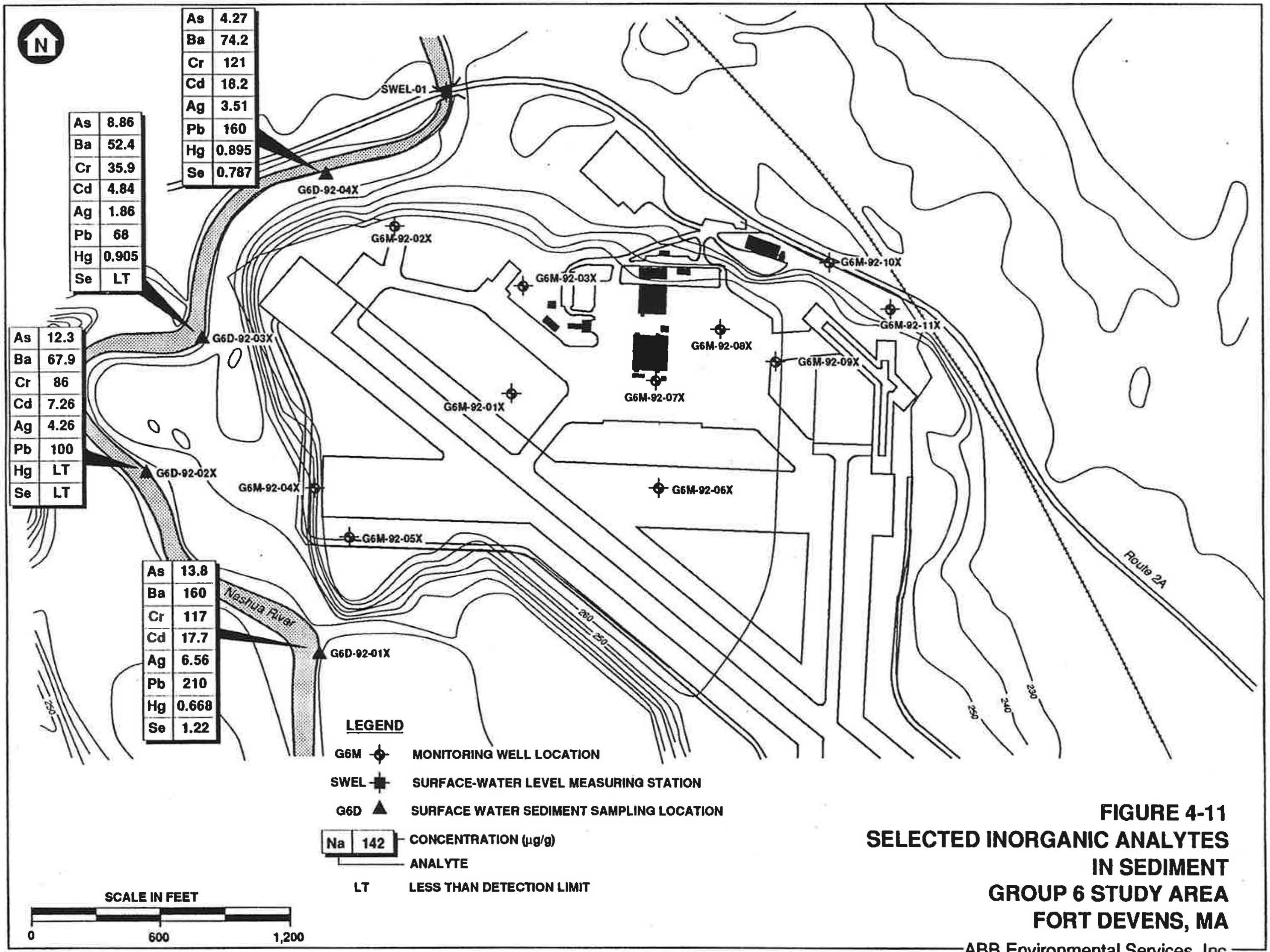
6917-07(a) -123 B



## FIGURE 4-10
## TOTAL PETROLEUM HYDROCARBON COMPOUNDS IN SEDIMENT
## GROUP 6 STUDY AREA
## FORT DEVENS, MA

ABB Environmental Services, Inc.

6917-07(a) -123 A



| | |
|---|---|
| As | 4.27 |
| Ba | 74.2 |
| Cr | 121 |
| Cd | 18.2 |
| Ag | 3.51 |
| Pb | 160 |
| Hg | 0.895 |
| Se | 0.787 |

| | |
|---|---|
| As | 8.86 |
| Ba | 52.4 |
| Cr | 35.9 |
| Cd | 4.84 |
| Ag | 1.86 |
| Pb | 68 |
| Hg | 0.905 |
| Se | LT |

| | |
|---|---|
| As | 12.3 |
| Ba | 67.9 |
| Cr | 86 |
| Cd | 7.26 |
| Ag | 4.26 |
| Pb | 100 |
| Hg | LT |
| Se | LT |

| | |
|---|---|
| As | 13.8 |
| Ba | 160 |
| Cr | 117 |
| Cd | 17.7 |
| Ag | 6.56 |
| Pb | 210 |
| Hg | 0.668 |
| Se | 1.22 |

**LEGEND**

| | |
|---|---|
| G6M ⊕ | MONITORING WELL LOCATION |
| SWEL ■ | SURFACE-WATER LEVEL MEASURING STATION |
| G6D ▲ | SURFACE WATER SEDIMENT SAMPLING LOCATION |
| Na 142 | CONCENTRATION (μg/g) |
| | ANALYTE |
| LT | LESS THAN DETECTION LIMIT |

## FIGURE 4-11
## SELECTED INORGANIC ANALYTES IN SEDIMENT
## GROUP 6 STUDY AREA
## FORT DEVENS, MA

ABB Environmental Services, Inc.

