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**NO FURTHER ACTION DECISION  
UNDER CERCLA**

**FORT DEVENS STUDY AREA 47  
MOORE ARMY AIRFIELD  
UNDERGROUND STORAGE TANK  
DATA ITEM A009**

**CONTRACT DAAA15-91-D-0008**

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

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**NO FURTHER ACTION DECISION  
UNDER CERCLA  
STUDY AREA 47  
MOORE ARMY AIRFIELD UNDERGROUND STORAGE TANK  
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

DECEMBER 1993

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## **EXECUTIVE SUMMARY**

Investigations of Study Area 47 (Moore Army Airfield Underground Storage Tank) at Fort Devens Massachusetts have resulted in the decision that no further studies or remediation are required at this site. Study Area 47 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 21 December 1989. In addition, under Public Law 101-510, the Defense Base Realignment and Closure Act of 1990, Fort Devens was selected for cessation of operations and closure. In accordance with these acts, numerous studies, including a Master Environmental Plan, an Enhanced Preliminary Assessment, and a Site Investigation have been conducted which address Study Area 47.

Field investigation of Study Area 47 was initiated in 1992 in conjunction with the other ten Group 3, 5 and 6 Study Areas at Fort Devens. Investigation at Study Area 47 entailed installing a monitoring well soil boring adjacent to the former underground storage tank excavation. Two other wells were installed as part of the group-wide water quality assessment at the airfield, but were near enough to and roughly downgradient of the former tank location to provide additional relevant data on impacts due to potential releases from that tank. To evaluate the potential impact of contaminant migration from Study Area 47 to the Nashua River, surface water and sediment samples were collected from the Nashua River.

Soil samples collected from the boring were analyzed for volatile organic compounds, lead, and total petroleum hydrocarbon compounds. No volatile organic compounds were detected and lead was detected at concentrations below background. The maximum total petroleum hydrocarbon compounds concentration was found to be 39.3 micrograms per gram from the boring placed adjacent to the tank. This concentration was lower than what would be expected for overtly contaminated soil. The investigation results indicate that fuel-related contamination may have occurred. However, the absence of petroleum hydrocarbons in deeper soils suggests that migration was not extensive in this study area.

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## **EXECUTIVE SUMMARY**

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Bis(2-ethylhexyl)phthalate was detected in a groundwater sample collected from the monitoring well adjacent to the tank at concentrations exceeding the U.S. Environmental Protection Agency Region III drinking water guidelines, but is a suspected laboratory contaminant. Aluminum and iron concentrations at this location exceeded secondary Maximum Concentrations Limits in the second round of sampling only, but are well below calculated background concentrations. Based on these results, no observable contamination of groundwater has occurred as a result of potential releases associated with the former underground storage tank at Study Area 47.

The results of sediment sampling support the conclusion that contaminant migration via storm and surface water runoff from the airfield 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 will be further investigated under Area Requiring Environmental Evaluation 70.

On the basis of the investigation and Preliminary Risk Evaluations performed for Study Area 47, there is no evidence to conclude that possible residual contamination due to releases from a former leaking underground tank have caused significant environmental contamination or 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 47 (SA 47) - Moore Army Airfield Underground Storage Tank (UST) 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 47 was identified as a potential source of contamination in the MEP. On 21 December, 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 47 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 47 were conducted to support this overall mission.

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## **2.0 BACKGROUND AND PHYSICAL SETTING**

### **2.1 DESCRIPTION AND LAND USE**

Fort Devens is located approximately 35 miles northwest of Boston, Massachusetts, 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 shopette, cafeteria, post exchange, commissary, bowling alley, golf course, and hospital), 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 drop zone where air training exercises are performed. The Nashua River bounds the South Post on the northeast side.

## **SECTION 2**

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The North Post is directly north of the Main Post. The principal activities on the North Post are the Douglas E. Moore Army Airfield (MAAF), where SA 47 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 47 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.

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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 permeabilities. Groundwater beneath SA 47 flows roughly southwest at an average rate of 200 ft/year (Figure 2-2) (ABB-ES, 1993). The depth to bedrock beneath the airfield is greater than 60 feet below ground surface (bgs).

The MAAF fuel oil UST at SA 47 was located at the base of the flight control tower (Building 3816). The 500-gallon UST was used to store heating fuel oil between 1970 and 1989.

The UST was removed and replaced in January 1989 by Petroleum and Chemical Equipment Service of New Hampshire, Inc. (subcontractor to C-Q Construction Corporation of Watertown, Massachusetts). After tank removal, excavation was continued to remove contaminated soil. Because of the potential that further excavation might affect the stability of the flight-control tower, the decision was made to stop digging at a depth of 8.5 ft. The sides of the excavation were clean, but the bottom was judged to be still contaminated (Sharma, 1988). Two confirmatory samples were collected, but the analytical results have not been located. The location of the tank excavation is evident at the surface by a small area of newer pavement. A replacement 500-gallon fuel oil UST installed in the former tank grave is currently in use.

SA 47 is located on a part of the airfield expected to remain an airfield for the foreseeable future.

### **3.0 RELATED INVESTIGATIONS**

#### **3.1 MASTER ENVIRONMENTAL PLAN**

The MAAF UST was identified as a possible source for release of contaminants into the environment and the installation of groundwater monitoring wells and collection of soil and groundwater samples for laboratory analysis of total petroleum hydrocarbon compounds (TPHC) and volatile organic compounds (VOCs) was recommended in the MEP.

#### **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 47 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 09 (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 Final SI Report for these SAs 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.

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## SECTION 3

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The SI work conducted at SA 47 consisted of drilling a monitoring well soil boring (G6M-92-07X) adjacent to the former UST excavation as close to the existing replacement UST as possible (see Figure 2-2). The boring was advanced to 10 feet below the water table (65.2 ft bgs). Split-spoon soil samples were collected at 5-ft intervals for field screening by photoionization detector and for field classification. Five split-spoon samples were selected for analysis for Project Analyte List (PAL) VOCs, lead, and TPHC: one sample was collected at the ground surface (from zero to 2 ft bgs), one was collected in saturated soil at the approximate depth of the water table (60 to 62 ft bgs), and the other three samples were selected from intermediate depth intervals. The water table soil sample was analyzed for total organic carbon (TOC) in addition to the analytes listed above.

Two other wells, G6M-92-01X and G6M-92-06X, were installed as part of the group-wide water quality assessment, but were near enough to and roughly downgradient of the former UST location to provide additional relevant data on impacts due to potential releases from that tank. Two rounds of groundwater samples, three months apart, were collected from the three wells and analyzed for PAL semivolatile organic compounds, inorganic analytes, and anions/cations in addition to the soil parameters. A third round of samples was collected from the wells and analyzed for PAL VOCs to replace cross contaminated Round 2 VOC results.

Additionally, to evaluate the potential impact of contaminant migration from SA 47 to the Nashua River, surface water and sediment samples were collected from the Nashua River and analyzed for PAL organics, inorganics, and TPHC. Surface water samples were also analyzed for PAL water quality parameters and total suspended solids, and sediment samples were analyzed for TOC and were tested for grain size distribution.