6917-07(a)-123 9

# TABLE 4-1
## ORGANIC COMPOUNDS IN SOIL
## STUDY AREA 30 – MOORE ARMY AIRFIELD DRUM STORAGE AREA
## DECISION DOCUMENT
## FORT DEVENS

| ANALYTE | BORING | 30B-92-01X | | | | 30B-92-02X | | | 30B-92-03X | | | 30B-92-04X | | | 30B-92-05X | | | 30B-92-06X | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DEPTH | 0 | 4 | 8 | 8D | 0 | 4 | 8 | 0 | 4 | 8 | 0 | 4 | 8 | 0 | 6 | 8 | 0 | 2 | 8 |
| **VOLATILES (ug/g)** | | | | | | | | | | | | | | | | | | | | |
| TOLUENE | | <0.00078 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | 0.0016 | 0.00084 | 0.0012 | 0.0018 | 0.0014 | 0.0013 | <0.00078 | 0.0017 | <0.00078 |
| XYLENES | | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | 0.0015 | <0.00150 | 0.0035 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 |
| **SEMIVOLATILES (ug/g)** | | | | | | | | | | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | | < 0.049 | 0.100 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 |
| ACENAPHTHENE | | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | 0.061 | < 0.036 | < 0.036 |
| ACENAPHTHYLENE | | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | 0.150 | < 0.033 | < 0.033 |
| ANTHRACENE | | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | 0.280 | < 0.033 | < 0.033 |
| BIS(2-EH)PHTHALATE | | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 |
| BENZO[A]ANTHRACENE | | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | 0.910 | < 0.170 | < 0.170 |
| BENZO[A]PYRENE | | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | 1.20 | < 0.250 | < 0.250 |
| BENZO[B]FLUORANTHENE | | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | 1.50 | < 0.210 | < 0.210 |
| BENZO[G,H,I]PERYLENE | | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | 0.710 | < 0.250 | < 0.250 |
| BENZO[K]FLUORANTHENE | | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | 1.00 | < 0.066 | < 0.066 |
| CARBAZOLE | | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | 0.170 | ND 0.033 | ND 0.033 |
| CHRYSENE | | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | 1.30 | <0.120 | <0.120 |
| DIBENZO[A,H]ANTHRACENE | | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | 0.260 | < 0.210 | < 0.210 |
| DIBENZOFURAN | | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | 0.083 | < 0.035 | < 0.035 |
| FLUORANTHENE | | < 0.068 | 0.250 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | 2.40 | < 0.068 | < 0.068 |
| FLUORENE | | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | 0.150 | < 0.033 | < 0.033 |
| INDENO[1,2,3-C,D]PYRENE | | <0.290 | <0.290 | <0.290 | <0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | 0.750 | < 0.290 | < 0.290 |
| NAPHTHALENE | | < 0.037 | 0.049 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | 0.074 | < 0.037 | < 0.037 |
| PHENANTHRENE | | < 0.033 | 0.430 | < 0.033 | 0.099 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | 1.10 | < 0.033 | < 0.033 |
| PYRENE | | < 0.033 | 0.520 | < 0.033 | 0.080 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | 2.10 | < 0.033 | < 0.033 |
| **OTHER (ug/g)** | | | | | | | | | | | | | | | | | | | | |
| TOTAL ORGANIC CARBON | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| TPHC | | < 28.3 | 34.2 | < 28.5 | 40.5 | < 28.5 | < 28.5 | < 28.5 | 30.0 | < 28.3 | < 28.3 | < 28.7 | < 28.5 | < 28.3 | < 28.5 | < 28.7 | < 28.3 | 71.3 | 38.9 | < 28.7 |

NOTES: TABLE LISTS DETECTED ANALYTES ONLY – SEE PROJECT ANALYTE LIST FOR SUMMARY
ND = NOT DETECTED
NA = NOT ANALYZED

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# TABLE 4–1 (continued)
# ORGANIC COMPOUNDS IN SOIL
# STUDY AREA 30 – MOORE ARMY AIRFIELD DRUM STORAGE AREA
# DECISION DOCUMENT
# FORT DEVENS

| ANALYTE | BORING | 30B–92–07X | | | 30B–92–08X | | | G6M–92–02X | | | | | G6M–92–03X | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DEPTH | 0 | 6 | 8 | 0 | 4 | 8 | 0 | 10 | 25 | 40 | 65 | 0 | 12 | 25 | 40 | 40D | 55 |
| **VOLATILES (ug/g)** | | | | | | | | | | | | | | | | | | |
| TOLUENE | | <0.00078 | 0.0014 | 0.0010 | 0.0024 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | <0.00078 | 0.0032 | 0.0015 | 0.0010 | 0.0017 | <0.00078 | <0.00078 |
| XYLENES | | <0.00150 | <0.00150 | <0.00150 | <0.00150 | 0.0057 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | 0.0042 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 | <0.00150 |
| **SEMIVOLATILES (ug/g)** | | | | | | | | | | | | | | | | | | |
| 2–METHYLNAPHTHALENE | | < 1.00 | < 0.200 | < 0.049 | < 1.00 | < 0.049 | < 0.049 | < 0.049 | < 0.200 | < 0.200 | < 0.049 | < 0.049 | < 1.00 | < 0.049 | < 0.049 | < 0.049 | < 0.049 | < 0.049 |
| ACENAPHTHENE | | < 0.700 | < 0.200 | < 0.036 | < 0.700 | < 0.036 | < 0.036 | < 0.036 | < 0.200 | < 0.200 | < 0.036 | < 0.036 | < 0.700 | < 0.036 | < 0.036 | < 0.036 | < 0.036 | < 0.036 |
| ACENAPHTHYLENE | | 1.00 | < 0.200 | < 0.033 | 1.00 | < 0.033 | < 0.033 | < 0.033 | < 0.200 | < 0.200 | < 0.033 | < 0.033 | < 0.700 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| ANTHRACENE | | 2.00 | < 0.200 | < 0.033 | 2.00 | < 0.033 | < 0.033 | < 0.033 | < 0.200 | < 0.200 | < 0.033 | < 0.033 | 1.00 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| BIS(2–EH)PHTHALATE | | < 10.0 | 4.00 | < 0.620 | < 10.0 | < 0.620 | < 0.620 | < 0.620 | < 3.00 | < 3.00 | < 0.620 | < 0.620 | < 10.0 | < 0.620 | < 0.620 | < 0.620 | < 0.620 | < 0.620 |
| BENZO[A]ANTHRACENE | | 8.00 | < 0.800 | < 0.170 | 10.0 | < 0.170 | < 0.170 | < 0.170 | < 0.800 | < 0.800 | < 0.170 | < 0.170 | 4.00 | < 0.170 | < 0.170 | < 0.170 | < 0.170 | < 0.170 |
| BENZO[A]PYRENE | | 10.0 | < 1.00 | < 0.250 | 20.0 | < 0.250 | < 0.250 | < 0.250 | < 1.00 | < 1.00 | < 0.250 | < 0.250 | < 5.00 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 |
| BENZO[B]FLUORANTHENE | | 10.0 | < 1.00 | < 0.210 | 10.0 | < 0.210 | < 0.210 | < 0.210 | < 1.00 | < 1.00 | < 0.210 | < 0.210 | 6.00 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 |
| BENZO[G,H,I]PERYLENE | | < 5.00 | < 1.00 | < 0.250 | 8.00 | < 0.250 | < 0.250 | < 0.250 | < 1.00 | < 1.00 | < 0.250 | < 0.250 | < 5.00 | < 0.250 | < 0.250 | < 0.250 | < 0.250 | < 0.250 |
| BENZO[K]FLUORANTHENE | | 9.00 | < 0.300 | < 0.066 | 10.0 | < 0.066 | < 0.066 | < 0.066 | < 0.300 | < 0.300 | < 0.066 | < 0.066 | 7.00 | < 0.066 | < 0.066 | < 0.066 | < 0.066 | < 0.066 |
| CARBAZOLE | | 0.90 | ND 0.200 | ND 0.033 | ND 0.700 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.200 | ND 0.200 | ND 0.033 | ND 0.033 | ND 0.700 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 | ND 0.033 |
| CHRYSENE | | 10.0 | < 0.600 | < 0.120 | 20.0 | < 0.120 | < 0.120 | < 0.120 | < 0.600 | < 0.600 | < 0.120 | < 0.120 | 8.00 | < 0.120 | < 0.120 | < 0.120 | < 0.120 | < 0.120 |
| DIBENZO[A,H]ANTHRACENE | | < 4.00 | < 1.00 | < 0.210 | < 4.00 | < 0.210 | < 0.210 | < 0.210 | < 1.00 | < 1.00 | < 0.210 | < 0.210 | < 4.00 | < 0.210 | < 0.210 | < 0.210 | < 0.210 | < 0.210 |
| DIBENZOFURAN | | < 0.700 | < 0.200 | < 0.035 | < 0.700 | < 0.035 | < 0.035 | < 0.035 | < 0.200 | < 0.200 | < 0.035 | < 0.035 | < 0.700 | < 0.035 | < 0.035 | < 0.035 | < 0.035 | < 0.035 |
| FLUORANTHENE | | 20.0 | < 0.300 | < 0.068 | 20.0 | 0.086 | < 0.068 | < 0.068 | < 0.300 | < 0.300 | <0.068 | <0.068 | 20.0 | < 0.068 | < 0.068 | < 0.068 | < 0.068 | < 0.068 |
| FLUORENE | | < 0.700 | < 0.200 | < 0.033 | < 0.700 | < 0.033 | < 0.033 | < 0.033 | < 0.200 | < 0.200 | < 0.033 | < 0.033 | < 0.700 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| INDENO[1,2,3–C,D]PYRENE | | < 6.00 | < 1.00 | < 0.290 | 7.00 | <0.290 | <0.290 | <0.290 | < 1.00 | < 1.00 | < 0.290 | < 0.290 | < 6.00 | < 0.290 | < 0.290 | < 0.290 | < 0.290 | < 0.290 |
| NAPHTHALENE | | < 0.700 | < 0.200 | < 0.037 | < 0.700 | < 0.037 | < 0.037 | < 0.037 | < 0.200 | < 0.200 | < 0.037 | < 0.037 | < 0.700 | < 0.037 | < 0.037 | < 0.037 | < 0.037 | < 0.037 |
| PHENANTHRENE | | 9.00 | < 0.200 | < 0.033 | 7.00 | < 0.033 | < 0.033 | < 0.033 | < 0.200 | < 0.200 | < 0.033 | < 0.033 | 4.00 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| PYRENE | | 20.0 | < 0.200 | < 0.033 | 30.0 | 0.087 | < 0.033 | < 0.033 | < 0.200 | < 0.200 | < 0.033 | < 0.033 | 10.0 | < 0.033 | < 0.033 | < 0.033 | < 0.033 | < 0.033 |
| **OTHER (ug/g)** | | | | | | | | | | | | | | | | | | |
| TOTAL ORGANIC CARBON | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 717 | NA | NA | NA | NA | NA | 580 |
| TPHC | | 112 | < 28.3 | 44.3 | 65.3 | < 28.5 | < 28.3 | < 28.5 | < 28.3 | < 28.5 | < 28.7 | < 28.7 | 171 | < 28.7 | < 28.5 | < 28.7 | 44.7 | < 28.3 |

NOTES:
TABLE LISTS DETECTED ANALYTES ONLY – SEE PROJECT ANALYTE LIST FOR SUMMARY
ND = NOT DETECTED
NA = NOT ANALYZED

# TABLE 4–2
## INORGANIC ANALYTES IN SOIL
## STUDY AREA 30 – MOORE ARMY AIRFIELD DRUM STORAGE AREA
## DECISION DOCUMENT
## FORT DEVENS