### 3.4 PRELIMINARY RISK EVALUATION

Preliminary Risk Evaluations (PREs) were performed as part of the SI to help establish whether environmental contamination at SA 47 required further investigation or remediation. This section presents the general approach employed for the SI PREs; details 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 47 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 will 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 47 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.

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**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 47 Human Health PRE, Region III risk-based concentrations for tap water, commercial/industrial soil, and residential soil were used. Risk-based concentrations for tap water assume daily consumption of two liters of water for a residential lifetime of 30 years; these also assume exposure from the inhalation of volatiles from household water uses (including showering, laundering, and dish washing). For soil, Region III risk-based concentrations have been developed for commercial/industrial soil exposure as well as for residential exposure. Risk-based concentrations for commercial/industrial soil assume that a worker ingests soil 250 days per year for 25 years, at an ingestion rate of 100 mg/day. Risk-based concentrations for residential soil assume that an individual ingests soil 350 days per year for a residential lifetime of 30 years, at an age-adjusted ingestion rate of 100 mg/day.

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### **3.4.2 Ecological Risk Evaluations**

The ecological PRE at SA 47 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 U.S. Fish and Wildlife Service (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 47 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. Since no significant habitat for resident or migratory ecological receptors was found at SA 47, no comparison to ecological standards and criteria was required.

## 4.0 CONTAMINATION ASSESSMENT

The SA 47 SI analytical results are discussed by medium in the following subsections.

### 4.1 SOILS

A total of five soil samples were collected from boring G6M-92-07X installed adjacent to the former tank location. Samples were collected at the surface and 10, 25, 40, and 60 ft bgs. The laboratory results for these five soil samples are provided in Table 4-1.

No VOCs were detected in any soil samples collected from the boring. Very low TPHC concentrations were detected in the two shallowest samples (39.3 micrograms per gram [ $\mu\text{g/g}$ ] and 38.1  $\mu\text{g/g}$ , respectively). Lead was detected in all five samples ranging in concentration from 0.989 to 4.7  $\mu\text{g/g}$ , all below the calculated Fort Devens background soil concentration of 48.4  $\mu\text{g/g}$  (ABB-ES, 1993). Figure 4-1 illustrates the distribution of contaminants by depth.

TPHC concentrations, though expected in soil contaminated with fuel oil, were at concentrations lower than what would be expected for overtly contaminated soil. The current distribution may indicate that fuel-related contamination occurred. However, the absence of TPHC in deeper soils suggests that migration was not extensive in this SA.

### 4.2 GROUNDWATER

G6M-92-07X was installed to assess groundwater quality directly beneath the former leaking UST. Two other wells, G6M-92-01X and G6M-92-06X, were installed as part of the group-wide water quality assessment, but were near enough to and roughly downgradient of the former UST location to provide additional relevant data on impacts due to potential releases from that tank. Groundwater analytical results are summarized in Table 4-2. Figure 4-2 shows the distribution of organic and inorganic analytes detected in these three wells.

Except for bis(2-ethylhexyl)phthalate (B2EHP), no organic compounds were detected in the groundwater sample collected at SA 47 (monitoring well G6M-92-07X). During Round 1, acetone, the only VOC observed in groundwater at MAAF, was detected at a concentration of 21 micrograms per liter ( $\mu\text{g/l}$ ) in G6M-92-01X, located roughly 700 ft

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downgradient of SA 47. TPHC was also detected in the Round 1 sample collected from this well at a concentration of 1,550  $\mu\text{g/l}$ , but neither acetone nor TPHC was detected in Round 2 at this well. B2EHP did, however, appear in G6M-92-01X during Round 2 sampling. B2EHP (8.8  $\mu\text{g/l}$ ) was the only organic compound detected in groundwater from G6M-92-06X during Round 1. In Round 2, B2EHP was absent in this well, but TPHC was detected at a concentration just above the detection limit. G6M-92-06X is located 500 ft to the south of SA 47. As detailed further in Section 4.4, it is likely that the B2EHP and acetone detected during various sampling rounds at all three well locations are laboratory contaminants. The isolated occurrences of TPHC in G6M-92-01X and G6M-92-06X are not considered significant.

Inorganic analytes detected above the calculated groundwater background concentration in these three wells included calcium, silver, and zinc. Calcium was observed in G6M-92-07X at a concentration of 16,200  $\mu\text{g/l}$  in Round 1 and 17,000 and 18,800  $\mu\text{g/l}$  in Round 2. Silver (93.6  $\mu\text{g/l}$ ) was detected in G6M-92-01X during Round 1, but not in Round 2. No inorganic analytes exceeded background concentrations in G6M-92-06X except for zinc during Round 2. Zinc was present above background in most of the groundwater samples collected (installation-wide) during Round 2.

Based on these results, no observable contamination of groundwater has occurred as a result of potential releases associated with the former UST at SA 47. Because no organic contaminants were detected in groundwater at G6M-92-07X, contaminant migration from SA 47 via groundwater flow to wells G6M-92-01X or G6M-92-06X, or the Nashua River is unlikely. There is no identified source for the contaminants detected in G6M-92-01X; furthermore, there is little correlation between Rounds 1 and 2 sampling results of these wells.

### 4.3 SURFACE WATER AND SEDIMENT

Surface water and sediment samples were collected at four locations along the Nashua River in locations downgradient of the Group 6 SAs (SAs 30, 31, 47, and 50) and near storm water outfalls (see Figure 2-2). Analytical results for surface water and sediment samples are provided in Tables 4-3 and 4-4, 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). Detected organic compounds in Nashua River sediments included acetone, toluene, three polynuclear



aromatic hydrocarbons, B2EHP, and TPHC. Both toluene and B2EHP were likely laboratory contaminants as described in Section 4.4. The distributions of organic compounds, TPHC, and selected inorganic analytes for surface water and sediment samples are provided in Figures 4-3 through 4-6.

Surface runoff from the airfield is discharged to the Nashua River via storm drainage and 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 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 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 47 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.



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

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

### 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-Epoxyoctahydronaphthalene, 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**

Section 3.4 presents the basic methodology used for the PRE for Human Health. Details of the PRE for SA 47 are summarized below.

### **5.1 SOILS**

The preliminary risk evaluation considered all soils to a depth of 3 ft 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 47 is to house the UST for airfield use. All subsurface soil (defined as 3-10 ft in depth) was considered as accessible under a commercial/industrial future use exposure scenario.

The inorganic analyses of soil at SA 47 were restricted to lead since that analyte may have been an indicator of fuel contamination. Sampling location G6M-92-07X represented soil at SA 47. An assessment of the lead data for SA 47 soils showed that there is no apparent contamination present. Additionally, there is no clear pattern over sample depth. When comparing soil concentrations to the statistical background lead concentration, there are no exceedances.

When considering lead levels in soil, the USEPA interim guidance on Superfund soil lead cleanup value of 500  $\mu\text{g/g}$  (USEPA, 1989) is considerably above the concentrations found in the SA during the SI activity. Therefore, it is clear that lead at SA 47 does not pose a significant risk to human health.