| ANALYTE | BACK- GROUND | BORING | 30B–92–01X | | | | 30B–92–02X | | | 30B–92–03X | | | 30B–92–04X | | | 30B–92–05X | | | 30B–92–06X | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | DEPTH | 0 | 4 | 8 | 8D | 0 | 4 | 8 | 0 | 4 | 8 | 0 | 4 | 8 | 0 | 6 | 8 | 0 | 2 | 8 |
| ALUMINUM | 15000 | | 3370 | 3710 | 2600 | 2090 | 3120 | 3640 | 2510 | 3990 | 2910 | 2230 | 4260 | 3480 | 2870 | 4500 | 3340 | 2910 | 6330 | 5850 | 2350 |
| ARSENIC | 21 | | 9.73 | 10.6 | 5.14 | 8.07 | 10.7 | 8.88 | 5.13 | 10.0 | 7.03 | 7.12 | 8.52 | 9.06 | 7.12 | 7.11 | 16.0 | 10.6 | 9.59 | 6.78 | 6.36 |
| BARIUM | 42.5 | | 11.2 | 13.9 | 14.6 | 12.2 | 14.8 | 20.3 | 15.5 | 15.5 | 13.3 | 14.2 | 18.7 | 14.1 | 12.1 | 11.1 | 18.3 | 13.7 | 20.1 | 12.8 | 13.0 |
| BERYLLIUM | 0.347 | | 0.626 | <0.500 | <0.500 | <0.500 | <0.500 | <0.500 | <0.500 | <0.500 | <0.500 | <0.500 | <0.500 | 0.552 | <0.500 | 0.600 | <0.500 | <0.500 | 0.847 | 0.567 | 0.640 |
| CALCIUM | 1400 | | 290 | 984 | 480 | 415 | 1390 | 1490 | 572 | 422 | 538 | 295 | 544 | 370 | 354 | <0.700 | 452 | 376 | 599 | 249 | 559 |
| CHROMIUM | 31 | | 4.86 | 8.21 | 7.39 | 5.67 | 8.01 | 8.91 | 5.79 | 5.65 | 5.37 | 5.65 | 8.11 | 7.19 | 5.48 | 5.83 | 6.40 | 5.62 | 7.22 | 7.65 | <4.05 |
| COBALT | NA | | 2.11 | 2.78 | 2.19 | 2.50 | 2.73 | 2.57 | 2.25 | 2.30 | 2.09 | 2.27 | 2.80 | 2.50 | 2.30 | 2.04 | 2.58 | 2.48 | 1.99 | 2.02 | 2.10 |
| COPPER | 8.39 | | 5.04 | 6.17 | 3.69 | 4.20 | 5.79 | 7.01 | 4.08 | 5.58 | 4.27 | 5.19 | 6.36 | 5.56 | 3.70 | 3.96 | 6.36 | 5.63 | 7.15 | 4.50 | 7.19 |
| IRON | 15000 | | 4320 | 5440 | 4180 | 3480 | 4600 | 6220 | 3930 | 4880 | 3490 | 4360 | 5650 | 5140 | 4210 | 4540 | 5550 | 5230 | 6070 | 4960 | 4510 |
| LEAD | 34.4 | | 2.87 | 4.69 | 3.07 | 2.91 | 3.13 | 3.54 | 2.07 | 3.62 | 2.70 | 2.58 | 5.97 | 4.94 | 3.76 | 3.41 | 3.19 | 2.93 | 10.3 | 3.33 | 2.15 |
| MAGNESIUM | 5600 | | 829 | 1430 | 1130 | 847 | 1210 | 1530 | 1050 | 1130 | 863 | 920 | 1260 | 1250 | 977 | 990 | 1180 | 1130 | 908 | 1150 | 860 |
| MANGANESE | 300 | | 51.6 | 85.8 | 86.9 | 87.0 | 68.6 | 98.8 | 104 | 85.0 | 58.2 | 110 | 100 | 84.5 | 84.2 | 48.8 | 99.2 | 108 | 114 | 50.9 | 43.2 |
| MERCURY | 0.22 | | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.069 | 0.057 | <0.050 |
| NICKEL | 14.0 | | 4.71 | 7.38 | 5.28 | 5.76 | 5.73 | 8.54 | 6.51 | 6.45 | 6.21 | 5.95 | 6.45 | 6.79 | 5.13 | 4.55 | 8.51 | 7.34 | 6.98 | 5.78 | 4.53 |
| POTASSIUM | 1700 | | 467 | 546 | 479 | 385 | 535 | 991 | 480 | 460 | 493 | 524 | 634 | 542 | 514 | 295 | 471 | 428 | 280 | 415 | 480 |
| SODIUM | 131 | | 157 | 164 | 160 | <100 | 192 | 184 | 273 | 191 | <100 | 205 | <100 | 185 | 136 | 146 | 487 | 284 | 196 | 116 | 336 |
| VANADIUM | 28.7 | | 5.44 | 6.71 | 5.52 | 3.82 | 6.14 | 7.50 | 4.73 | 5.31 | 4.45 | 4.18 | 6.76 | 5.37 | 4.75 | 5.77 | 5.06 | 4.35 | 6.94 | 6.91 | 4.35 |
| ZINC | 35.5 | | 11.3 | 18.7 | 14.6 | 11.7 | 13.8 | 19.1 | 12.8 | 15.5 | 11.6 | 13.3 | 18.2 | 16.5 | 14.4 | 16.3 | 24.4 | 15.8 | 27.8 | 19.2 | 15.6 |

NOTES: TABLE LIST DETECTED ANALYTES ONLY – SEE PROJECT ANALYTE LIST FOR SUMMARY
NA = NOT ANALYZED
CONCENTRATIONS IN BOXES EXCEED BACKGROUND

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# TABLE 4-2 (continued)
# INORGANIC ANALYTES IN SOIL
# STUDY AREA 30 – MOORE ARMY AIRFIELD DRUM STORAGE AREA
# DECISION DOCUMENT
# FORT DEVENS