TPHC and VOCs were used as the primary organic compound indicators for the study area soils. Under the tarmac in the vicinity of the UST, at monitoring well boring location G6M-92-07X, no VOCs were detected. The TPHC levels range from approximately 40  $\mu\text{g/g}$  just below the tarmac and drop off to less than the detection limit at the 25-foot sample depth and below. The TPHC levels indicate that contamination from fuel spillage has not significantly occurred in that area.

To evaluate the health risk associated with TPHC in soil, ABB-ES developed risk-based concentrations for petroleum products. These concentrations were calculated using the same exposure assumptions as those used by USEPA toxicologists in the USEPA Region III Risk-Based Concentration Table, First Quarter, 1993 (USEPA, 1993) for commercial/industrial soils and residential soils. Dose response values for gasoline and

## SECTION 5

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marine diesel used in the calculations are provisional values developed by USEPA, Environmental Criteria and Assessment Office (USEPA, 1992). USEPA suggests using the reference dose value for diesel oil as a surrogate for No. 2 fuel oil.

The table below presents the risk-based concentrations for petroleum products:

Analyte	Residential Soil ( $\mu\text{g/g}$ )	Commercial/Industrial Soil ( $\mu\text{g/g}$ )
Gasoline	1,000	1,800
No. 2 Fuel Oil	630	8,180

The maximum detected TPHC concentration in soil at SA 47 ( $39 \mu\text{g/g}$ ) is well below the risk-based residential soil concentration of  $630 \mu\text{g/g}$ .

### 5.2 GROUNDWATER

Monitoring well location G6M-92-07X was used to define the groundwater quality in the vicinity of the UST. Except for B2EHP, organic contaminants were not detected in groundwater at SA 47 during the SI. B2EHP was detected at  $20 \mu\text{g/l}$ , a concentration above the USEPA Region III tap water concentration of  $6.1 \mu\text{g/l}$ , but is a suspected laboratory contaminant as described in Section 4.4. Considering inorganic compounds, statistical background concentrations were not exceeded except for calcium and zinc. The de-icing of the airfield tarmac readily explains the presence of calcium in groundwater. Although the concentration of zinc in G6M-92-07X exceeds the statistical background, it is well below the secondary Maximum Contaminant Level (MCL) for zinc. Concentrations of aluminum and iron exceeded their respective secondary MCLs in Round 2 only. Both concentrations, however, are well below the statistical background levels.

## **6.0 PRELIMINARY ECOLOGICAL RISK EVALUATION**

SA 47 consists of approximately an eighth of an acre area of asphalt driveway, adjacent to the Moore Army Airfield flight control tower (Building 3816). Mowed grass surrounds this developed site.

No significant habitat for resident or migratory ecological receptors occurs at this paved site. A review of the Fort Devens biological database indicates that no rare and endangered species are known to occur in the vicinity of SA 47. Therefore, based on the lack of ecological habitat at SA 47, and the resulting lack of ecological exposure pathways, no comparison of surface soil analytes to Protective Contaminant Level reference values was conducted.

## 7.0 CONCLUSIONS

No further action is recommended for SA 47. 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.

B2EHP was detected in groundwater samples from monitoring well G6M-92-07X in the SA at concentrations exceeding USEPA Region III drinking water guidelines, but is a suspected laboratory contaminant as detailed in Section 4.4. Aluminum and iron concentrations at this location exceed secondary MCLs in the Round 2 sampling only, but are well below calculated background concentrations.

As noted above, the primary concern at SA 47 has been possible residual contamination due to releases from a leaking underground tank which has since been removed and replaced. Sampling and analysis of soil and groundwater in the vicinity of this former tank location during the SI found no significant petroleum hydrocarbon concentrations associated with fuel.

## 8.0 DECISION

On the basis of findings at SA 47, there is no evidence or reason to conclude that possible residual contamination due to release from a leaking underground tank, which has since been removed, has caused significant environmental contamination or poses a threat to human health or the environment. The decision has been made to remove SA 47 from further consideration in the IRP process.

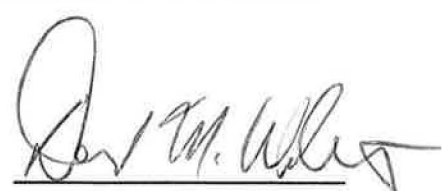
  
COMMANDER, FORT DEVENS

EDWARD NUTTALL  
Colonel, U.S. Army  
Installation Commander

17 Dec 53  
Date

U.S. ENVIRONMENTAL PROTECTION AGENCY  
REGION I, ME & VT WASTE MANAGEMENT BRANCH

☒ Concur

  
DAVID M. WEBSTER  
Chief

6/20/94  
Date

☐ Non-concur (Please provide reasons) \_\_\_\_\_

ABB Environmental Services, Inc.

## **GLOSSARY OF ACRONYMS AND ABBREVIATIONS**

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<b>ABB-ES</b>	<b>ABB Environmental Services, Inc.</b>
<b>AREE 70</b>	<b>Area Requiring Environmental Evaluation 70</b>
<b>B2EHP</b>	<b>bis(2-ethylhexyl)phthalate</b>
<b>bgs</b>	<b>below ground surface</b>
<b>BRAC</b>	<b>Defense Base Realignment and Closure Act of 1990</b>
<b>CERCLA</b>	<b>Comprehensive Environmental Response, Compensation, and Liability Act</b>
<b>CRL</b>	<b>Certified Reporting Limit</b>
<b>DOD</b>	<b>U.S. Department of Defense</b>
<b>ESE</b>	<b>Environmental Science and Engineering, Inc.</b>
<b>FESA</b>	<b>Federal Endangered Species Act</b>
<b>ft</b>	<b>foot or feet</b>
<b>gpm</b>	<b>gallons per minute</b>
<b>IRP</b>	<b>Installation Restoration Program</b>
<b>MAAF</b>	<b>Moore Army Airfield</b>
<b>MCL</b>	<b>Maximum Contaminant Level</b>
<b>MEP</b>	<b>Master Environmental Plan</b>
<b>MESA</b>	<b>Massachusetts Endangered Species Act</b>
<b>MNHP</b>	<b>Massachusetts Natural Heritage Program</b>
<b>MSL</b>	<b>mean sea level</b>
<b>PA</b>	<b>Preliminary Assessment</b>
<b>PAL</b>	<b>Project Analyte List</b>
<b>PRE</b>	<b>Preliminary Risk Evaluation</b>
<b>SA</b>	<b>Study Area</b>
<b>SI</b>	<b>site investigation</b>
<b>SOW</b>	<b>Statement of Work</b>
<b>SVOCs</b>	<b>semivolatile organic compounds</b>

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## **GLOSSARY OF ACRONYMS AND ABBREVIATIONS**

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TCA	trichloroethane
TCFM	trichlorofluoromethane
TOC	total organic carbon
TPHC	total petroleum hydrocarbon compounds
$\mu\text{g/g}$	micrograms per gram
$\mu\text{g/l}$	micrograms per liter
USAEC	U.S. Army Environmental Center
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VOC	volatile organic compound

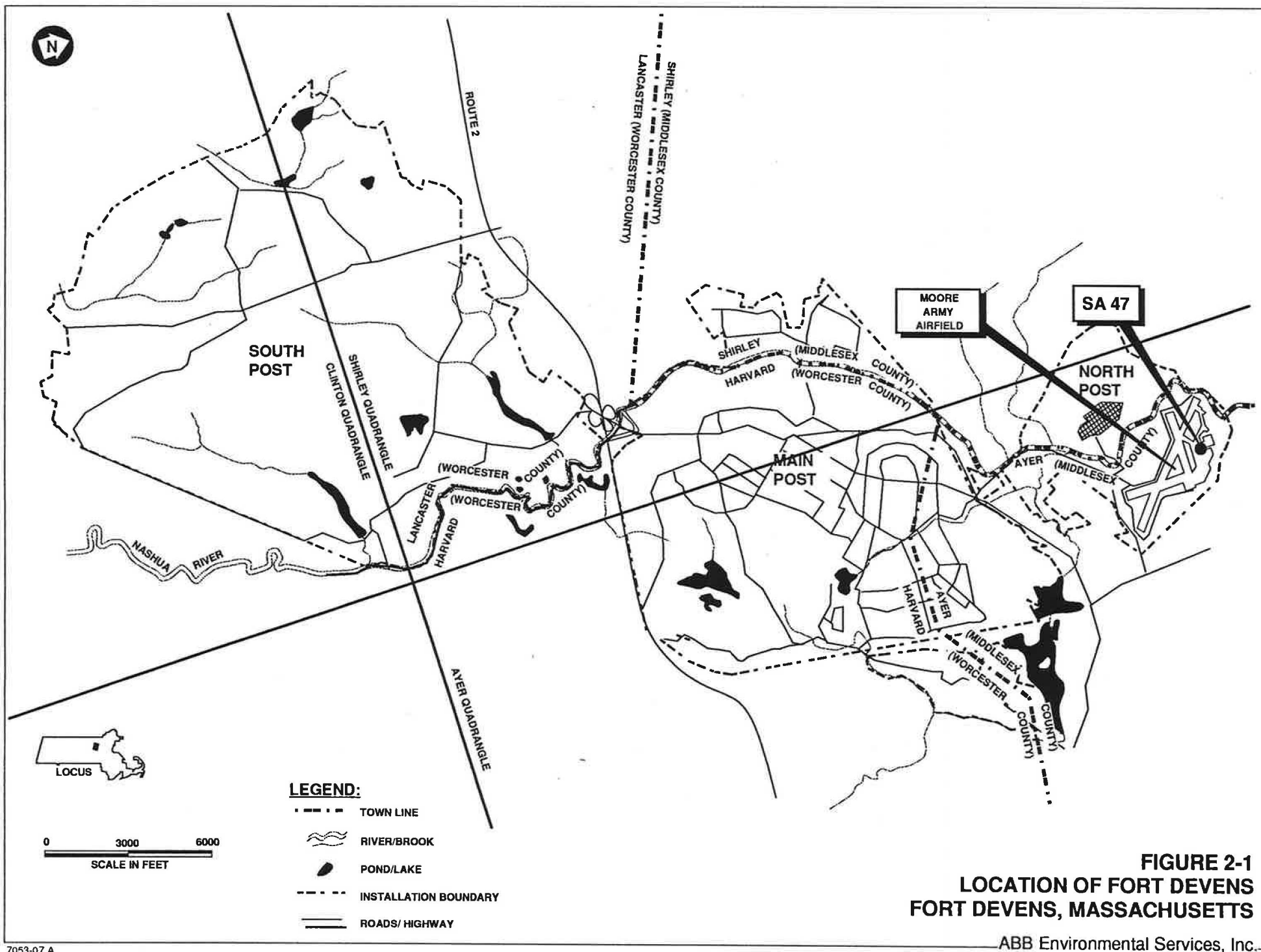
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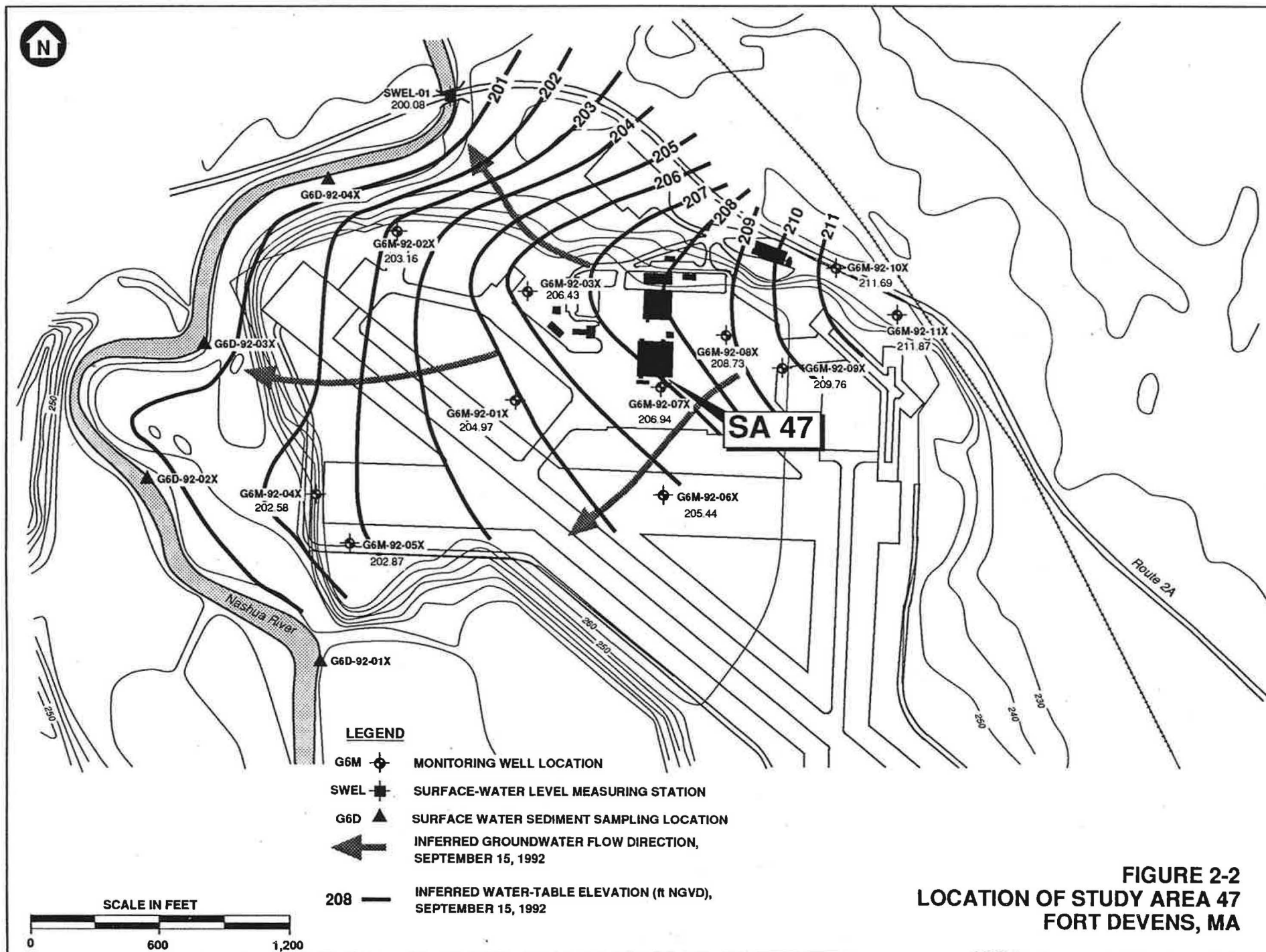