| ANALYTE | BACKGROUND | BORING DEPTH | 30B-92-07X | | | 30B-92-08X | | | G6M-92-02X | | | | | G6M-92-03X | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 6 | 8 | 0 | 4 | 8 | 0 | 10 | 25 | 40 | 65 | 0 | 12 | 25 | 40 | 40D | 55 |
| ALUMINUM | 15000 | | 5700 | 3940 | 2640 | 5370 | 3090 | 1540 | 4190 | 4090 | 2520 | 3370 | 6100 | 5630 | 2860 | 4280 | 4020 | 3010 | 4240 |
| ARSENIC | 21 | | 8.55 | 6.09 | 6.28 | 11.9 | 7.20 | 5.35 | 8.10 | 15.0 | 6.33 | 3.99 | 8.18 | 9.94 | 8.86 | 5.68 | 7.20 | 7.72 | 18.0 |
| BARIUM | 42.5 | | 29.8 | 14.6 | 10.9 | 26.1 | 9.84 | 9.93 | 15.9 | 23.0 | 13.6 | 20.8 | 30.4 | 21.0 | 11.9 | 29.2 | 20.7 | 20.7 | 19.3 |
| BERYLLIUM | 0.347 | | 0.661 | <0.500 | <0.500 | <0.500 | <0.500 | <0.500 | 0.759 | 0.631 | <0.500 | 0.580 | <0.500 | 0.571 | <0.500 | <0.500 | <0.500 | 0.594 | <0.500 |
| CALCIUM | 1400 | | 583 | 648 | 426 | 660 | 255 | 236 | 963 | 2200 | 2630 | 1050 | 1060 | 828 | 497 | 1130 | 1110 | 830 | 1020 |
| CHROMIUM | 31 | | 10.2 | 6.70 | 5.90 | 12.6 | 5.43 | <4.05 | 9.24 | 15.1 | 5.08 | 7.11 | 12.6 | 10.7 | 5.30 | 7.71 | 7.21 | 6.13 | 9.83 |
| COBALT | NA | | 2.32 | 1.87 | 1.89 | 2.86 | <1.42 | <1.42 | 2.93 | 3.54 | 2.53 | 2.52 | 4.00 | 3.86 | <1.42 | 2.05 | 3.58 | 2.82 | 5.58 |
| COPPER | 8.39 | | 7.88 | 4.64 | 4.71 | 9.02 | 4.04 | 3.98 | 6.51 | 7.95 | 3.78 | 3.93 | 7.56 | 11.1 | 4.42 | 4.13 | 4.80 | 4.14 | 7.24 |
| IRON | 15000 | | 6280 | 5390 | 3570 | 6440 | 3190 | 2460 | 5900 | 7000 | 4760 | 5270 | 9020 | 8080 | 4500 | 6940 | 6680 | 4990 | 8020 |
| LEAD | 34.4 | | 17.0 | 2.72 | 2.98 | 23 | 2.96 | 2.35 | 3.26 | 3.89 | 2.75 | 2.28 | 3.70 | 45.0 | 2.86 | 2.55 | 2.93 | 2.43 | 4.67 |
| MAGNESIUM | 5600 | | 1460 | 1300 | 863 | 1710 | 786 | 487 | 1540 | 1860 | 1020 | 1220 | 2190 | 1690 | 934 | 1420 | 1500 | 989 | 1770 |
| MANGANESE | 300 | | 95.9 | 77.1 | 39.4 | 126 | 35.5 | 24.9 | 85.6 | 142 | 120 | 129 | 270 | 144 | 49.8 | 78.3 | 114 | 118 | 401 |
| MERCURY | 0.22 | | 0.141 | <0.050 | <0.050 | 0.068 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| NICKEL | 14.0 | | 10.1 | 5.65 | 5.60 | 10.5 | 4.01 | 3.62 | 8.20 | 9.50 | 6.98 | 5.70 | 9.64 | 12.5 | 4.81 | 4.16 | 7.56 | 7.58 | 14.0 |
| POTASSIUM | 1700 | | 448 | 533 | 489 | 578 | 475 | 377 | 614 | 989 | 465 | 1040 | 1650 | 469 | 548 | 1400 | 834 | 697 | 765 |
| SODIUM | 131 | | 318 | 259 | 127 | 144 | <100 | 122 | 166 | 208 | 160 | 174 | 171 | 152 | 206 | 178 | 161 | 134 | 138 |
| VANADIUM | 28.7 | | 8.06 | 6.47 | 3.90 | 9.18 | 4.15 | <3.39 | 7.14 | 8.20 | 4.67 | 7.21 | 12.0 | 9.04 | 4.49 | 9.00 | 7.50 | 5.75 | 7.67 |
| ZINC | 35.5 | | 47.5 | 52.3 | 21.9 | 53.0 | 10.3 | 10.6 | 18.9 | 22.2 | 13.8 | 15.8 | 25.9 | 32.8 | 13.0 | 17.8 | 19.1 | 15.5 | 21.7 |

NOTES:
TABLE LIST DETECTED ANALYTES ONLY – SEE PROJECT ANALYTE LIST FOR SUMMARY
NA = NOT ANALYEZED
CONCENTRATIONS IN BOXES EXCEED BACKGROUND

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# TABLE 4-3
# ANALYTES IN GROUNDWATER
# G6M-92-02X AND G6M-92-03X
# STUDY AREA 30 - MOORE ARMY AIRFIELD DRUM STORAGE AREA
# DECISION DOCUMENT
# FORT DEVENS

| ANALYTE | BACK-GROUND | ROUND 1 | | ROUND 2/ROUND 3 | |
|---|---|---|---|---|---|
| | | G6M-92-02X | G6M-92-03X | G6M-92-02X | G6M-92-03X |
| **ORGANICS (ug/L)** | | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | | <4.80 | <4.80 | 33.0 | 17.0 |
| **INORGANICS (ug/L)** | | | | | |
| ALUMINUM | 6870 | <141 | 150 | 250 | 1620 |
| ARSENIC | 10.5 | <2.54 | <2.54 | <2.54 | 4.05 |
| BARIUM | 39.6 | <5.00 | 10.3 | 75.7 | 53.6 |
| CALCIUM | 14700 | 4520 | 12500 | 3380 | 9550 |
| IRON | 9100 | 96.3 | 240 | 291 | 2380 |
| LEAD | 4.25 | <1.26 | <1.26 | 3.36 | <1.26 |
| MAGNESIUM | 3480 | <500 | 1340 | 500 | 1300 |
| MANGANESE | 291 | 18.5 | 42.5 | 22.7 | 75.9 |
| POTASSIUM | 2370 | 2260 | 1820 | 2690 | 2510 |
| SODIUM | 10800 | 3120 | 19300 | 2750 | 21800 |
| ZINC | 21.1 | <21.1 | <21.1 | 50.1 | 36.5 |
| **ANIONS/CATIONS (ug/L)** | | | | | |
| BICARBONATE | | 12200 | 14600 | 6000 | 13000 |
| CHLORIDE | | <2120 | 29700 | <2120 | 31200 |
| SULFATE | | <10000 | 15400 | <10000 | 13300 |
| NITRATE/NITRITE | | 2000 | 3800 | 1800 | 3300 |
| ALKALINITY | | 10000 | 12000 | 5000 | 11000 |
| **OTHER (ug/L)** | | | | | |
| TSS | | 13000 | 5000 | 34000 | 47000 |