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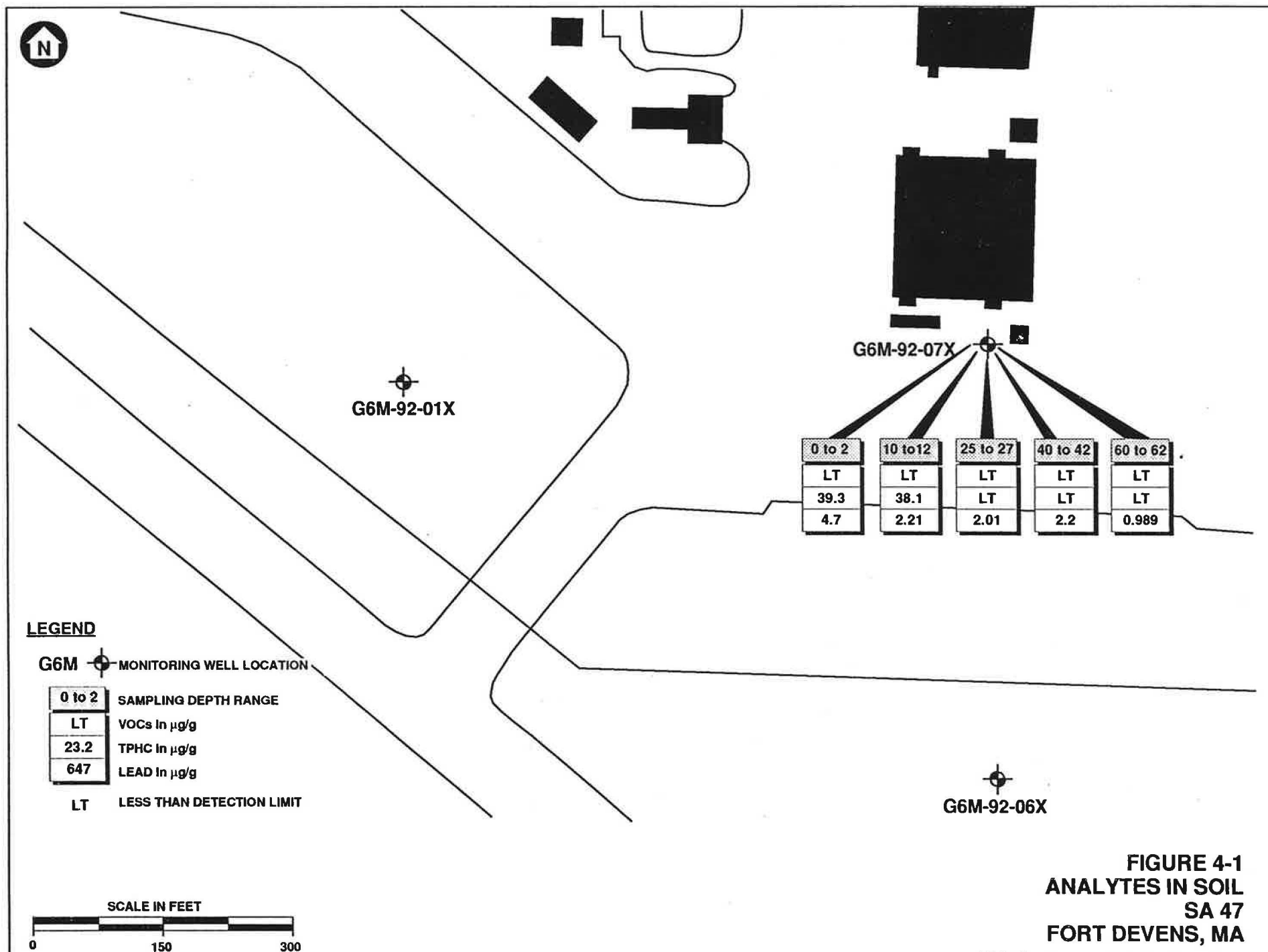
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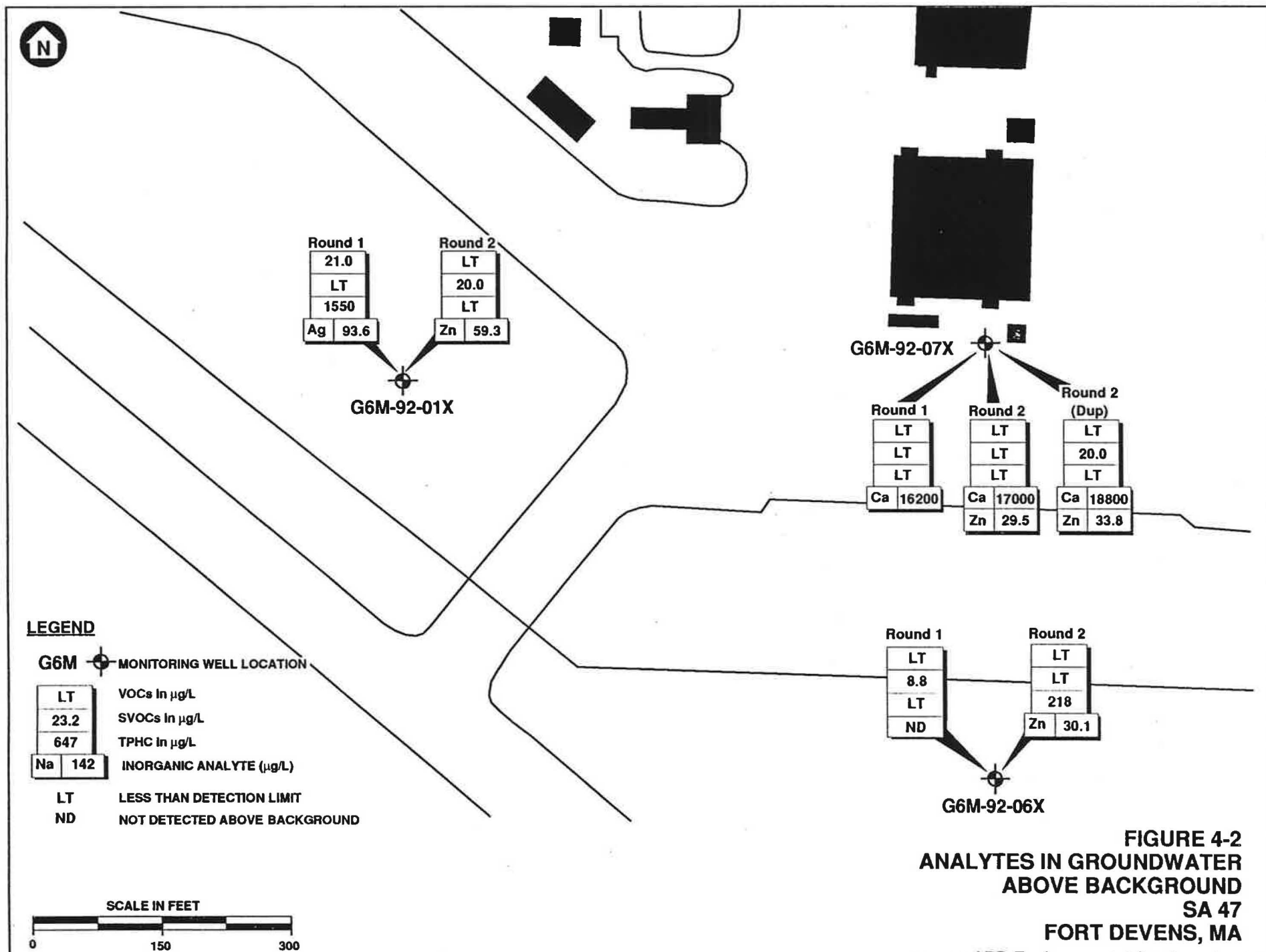
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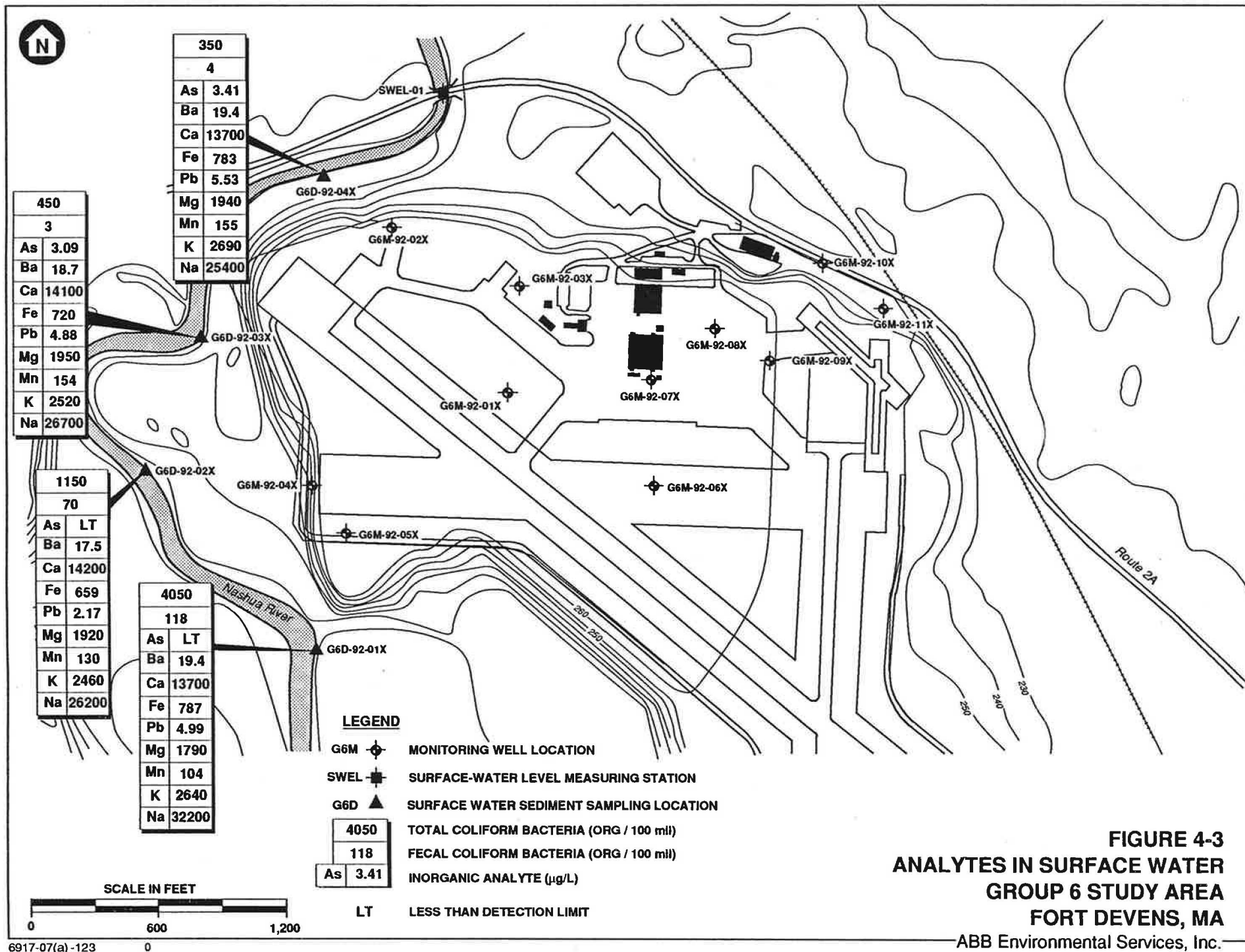