TABLE LISTS DETECTED ANALYTES ONLY - SEE PROJECT ANALYTE LIST FOR SUMMARY
CONCENTRATIONS IN BOXES EXCEED BACKGROUND

G6M2&3.WK1
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# TABLE 4–4
# ANALYTES IN GROUP 6 SURFACE WATER
# NASHUA RIVER
# STUDY AREA 30 – MOORE ARMY AIRFIELD DRUM STORAGE AREA
# DECISION DOCUMENT
# FORT DEVENS

| ANALYTE | G6D–92–01X | G6D–92–02X | G6D–92–03X | G6D–92–04X |
|---|---|---|---|---|
| **INORGANICS (ug/L)** | | | | |
| ARSENIC | <2.54 | <2.54 | 3.09 | 3.41 |
| BARIUM | 19.4 | 17.5 | 18.7 | 19.4 |
| CALCIUM | 13700 | 14200 | 14100 | 13700 |
| IRON | 787 | 659 | 720 | 783 |
| LEAD | 4.99 | 2.17 | 4.88 | 5.53 |
| MAGNESIUM | 1790 | 1920 | 1950 | 1940 |
| MANGANESE | 104 | 130 | 154 | 155 |
| POTASSIUM | 2640 | 2460 | 2520 | 2690 |
| SODIUM | 32200 | 26200 | 26700 | 25400 |
| **ANIONS/CATIONS (ug/L)** | | | | |
| CHLORIDE | 60000 | 46000 | 47000 | 46000 |
| SULFATE | 14100 | 11600 | 14100 | 14000 |
| NITRATE/NITRITE | 1000 | 1000 | 980 | 1000 |
| KJELDAHL NITROGEN | 952 | 657 | 810 | 819 |
| TOTAL PHOSPHOROUS | 139 | 119 | 148 | 139 |
| ALKALINITY | 37000 | 23000 | 35000 | 31000 |
| **OTHER (ug/L)** | | | | |
| HARDNESS | 46600 | 41000 | 45600 | 45800 |
| TSS | 7000 | <4000 | 6000 | 6000 |
| TOTAL COLIFORM (org/100ml) | 4050 | 1150 | 450 | 350 |
| FECAL COLIFORM (org/100ml) | 118 | 70 | 3 | 4 |

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

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# TABLE 4-5
# ANALYTES IN GROUP 6 SEDIMENTS
# NASHUA RIVER
# STUDY AREA 30 - MOORE ARMY AIRFIELD DRUM STORAGE AREA
# DECISION DOCUMENT
# FORT DEVENS

| ANALYTE | G6D-92-01X | G6D-92-02X | G6D-92-03X | G6D-92-04X |
|---|---|---|---|---|
| **INORGANICS (ug/g)** | | | | |
| ALUMINUM | 12200 | 7820 | 7290 | 6800 |
| ANTIMONY | 11.4 | 4.38 | 3.64 | 13.5 |
| ARSENIC | 13.8 | 12.3 | 8.86 | 4.27 |
| BARIUM | 160 | 67.9 | 52.4 | 74.2 |
| BERYLLIUM | 2.16 | 1.05 | 1.20 | <0.500 |
| CADMIUM | 17.7 | 7.26 | 4.84 | 18.2 |
| CALCIUM | 1880 | 1880 | 1040 | 1050 |
| CHROMIUM | 117 | 86.0 | 35.9 | 121 |
| COBALT | 6.79 | 6.45 | 4.08 | 2.79 |
| COPPER | 128 | 74.7 | 43.7 | 100 |
| IRON | 17500 | 13100 | 10500 | 6600 |
| LEAD | 210 | 100 | 68.0 | 160 |
| MAGNESIUM | 3010 | 2140 | 2050 | 1710 |
| MANGANESE | 364 | 855 | 160 | 73.1 |
| MERCURY | 0.668 | <0.050 | 0.905 | 0.895 |
| NICKEL | 22.3 | 13.8 | 15.5 | 12.5 |
| POTASSIUM | 1240 | 857 | 519 | 604 |
| SELENIUM | 1.22 | <0.250 | <0.250 | 0.787 |
| SILVER | 6.56 | 4.26 | 1.86 | 3.51 |
| SODIUM | 550 | 340 | 276 | <100 |
| VANADIUM | 26.0 | 15.7 | 11.8 | 13.6 |
| ZINC | 284 | 115 | 106 | 121 |
| **ORGANICS (ug/g)** | | | | |
| ACETONE | <0.0170 | <0.0170 | 0.0658 | <0.0170 |
| TOLUENE | 0.0516 | <0.00078 | 0.00353 | 0.0177 |
| BIS(2-ETHYLHEXYL)PHTHALATE | <3.10 | <3.10 | <3.10 | 6.74 |
| FLOURANTHENE | 3.21 | 0.770 | <0.340 | 0.856 |
| PHENATHRENE | 1.43 | 0.587 | <0.165 | 0.508 |
| PYRENE | 3.28 | 1.12 | 0.400 | 0.874 |
| **OTHER (ug/g)** | | | | |
| TOTAL PETROLEUM HYDROCARBONS | 765 | 541 | 260 | 345 |
| TOTAL ORGANIC CARBON | 31600 | 14300 | 9460 | 9880 |