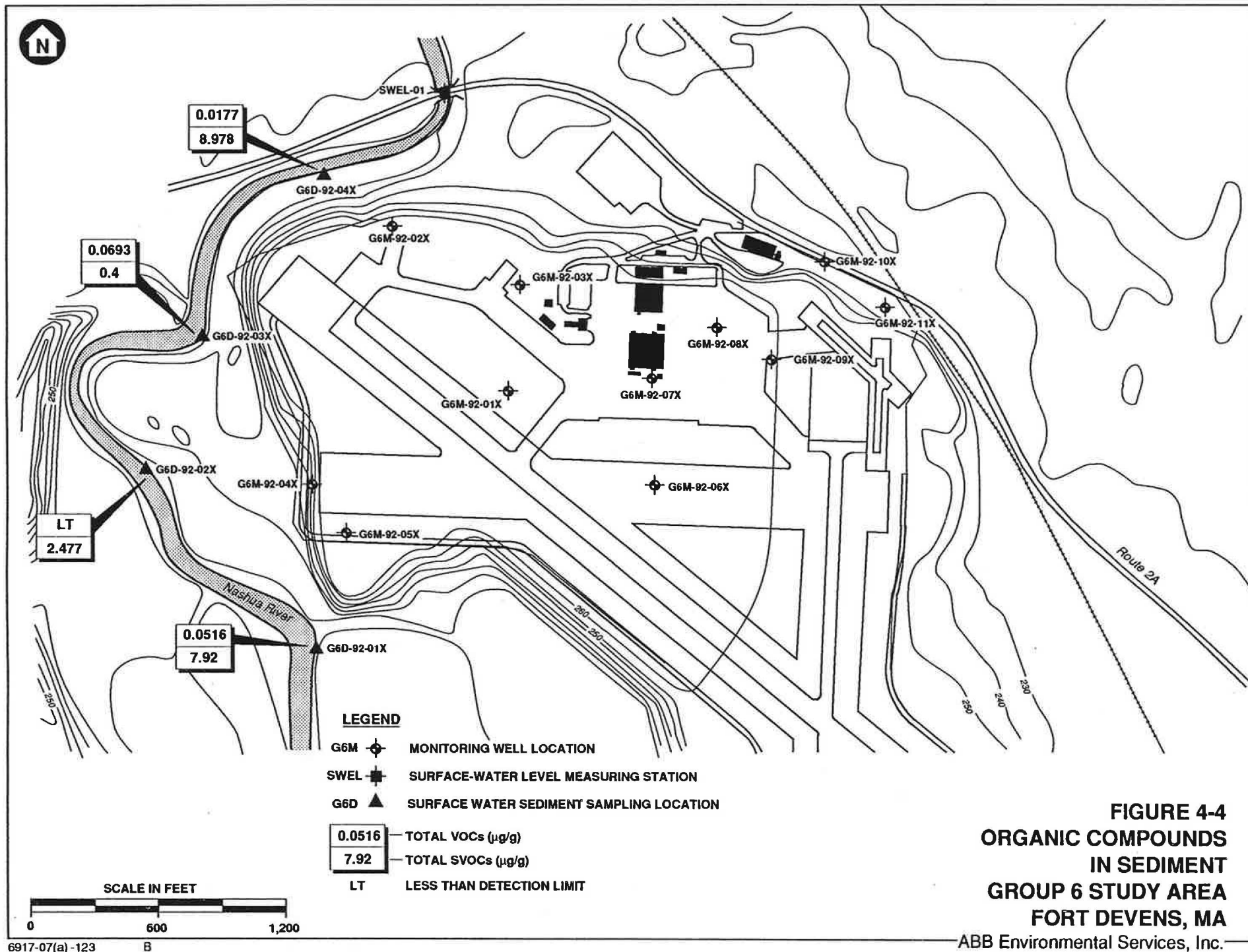


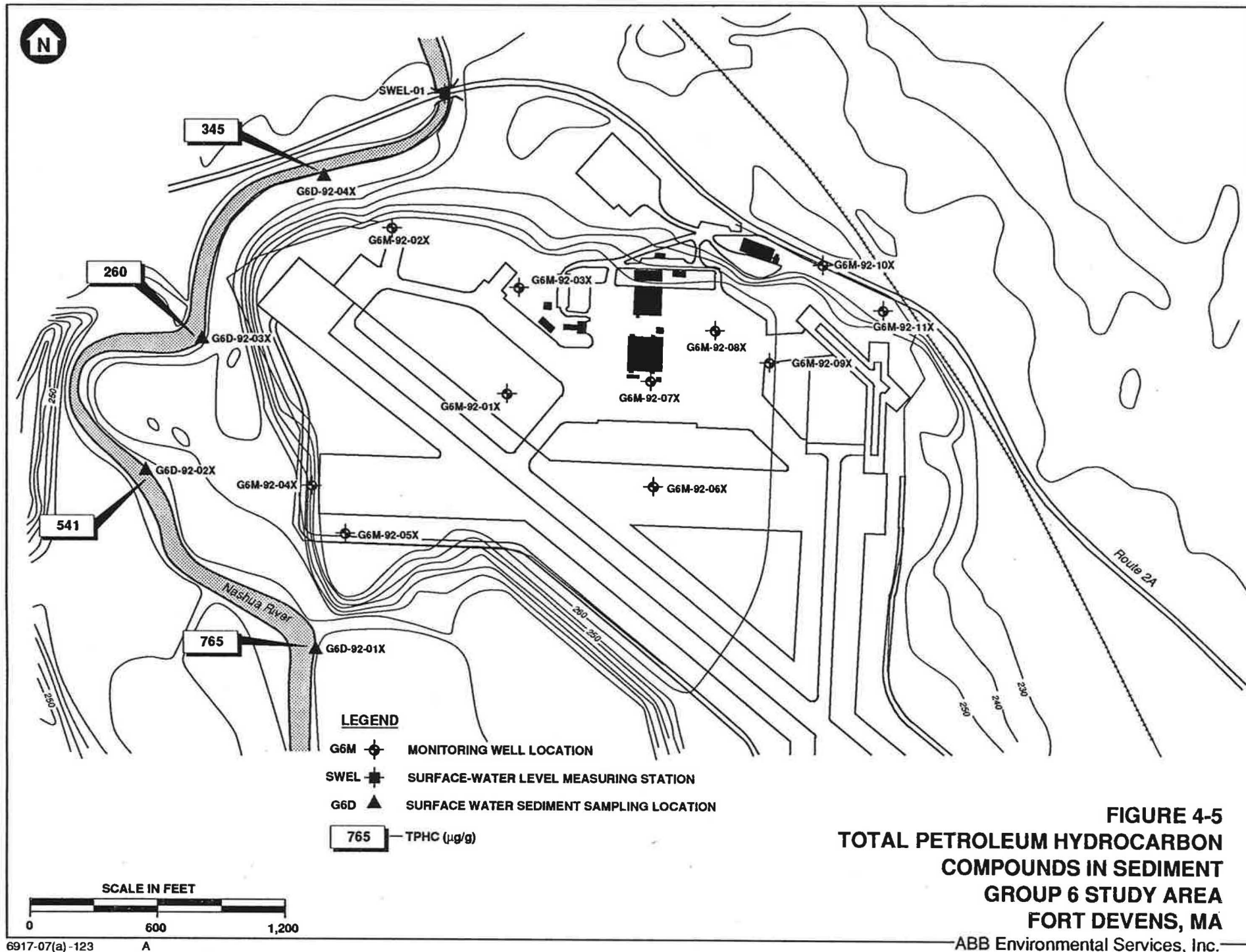
**FIGURE 4-2**  
**ANALYTES IN GROUNDWATER**  
**ABOVE BACKGROUND**  
**SA 47**  
**FORT DEVENS, MA**