NOTES: TABLE LISTS DETECTED ANALYTES ONLY - SEE PROJECT ANALYTE LIST FOR SUMMARY

G6SEDS.WK1
01/13/95

# Table 5-1
# Human Health PRE Evaluation of Surface Soil
# Study Area 30 – Moore Army Airfield Drum Storage Area

## Decision Document
## Fort Devens

| Analyte | Soil Background Concentration [a] | Detected Concentration [b] | | Frequency Of Detection | Maximum Exceeds Backgrouound? | Region III Residential Soil Concentration (ug/g) | Maximum Exceeds Region III Concentration? |
|---|---|---|---|---|---|---|---|
| | | Average | Maximum | | | | |
| **Inorganics (ug/g)** | | | | | | | |
| aluminum | 15000 | 4,755 | 6,330 | 11/11 | NO | 230,000 | NO |
| arsenic | 21 | 9.2 | 12 | 11/11 | NO | 0.97 | YES |
| barium | 42.5 | 18 | 30 | 11/11 | NO | 5,500 | NO |
| beryllium | 0.347 | 0.66 | 0.85 | 7/11 | YES | 0.4 | YES |
| chromium | 31 | 8.2 | 13 | 11/11 | NO | 390 | NO |
| cobalt | NA | 2.5 | 3.9 | 11/11 | NA | NA | NA |
| copper | 8.39 | 6.6 | 11 | 11/11 | YES | 2,900 | NO |
| lead | 34.4 | 11 | 45 | 11/11 | YES | 500[c] | NO |
| manganese | 300 | 88 | 144 | 11/11 | NO | 7,800 | NO |
| mercury | 0.22 | 0.084 | 0.14 | 4/11 | NO | 23 | NO |
| nickel | 14.0 | 7.5 | 13 | 11/11 | NO | 1,600 | NO |
| vanadium | 28.7 | 7.0 | 9.2 | 11/11 | NO | 550 | NO |
| zinc | 35.5 | 25 | 53 | 11/11 | YES | 23,000 | NO |
| **Organics (ug/g)** | | | | | | | |
| toluene | | 0.0021 | 0.0032 | 5/11 | NA | 16,000 | NO |
| xylenes | | 0.0035 | 0.0035 | 1/11 | NA | 160,000 | NO |
| acenaphthene | | 0.061 | 0.061 | 1/11 | NA | 4,700 | NO |
| acenapthylene | | 0.72 | 1 | 3/11 | NA | NA | NA |
| anthracene | | 1.3 | 2 | 4/11 | NA | 23,000 | NO |
| benzo(a)anthracene | | 5.7 | 10 | 4/11 | NA | 1.6 | YES |
| benzo(a)pyrene | | 10 | 20 | 3/11 | NA | 0.23 | YES |
| benzo(b)fluoranthene | | 6.9 | 10 | 4/11 | NA | 1.9 | YES |
| benzo(g,h,i)perylene | | 4.4 | 8 | 2/11 | NA | 11 | NO |
| benzo(k)fluoranthene | | 6.8 | 10 | 4/11 | NA | 4.4 | YES |
| carbazole | | 0.54 | 0.9 | 2/11 | NA | 85 | NO |
| chrysene | | 9.8 | 20 | 4/11 | NA | NA | NA |
| dibenzo(a,h)anthracene | | 0.26 | 0.26 | 1/11 | NA | 0.21 | YES |
| dibenzofuran | | 0.083 | 0.083 | 1/11 | NA | NA | NA |
| fluoranthene | | 16 | 20 | 4/11 | NA | 3,100 | NO |
| fluorene | | 0.15 | 0.15 | 1/11 | NA | 3,100 | NO |
| indeno(1,2,3-c,d)pyrene | | 3.9 | 7 | 2/11 | NA | 0.84 | YES |
| naphthalene | | 0.074 | 0.074 | 1/11 | NA | 3,100 | NO |
| phenanthrene | | 5.3 | 9 | 4/11 | NA | 2,300 | NO |
| pyrene | | 16 | 30 | 4/11 | NA | 2,300 | NO |

Notes: [a] Base-wide background soil inorganics database

[b] Surface soil samples from sampling stations 30B-92-01X to 30B-92-08X, G6M-92-02X, and G6M-92-03X.

NA = not available.

[c] Lead value from USEPA interim guidance on establishing soil lead cleanup levels at superfund sites (OSWER DIRECTIVE 9355.4-02)

## Table 5–2
## Human Health PRE Evaluation of Subsurface Soil
## Study Area 30 – Moore Army Airfield Drum Storage Area

### Decision Document
### Fort Devens

| Analyte | Soil Background Concentration [a] | Detected Concentration [b] | | Frequency of Detection (Out of 18) | Maximum Exceeds Background ? | Region III Commercial/Industrial Concentration (ug/g) | Maximum Exceeds Region III Concentration? |
|---|---|---|---|---|---|---|---|
| | | Average | Maximum | | | | |
| **Inorganics (ug/g)** | | | | | | | |
| aluminum | 15,000 | 2,828 | 3,940 | 18 | NO | 3,000,000 | NO |
| arsenic | 21 | 8.3 | 16 | 18 | NO | 1.6 | YES |
| barium | 42.5 | 14 | 23 | 18 | NO | 72,000 | NO |
| beryllium | 0.347 | 0.61 | 0.64 | 3 | YES | 0.67 | NO |
| chromium | 31 | 6.9 | 15 | 16 | NO | 5,100 | NO |
| cobalt | NA | 2.4 | 3.5 | 15 | NA | NA | NA |
| copper | 8.39 | 5.2 | 8.0 | 18 | NO | 38,000 | NO |
| lead | 34.4 | 3.1 | 4.9 | 18 | NO | 500[c] | NO |
| manganese | 300 | 72 | 110 | 18 | NO | 100,000 | NO |
| nickel | 14.0 | 6.2 | 9.5 | 18 | NO | 20,000 | NO |
| vanadium | 28.7 | 5.2 | 8.2 | 17 | NO | 7,200 | NO |
| zinc | 35.5 | 18 | 52 | 18 | YES | 310,000 | NO |
| **Organics (ug/g)** | | | | | | | |
| toluene | | 0.0012 | 0.0015 | 7 | NA | 200,000 | NO |
| xylenes | | 0.0036 | 0.0057 | 2 | NA | 2,000,000 | NO |
| 2–methylnaphthalene | | 0.1 | 0.1 | 1 | NA | NA | NA |
| bis(2–ethylhexyl)phthalate | | 4 | 4 | 1 | NA | 200 | NO |
| fluoranthene | | 0.17 | 0.25 | 2 | NA | 41,000 | NO |
| naphthalene | | 0.049 | 0.049 | 1 | NA | 41,000 | NO |
| phenanthrene | | 0.26 | 0.43 | 2 | NA | 30,000 | NO |
| pyrene | | 0.23 | 0.52 | 3 | NA | 31,000 | NO |
| TPHC | | 40 | 44 | 3 | NA | NA | NA |

Notes:

[a] Base–wide background soil inorganics database.

[b] Subsurface soil samples from sampling locations 30B–92–01X to 30B–92–08X, G6M–92–02X and G6M–92–03X.

[c] Lead value from USEPA interim guidance on establishing soil lead cleanup levels at superfund sites (OSWER DIRECTIVE 9355.4–02)

NA = not available.

## Table 5–3
## Human Health PRE Evaluation of Groundwater
## SA 30 – Moore Army Airfield/Drum Storage Area Monitoring Wells

### Decision Document
### Fort Devens

| Analyte | Groundwater Background Concentration | Maximum Detected Concentration [a] | Maximum Exceeds Background? | Drinking Water Standard/Guideline [b] (ug/l) | Maximum Exceeds Standard/Guideline? |
|---|---|---|---|---|---|
| **Organics (ug/l)** | | | | | |
| bis(2–ethylhexyl)phthalate | | 33.0 | | 6.1 | YES |
| | | | | | |
| **Inorganics (ug/l)** | | | | | |
| aluminum | 6,870 | 1,620 | NO | 50–200 | YES |
| arsenic | 10.5 | 4.05 | NO | 50 | NO |
| barium | 39.6 | 75.7 | YES | 2,000 | NO |
| calcium | 14,700 | 12,500 | NO | NA | NA |
| iron | 9,100 | 2,380 | NO | 300 | YES |
| lead | 4.25 | 3.36 | NO | 15 | NO |
| magnesium | 3,480 | 1,340 | NO | NA | NA |
| manganese | 291 | 75.9 | NO | 50 | YES |
| potassium | 2,370 | 2,690 | YES | NA | NA |
| sodium | 10,800 | 21,800 | YES | 28,400 | NO |
| zinc | 21.1 | 50.1 | YES | 5,000 | NO |
| | | | | | |
| **Anions/Cations (ug/l)** | | | | | |
| nitrate/nitrite | | 3,800 | | 10,000 | NO |

NOTES:
[a] Maximum from either Round 1 or Rounds 2 & 3. Only unfiltered samples are used for inorganics.
[b] Standard/Guideline selected in order of the following preference: MA drinking water standard, EPA drinking water standard, Region III Tap Water Concentration.
[c] SA 30 is represented by monitoring wells G6M–92–02X and G6M–92–03X.
ND Not detected
NA Not available

# Table 6–1
## Ecological PRE Evaluation of Surface Soil
## Study Area 30 – Moore Army Airfield Drum Storage Area

## Decision Document
## Fort Devens

| Analyte | Soil Background Concentration [a] | Detected Concentration [b] | | Frequency Of Detection | Maximum Exceeds Backgrouound? | Ecological Benchmark (ug/g) | Maximum Exceeds Benchmark? |
|---|---|---|---|---|---|---|---|
| | | Average | Maximum | | | | |
| **Inorganics (ug/g)** | | | | | | | |
| aluminum | 15000 | 4,755 | 6,330 | 11/11 | NO | 14,964 | NO |
| arsenic | 21 | 9.2 | 12 | 11/11 | NO | 33 | NO |
| barium | 42.5 | 18 | 30 | 11/11 | NO | 42.6 | NO |
| beryllium | 0.347 | 0.66 | 0.85 | 7/11 | YES | 0.88 | NO |
| chromium | 31 | 8.2 | 13 | 11/11 | NO | 830 | NO |
| cobalt | NA | 2.5 | 3.9 | 11/11 | NA | 50 | NO |
| copper | 8.39 | 6.6 | 11 | 11/11 | YES | 34 | NO |
| lead | 34.4 | 11 | 45 | 11/11 | YES | 34.4 | YES |
| manganese | 300 | 88 | 144 | 11/11 | NO | 1,500 | NO |
| mercury | 0.22 | 0.084 | 0.14 | 4/11 | NO | 3.6 | NO |
| nickel | 14.0 | 7.5 | 13 | 11/11 | NO | 100 | NO |
| vanadium | 28.7 | 7.0 | 9.2 | 11/11 | NO | 28.7 | NO |
| zinc | 35.5 | 25 | 53 | 11/11 | YES | 640 | NO |
| **Organics (ug/g)** | | | | | | | |
| toluene | | 0.0021 | 0.0032 | 5/11 | NA | 1,800 | NO |
| xylenes | | 0.0035 | 0.0035 | 1/11 | NA | 2,100 | NO |
| acenaphthene | | 0.061 | 0.061 | 1/11 | NA | 5,000 | NO |
| acenapthylene | | 0.72 | 1 | 3/11 | NA | 2,600 | NO |
| anthracene | | 1.3 | 2 | 4/11 | NA | 14,000 | NO |
| benzo(a)anthracene | | 5.7 | 10 | 4/11 | NA | 8.9 | YES |
| benzo(a)pyrene | | 10 | 20 | 3/11 | NA | 5.5 | YES |
| benzo(b)fluoranthene | | 6.9 | 10 | 4/11 | NA | 180 | NO |
| benzo(g,h,i)perylene | | 4.4 | 8 | 2/11 | NA | 440 | NO |
| benzo(k)fluoranthene | | 6.8 | 10 | 4/11 | NA | 320 | NO |
| carbazole | | 0.54 | 0.9 | 2/11 | NA | 43 | NO |
| chrysene | | 9.8 | 20 | 4/11 | NA | 440 | NO |
| dibenzo(a,h)anthracene | | 0.26 | 0.26 | 1/11 | NA | 5.5 | NO |
| dibenzofuran | | 0.083 | 0.083 | 1/11 | NA | 10 | NO |
| fluoranthene | | 16 | 20 | 4/11 | NA | 1,100 | NO |
| fluorene | | 0.15 | 0.15 | 1/11 | NA | 1,100 | NO |
| indeno(1,2,3–c,d)pyrene | | 3.9 | 7 | 2/11 | NA | 320 | NO |
| naphthalene | | 0.074 | 0.074 | 1/11 | NA | 170 | NO |
| phenanthrene | | 5.3 | 9 | 4/11 | NA | 510 | NO |
| pyrene | | 16 | 30 | 4/11 | NA | 550 | NO |

Notes:

[a] Base–wide background soil inorganics database.

[b] Surface soil samples from sampling stations 30B–92–01X to 30B–92–08X, G6M–92–02X, and G6M–92–03X.

NA = not available.