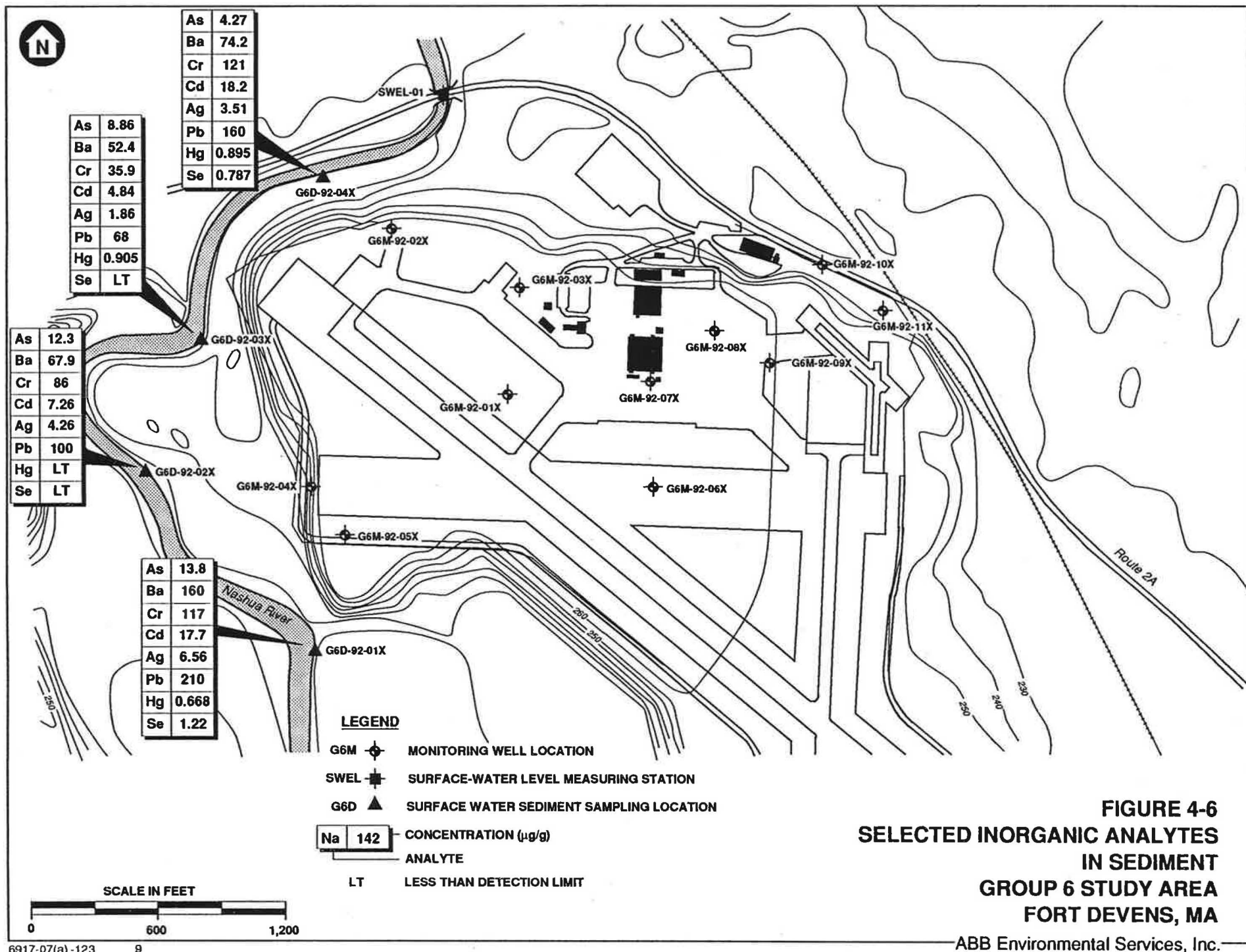
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**FIGURE 4-6**  
**SELECTED INORGANIC ANALYTES**  
**IN SEDIMENT**  
**GROUP 6 STUDY AREA**  
**FORT DEVENS, MA**

**TABLE 4-1**  
**ANALYTES IN SOIL**  
**G6M-92-07X**  
**DECISION DOCUMENT - STUDY AREA 47**  
**MOORE ARMY AIRFIELD UNDERGROUND STORAGE TANK SITE**  
**FORT DEVENS**

ANALYTE	SAMPLE DEPTH					
	BACKGROUND	0 ft	10 ft	25 ft	40 ft	60 ft
LEAD (ug/g)	48.4	4.70	2.21	2.01	2.20	0.989
VOCs (ug/g)		ND	ND	ND	ND	ND
OTHER	ug/g					
TOTAL PETROLEUM HYDROCARBONS		39.3	38.1	<27.9	<28.1	<27.7
TOTAL ORGANIC CARBON		NA	NA	NA	NA	134

NOTES: TABLE LISTS DETECTED ANALYTES ONLY IN ug/g  
 ND = NONE DETECTED  
 NA = NOT ANALYZED

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**TABLE 4-2**  
**ANALYTES IN GROUNDWATER**  
**G6M-92-01X, G6M-92-06X, AND G6M-92-07X**  
**DECISION DOCUMENT – STUDY AREA 47**  
**MOORE ARMY AIRFIELD UNDERGROUND STORAGE TANK SITE**  
**FORT DEVENS**

ANALYTE	BACK – GROUND	G6M-92-01X		G6M-92-06X		G6M-92-07X		
		ROUND 1	ROUND 2/3	ROUND 1	ROUND 2/3	ROUND 1	ROUND 2/3	ROUND 2/3 dup
ORGANICS (ug/L)								
ACETONE		21.0	<13.0	<13.0	<13.0	<13.0	<13.0	<13.0
BIS(2-ETHYLHEXYL)PHTHALATE		<4.80	20.0	8.80	<4.80	<4.80	<4.80	20.0
TPHC		1550	<192	<200	218	<200	<188	<184
INORGANICS (ug/L)								
ALUMINUM	6870	1290	387	<141	1460	<141	248	291
ARSENIC	10.5	<2.54	<2.54	<2.54	8.21	<2.54	<2.54	<2.54
BARIUM	39.6	14.9	6.82	<5.00	31.7	<5.00	16.2	<5.00
CALCIUM	14700	10400	7910	7240	8990	16200	17000	18800
CHROMIUM	14.7	11.8	<6.02	<6.02	9.88	<6.02	<6.02	<6.02
IRON	9100	1890	535	53.4	2320	132	393	451
LEAD	4.25	<1.26	<1.26	<1.26	4.01	<1.26	1.63	<1.26
MAGNESIUM	3480	1050	825	688	1030	1350	1410	1550
MANGANESE	291	66.8	22.5	7.64	102	9.80	15.6	16.7
POTASSIUM	2370	2340	2290	1210	1920	<375	1420	1510
SILVER	4.60	93.6	<4.60	<4.60	<4.60	<4.60	<4.60	<4.60
SODIUM	10800	4020	3230	5860	5000	5590	4410	5140
ZINC	21.1	<21.1	59.3	<21.1	30.1	<21.1	29.5	33.8
ANIONS/CATIONS (ug/L)								
BICARBONATE		<5000	6000	24400	22000	23200	24000	23000
CHLORIDE		<2120	<2120	<2120	<2120	4130	<2120	<2120
SULFATE		<10000	<10000	12100	11700	14100	13500	13300
NITRATE/NITRITE		7400	4400	850	990	5500	8000	7000
ALKALINITY		<5000	5000	20000	18000	19000	20000	19000
OTHER (ug/L)								
TSS		21000	245000	6000	21000	5000	15000	48000

TABLE LISTS DETECTED ANALYTES ONLY – SEE PROJECT ANALYTE LIST FOR SUMMARY  
CONCENTRATIONS WITHIN BOXES EXCEED BACKGROUND

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**TABLE 4-3**  
**ANALYTES IN GROUP 6 SURFACE WATER**  
**NASHUA RIVER**  
**DECISION DOCUMENT – STUDY AREA 47**  
**MOORE ARMY AIRFIELD UNDERGROUND STORAGE TANK SITE**  
**FORT DEVENS**

ANALYTE	G6D-92- 01X	G6D-92- 02X	G6D-92- 03X	G6D-92- 04X
<b>INORGANICS (ug/L)</b>				
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
<b>ANIONS/CATIONS (ug/L)</b>				
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
<b>OTHER (ug/L)</b>				
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 4-4**  
**ANALYTES IN GROUP 6 SEDIMENTS**  
**NASHUA RIVER**  
**DECISION DOCUMENT – STUDY AREA 47**  
**MOORE ARMY AIRFIELD UNDERGROUND STORAGE TANK SITE**  
**FORT DEVENS**

ANALYTE	G6D-92-01X	G6D-92-02X	G6D-92-03X	G6D-92-04X
<b>INORGANICS (ug/g)</b>				
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
<b>ORGANICS (ug/g)</b>				
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
<b>OTHER (ug/g)</b>				
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

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